Oracle® Warehouse Management

Implementation Guide

Release 12.2

Part No. E48828-02

November 2013

ORACLE

Oracle Warehouse Management Implementation Guide, Release 12.2

Part No. E48828-02

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Contents

Send Us Your Comments

Preface

1 Setting Up

Overview of Oracle Warehouse Management Setup 1-1
Setting Up a Warehouse Organization 1-4
Setting Up Subinventory Parameters 1-12
Setting Up Locator Parameters 1-14
Setting Up Locator Zones 1-19
Material Setup 1-25
Defining Shipping Parameters 1-25
Implementing Profile Options 1-25

2 Lot and Serial Control

Lot and Serial Attributes 2-1
Functional Business Flow Description 2-2
Types of Attributes 2-4
Attribute Functionality 2-6
Context Setup 2-10
Set Up Lot and Serial Attributes 2-11
Lot Transactions 2-17
Lot Split and Merge 2-18
Lot Splitting Features 2-18
Lot Merging Features 2-19
Lot Translate Features 2-19

Lot Genealogy 2-20
Lot Transaction Setup 2-20
Lot Split Merge and Translate Setup 2-20
Lot Genealogy Setup 2-21
Lot Transaction Examples 2-21
Lot Split 2-21
Lot Merge 2-22
Implementation 2-22
Common Problems 2-23
Frequently Asked Questions 2-24

3 Oracle Warehouse Management Rules Engine

System Rules Engine 3-1
Directed Picking and Putaway 3-2
Task Type Assignment 3-2
Cost Group Assignment 3-3
Label Format Assignment 3-3
Operation Plan Assignment 3-3
Crossdock Criteria 3-4
Rules Engine Methodology 3-4
Definitions 3-4
Execution for Rules with Strategies 3-6
Task Type, Label Format and Operation Plan Selection Rules 3-7
Top Down Approach 3-7
Grouping Similar Instances 3-8
Effective Dates 3-8
Implementation 3-8
Rules 3-9
Strategies 3-15
Rules Assignment 3-17
Implementation Considerations 3-19
Staging Lane Put away Rule 3-19
Manual Reservations 3-20
Performance 3-21
Lot and Serial Attributes 3-26
Performance Impact of Serial Attributes 3-26
Customization 3-27
Custom Expressions 3-27
Custom Rule Definition 3-31
Custom Selection Process 3-40

Custom Capacity Calculation 3-42
Maintenance 3-45
Rule and Strategy of Transaction 3-45
Rule Where Used 3-45
Simulation 3-46
Common Problems 3-46
Runtime Execution Trace 3-52
Debug Message from the Rules Engine 3-53
Frequently Asked Questions 3-53

4 Cost Groups

Cost Groups 4-1
Process Overview 4-2
Business Cases 4-3
Receiving Item of Different Grade to Same Zone 4-4
Setting Up Cost Groups 4-4
Implementation 4-5
Common Problems 4-6
Debugging Notes 4-7
Frequently Asked Questions 4-7

5 Advanced Task Framework

Overview 5-1
Advanced Task Framework Concepts 5-1
Framework 5-3
Receiving Locators 5-4
Putaway Rules 5-4
Operation Plan 5-4
Operation Plan Selection Rules 5-11
Advanced Task Framework Setup Considerations 5-11
Execution 5-12
Common Problems 5-13

6 Inbound Process

System Inbound Process Overview 6-1
Functional Business Flow Description 6-2
Functional Area 6-2
Receipts 6-3
Inspection 6-5
Putaway 6-6

Returns and Corrections..... 6-9
Crossdocking..... 6-11
Implementation..... 6-11
Receipt Routings..... 6-16
Receiving Other Items..... 6-18
Direct Receiving and Put Away Issues..... 6-18
Locator Capacity..... 6-19
QA Inspection..... 6-19
Shortages and Opportunistic Crossdocking..... 6-19
Special Rule Considerations..... 6-20
Lot and Serial Numbers..... 6-20
Receiving Tolerances..... 6-20
Matching Algorithm..... 6-21
Transaction Processing..... 6-21
Common Problems..... 6-21
Debugging Notes..... 6-26
Frequently Asked Questions..... 6-27

7 Crossdocking

Overview of Crossdocking 7-1
Crossdock Criteria..... 7-2
Crossdocking and Advanced Task Framework..... 7-3
Crossdocking and Consolidation..... 7-3
Implementation..... 7-3
Crossdocking Setup..... 7-4
Frequently Asked Questions..... 7-6

8 Label Printing Integration Kit

Label Printing Integration Kit..... 8-1
Implementing Label Printing..... 8-5
Label Printing Profile Options..... 8-6
Creating Printers..... 8-7
Assigning Printers 8-8
Defining Label Formats..... 8-8
Defining Label Formats with Multiple Records..... 8-8
Custom Label Fields..... 8-9
Assigning Label Types to Business Flows..... 8-10
Creating Label Format Rules..... 8-11
Completion of Setup..... 8-11
XML Formatting..... 8-11

XML DTD 8-11
Sample XML 8-12
Synchronous API Specification 8-12
Troubleshooting Label Printing 8-13
Common Label Printing Problems 8-14
Debugging Notes 8-18
Frequently Asked Questions 8-19
Summary 8-20

9 System Task Management

Overview 9-1
Functional Flow 9-2
Task Creation Process 9-3
System Task Type 9-6
Allocation 9-6
Pick Methodology 9-7
Paper Assisted Picking 9-8
Task Type Assignment 9-9
Task Split 9-9
Task Dispatch 9-10
Task Load 9-10
Task Drop 9-10
Defining Pick Methodologies 9-11
Labeling 9-12
Operation Plans 9-13
Task Planning 9-13
Warehouse Control Board 9-13
Task Management Setup 9-14
Implementation 9-16
Define Employees 9-18
Associate Employees to Users 9-18
Define Equipment Items 9-18
Define Equipment Instances 9-19
Define Resources 9-19
Define Departments 9-20
Define Task Types 9-20
Define Task Type Rules 9-20
Define Default Task Types 9-20
Transaction Reasons 9-21
Transaction Reason Functional Business Flow Description 9-21

Setup Example ... 9-22
Testing the Transaction Reason Workflow ... 9-23
Operation ... 9-23
Picking Process ... 9-24
Task Menu ... 9-24
Task Exceptions ... 9-29
License Plate Matching ... 9-29
Pick to LPN (Transfer / Into LPN) ... 9-32
Drop LPN ... 9-33
LPN Contexts ... 9-33
Warehouse Control Board ... 9-34
Common Problems ... 9-34
Frequently Asked Questions ... 9-39
Debugging Tools ... 9-43
Debugging Notes ... 9-43
Customization ... 9-44
Task Type Rules ... 9-45

10 Counting

Overview of Cycle Counting ... 10-1
Functional Business Flow Description ... 10-2
Cycle Count Functionality ... 10-3
Cycle Counting Setup ... 10-9
Setting Up Opportunistic Cycle Counting ... 10-11
LPN Related Counts ... 10-13
LPN Discrepancies ... 10-15
Serial Counts ... 10-16
Overview of Physical Inventory ... 10-17
Physical Inventory Functional/Business Flow Description ... 10-17
LPN Related Physical Inventory Counts ... 10-18
Common Problems ... 10-19
Debugging Notes ... 10-20
Frequently Asked Questions ... 10-21

11 Warehouse Management Transactions

Mobile Inventory Transactions ... 11-1
Supported Transactions ... 11-1
LPN Transactions ... 11-2
Transaction Features ... 11-4
LPN Controlled Subinventory ... 11-5

Form Function Parameters 11-5
Transaction Processing Mode 11-8
Customizing Hot Keys and Prompts 11-8
Transaction Manager Stub 11-12
Common Problems 11-13
Debugging 11-14
Frequently Asked Questions 11-15

12 Cartonization

Warehouse Management Cartonization 12-1
Cartonization Process 12-3
Setting up Cartonization 12-8
Categories 12-8
Contained Items 12-9
Container Items 12-10
Subinventory and Organization Setup 12-12
Cartonization Setup Steps 12-12
LPN Controlled and Cartonization Enabled 12-24
Bulk Pack API 12-25
Packing Workbench 12-25
Common Problems 12-29
Debugging Notes 12-30
Category Assignments 12-31
Bulk Pack Verification 12-32
Frequently Asked Questions 12-33

13 Dock Management

Functional/Business Flow Description 13-1
Setup 13-1
Dock Scheduling and Trip Planning 13-2
Implementation 13-3
Dock Scheduling and trip planning 13-4

14 Warehouse Management Picking for Manufacturing

Overview 14-1
Manufacturing Picking 14-2
Pick Release Process 14-2
Supply Types 14-3
Allocation Rules 14-4
Task Type Rules 14-4

Loading Tasks..... 14-4
Dropping Tasks..... 14-5
Pick Methodologies..... 14-5
Job Cancellation..... 14-5
Change Management..... 14-6
Manual Material Issue..... 14-6
Unloading Tasks..... 14-7
Backordered Requirement..... 14-7
Crossdock Support..... 14-7
Paper Assisted Picking..... 14-8
Label Printing..... 14-8
Updating Allocation..... 14-8
Updating Tasks..... 14-8
Retain Dispatched Tasks..... 14-8
Prioritize Dispatched Tasks..... 14-9
Implementation..... 14-9
Pull Requirements..... 14-9
Supply Subinventory..... 14-10
Allocation Rules..... 14-11
Task Setup..... 14-11
Pick Methodologies..... 14-12
Crossdocking..... 14-12
Common Problems..... 14-13
Frequently Asked Questions..... 14-16

15 Logistics Service Provider (LSP) Management in Oracle Warehouse Management

Overview of LSP Management 15-1
Features of Logistics Service Providers Management..... 15-2
Understanding the LSP Management Process Flow..... 15-2
Setting Up LSP Management Services 15-7
Defining Client Parameters 15-8
Setting Up LSP Billing..... 15-13

16 Distributed Warehouse Management System

Overview of the Distributed Warehouse Management System..... 16-1

17 Warehouse Management Shipping Transactions

Overview of Shipping Transactions..... 17-1
Definitions..... 17-2

Shipment Confirmation 17-3
Shipment Types 17-3
Dock Door Ship 17-5
Direct Ship 17-8
Shipping Process Flow 17-9
Verification Mode 17-10
Setting Up Windows 17-10
Advanced Catch Weight Entry 17-11
Setting Up the Advanced Catch Weight Feature 17-12
Assign Re-pricing Workflow to Order Type 17-16
Transaction Processing Modes 17-17
Scale Integration for Weight 17-18
Common Problems 17-18
Debugging Notes 17-20
Trip Verification 17-21
All staged LPNs 17-21
View Loaded LPNs 17-22
Frequently Asked Questions 17-23

18 Directed Put Away on WIP Completion

Overview 18-1
Supported Features 18-2
Prepack Request 18-5
Completion Using Prepacked LPNs 18-6
Generating New LPNs at Completion 18-6
Setting Up Completion Windows 18-6
Setting Up Putaway Windows 18-7
Common Problems 18-8
Frequently Asked Questions 18-9

19 Warehouse Management-Project Manufacturing Integration

Overview 19-1
Implementation Setup 19-2
Organization Setup 19-2
Subinventories and Locators 19-4
Inbound Logistics 19-6
Cross Docking 19-7
Outbound Logistics 19-7
Shipping 19-11
Manufacturing 19-12

Transactions 19-13
LPN transactions: Commingling 19-18
Cost Groups Overview 19-19
Common Problems 19-19
Frequently Asked Questions 19-20
Debugging Tips 19-20

20 Labor Management

Overview of Labor Management 20-1
Labor Management Prerequisites 20-2
Labor Management Setup 20-3
Setting Up Labor Management Parameters 20-5
Managing Non-Tracked Users 20-7
Defining Labor Standards 20-7
Implementation Considerations 20-10
Troubleshooting 20-11

21 Mobile Personalization

Overview 21-1
Personalization Framework Architecture 21-2
Personalizing Mobile Pages 21-2

22 Using Bar Code Standards with Oracle Mobile Applications

Overview 22-1
Out of Order Scanning 22-2
Oracle Mobile Applications DFI Flow 22-3
Necessary Elements for DFI Support 22-4
Setup for DFI Support 22-4
Navigating the AK Dictionary 22-6
Entering the DFI String 22-6
Seeded Data Field Identifiers 22-7
Customized Bar Code Scanning 22-10
Data Field Identifier String Setup for UCC/EAN-128 Application Identifiers 22-11
Sample Java Code 22-14

23 Oracle EDI Inbound ASN Enhancement for Warehouse Management

Overview 23-1
License Plate Data (Line Detail) 23-2
ASNI Record Hierarchy 23-4

Necessary e-Commerce Gateway Setup Steps for Warehouse Management Enhancement 23-5
Seed Date Reconciliation 23-5
EDI Import Process 23-6
Interface Table Definition 23-7
Process Trace 23-9
Troubleshooting Tips 23-9

24 Material Handling Device Integration

Overview 24-1
Functional Process Overview 24-3
Defining Devices 24-4
Assigning Devices to Business Events 24-5
Device Sign On 24-7
Response Messages 24-8
Carousel Bridge 24-8
PL/SQL API Specification 24-10
Table Structure 24-11
Device Response API Support 24-13
PL/SQL Specification 24-13
Process Flow for Calling the Device Response API 24-14
API Exceptions 24-15
Using the Device History Window to Simulate API Responses 24-16
Debug Mode 24-17
Debugging Notes 24-18
Frequently Asked Questions 24-19

25 RFID Implementation

Overview 25-1
Definitions 25-2
RFID Platform Architecture 25-2
Functional Process 25-2
Setting Up RFID 25-3
Business Flow Description 25-5
Automating the Outbound Process 25-6
Inbound Process 25-7
Debugging Tips 25-9
Frequently Asked Questions 25-10

26 Performance

Introduction 26-1
Overview 26-1
Security 26-3
Warehouse Management Architecture 26-3
Warehouse Management Availability 26-3
System Failures 26-3
Data Failures 26-4
Human Error 26-4
Planned Downtime 26-5
RF Network Availability 26-5
Printer Availability 26-5
Effect Of Failures On Warehouse Management Availability 26-5
Configuration and Control Functions 26-6
Warehouse Operator Functions 26-6
Performance 26-7
MWA Application Server 26-7
Wide Area Network 26-8
Network Traffic 26-8
Character vs. Block Mode 26-9
Network Traffic Priority 26-12
Network Performance Summary 26-12
Summary 26-12

27 Global Trade Item Numbers

Overview 27-1
Advantages of Global Trade Item Numbers 27-2
Global Trade Item Number Data Structures 27-3
Modeling of GTIN in Warehouse Management 27-4
Global Trade Item Number Configuration 27-6
Transactions Involving Global Trade Item Numbers 27-6
Label Printing and GTIN 27-7
Frequently Asked Questions 27-8

A Label Type Fields

Label Type Fields A-1

B Rules Engine

Date Types.... B-1
Objects.... B-2
Selected Parameters.... B-10
Seeded Rules.... B-19
Seeded Strategies.... B-23

C Task Management

Overview.... C-1
Business Example.... C-1
Worksheet.... C-1

D LPN Contexts

LPN Contexts.... D-1
Definitions of Context Values.... D-2

E Warehouse Management Case Study

Overview.... E-1
Application Landscape.... E-2
Product Profile.... E-2
Customer Profile.... E-3
Vendor Profile.... E-3
Inbound Process.... E-3
Outbound Process.... E-4
Retail Picking:.... E-4
New Store Orders:.... E-5
International Orders:.... E-5
Online Customers:.... E-5
Super Markets and Hotels:.... E-6
Replenishment.... E-6
Accuracy and Counting.... E-6
Major Challenges.... E-6
Facility Map.... E-7
Sample As-Is Process Maps E-8
Using Warehouse Management in Conjunction with Business Process Re-engineering to Address Current Challenges.... E-13
Maintaining Information.... E-14
Inventory Accuracy.... E-14

Inventory Obsolescence..... E-14
Space Utilization..... E-15
Personnel..... E-15
Mis-Shipments..... E-15
Best-of-Breed Attempted Implementation..... E-16
Sample Warehouse to be Process Maps E-16

F Migrating to Oracle Warehouse Management

Overview..... F-1
Migrating to LPNs..... F-1
Migrating to Material Statuses..... F-2
Migrating to Cost Groups..... F-2
Migrating to Locator Control..... F-3
Migrating to Setting Up Item Dimension and Locator Capacities..... F-3
Migrating to Lot & Serial Attributes..... F-4
Migrating to Rules Engine..... F-5

G Form Function Parameters

Form Function Parameters Overview..... G-1

Index

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Oracle Warehouse Management Implementation Guide, Release 12.2

Part No. E48828-02

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Preface

Intended Audience

Welcome to Release 12.2 of the *Oracle Warehouse Management Implementation Guide.*

See Related Information Sources on page xx for more Oracle E-Business Suite product information.

Documentation Accessibility

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Structure

1 Setting Up
2 Lot and Serial Control
3 Oracle Warehouse Management Rules Engine
4 Cost Groups
5 Advanced Task Framework
6 Inbound Process
7 Crossdocking
8 Label Printing Integration Kit
9 System Task Management
10 Counting
11 Warehouse Management Transactions

12 Cartonization
13 Dock Management
14 Warehouse Management Picking for Manufacturing
15 Logistics Service Provider (LSP) Management in Oracle Warehouse Management
16 Distributed Warehouse Management System
17 Warehouse Management Shipping Transactions
18 Directed Put Away on WIP Completion
19 Warehouse Management-Project Manufacturing Integration
20 Labor Management
21 Mobile Personalization
22 Using Bar Code Standards with Oracle Mobile Applications
23 Oracle EDI Inbound ASN Enhancement for Warehouse Management
24 Material Handling Device Integration
25 RFID Implementation
26 Oracle Warehouse Management Planning for High Availability and Performance
27 Global Trade Item Numbers
A Label Type Fields
B Rules Engine
C Task Management
D LPN Contexts
E Warehouse Management Case Study
F Migrating to Oracle Warehouse Management
G Form Function Parameters

Related Information Sources

Integration Repository

The Oracle Integration Repository is a compilation of information about the service endpoints exposed by the Oracle E-Business Suite of applications. It provides a complete catalog of Oracle E-Business Suite's business service interfaces. The tool lets users easily discover and deploy the appropriate business service interface for integration with any system, application, or business partner.

The Oracle Integration Repository is shipped as part of the E-Business Suite. As your instance is patched, the repository is automatically updated with content appropriate for the precise revisions of interfaces in your environment.

You can navigate to the Oracle Integration Repository through Oracle E-Business Suite Integrated SOA Gateway.

Oracle Inventory User's Guide

The *Oracle Inventory User's Guide* contains information about using and setting up Oracle Inventory.

Oracle Warehouse Management User's Guide

The *Oracle Warehouse Management User's Guide* contains information about using Oracle Warehouse Management.

Do Not Use Database Tools to Modify Oracle E-Business Suite Data

Oracle STRONGLY RECOMMENDS that you never use SQL*Plus, Oracle Data Browser, database triggers, or any other tool to modify Oracle E-Business Suite data unless otherwise instructed.

Oracle provides powerful tools you can use to create, store, change, retrieve, and maintain information in an Oracle database. But if you use Oracle tools such as SQL*Plus to modify Oracle E-Business Suite data, you risk destroying the integrity of your data and you lose the ability to audit changes to your data.

Because Oracle E-Business Suite tables are interrelated, any change you make using an Oracle E-Business Suite form can update many tables at once. But when you modify Oracle E-Business Suite data using anything other than Oracle E-Business Suite, you may change a row in one table without making corresponding changes in related tables. If your tables get out of synchronization with each other, you risk retrieving erroneous information and you risk unpredictable results throughout Oracle E-Business Suite.

When you use Oracle E-Business Suite to modify your data, Oracle E-Business Suite automatically checks that your changes are valid. Oracle E-Business Suite also keeps track of who changes information. If you enter information into database tables using database tools, you may store invalid information. You also lose the ability to track who has changed your information because SQL*Plus and other database tools do not keep a record of changes.

1

Setting Up

This chapter covers the following topics:

- Overview of Oracle Warehouse Management Setup
- Setting Up a Warehouse Organization
- Setting Up Subinventory Parameters
- Setting Up Locator Parameters
- Setting Up Locator Zones
- Material Setup
- Defining Shipping Parameters
- Implementing Profile Options

Overview of Oracle Warehouse Management Setup

> **Note:** Oracle Warehouse Management System setup assumes that you have knowledge of Oracle Inventory, Oracle Bills of Material, Oracle Receiving, Oracle Order Management, Oracle Shipping, and Oracle Project Manufacturing.

This section provides an overview of the setup requirements for Oracle Warehouse Management system (WMS). For instructions, see the detailed setup instructions that are associated with each step.

Setting up Oracle WMS includes setting up related Oracle applications, such as Oracle Inventory and Oracle Bills of Material. Therefore, you might only need to make WMS modifications specific to existing data, like existing items. Check with your implementation team to determine which setup requirements have already been fulfilled.

Oracle Warehouse Management system requires that Oracle Inventory, Oracle Purchasing (Receiving), and Oracle Order Management (Shipping) are installed and set

up.

Set up Oracle Inventory as described in Overview of Setting Up., *Inventory User's Guide*

Set up Oracle Bills of Material as described in, Overview of Setting Up, *Oracle Bill of Material User's Guide*

Set up Oracle Purchasing as described in Overview of Setting Up, *Oracle Purchasing User's Guide*.

Set up Oracle Cost Management as described in Overview of Setting Up, *Oracle Cost Management User's Guide*

Set up Oracle Quality as described in Overview of Setting Up, *Oracle Quality User's Guide*

Warehouse Setup

Warehouse configuration requires that you set up your warehouse as an inventory organization, and then select parameters that identify the organization as a warehouse. Warehouse configuration also includes defining the appropriate subinventories to represent the zones within your warehouse, as well as defining appropriate locators, and assigning dock doors to their related staging lanes.

> **Note:** When you set up your organization parameters, you should specify a default cost group. Therefore, you should set up the default cost group before setting up the organization.

The following list provides the attributes in Oracle Inventory that you set up for warehouse related organizations:

- Organization parameters
  - WMS enabled check box
  - Default cost group
  - Serial control generation
  - License Plate Number (LPN) information
  - Capacity weight and volume unit of measures
  - Crossdocking information
  - Time zone
  - Default cycle count header
  - Default picking rule

    - Default put away rule
    - Cartonization option
    - Default pick task type
    - Default replenishment task type
    - Default move order transfer task type
    - Default move order issue task type
    - Putaway tasks
    - Maximum clusters
    - Outbound consolidation plan
- Subinventory attributes
    - Subinventory status
    - Default cost group
    - Cartonization option
    - LPN controlled option
    - Locator controlled option
    - Default locator status
    - Picking unit of measure (UOM)
    - Picking order (functionality change)
- Locator attributes
    - Locator type
    - Locator status
    - Locator capacity
    - Pick UOM associated with the locator
    - Locator dimensions (length, width, and height)

    - Locator coordinates (X, Y, and Z)

- Dock door to staging lane relationships

To set up a warehouse, set up an inventory organization and make modifications as described in the following instructions. For specific instructions on setting up organizations, see: Defining Default Inventory Parameters, *Oracle Inventory User's Guide* .

Setting Up a Warehouse Organization

The following section describes the process for setting up a warehouse organization.

1. Set up the warehouse organization (Organization window).
2. Set up the inventory parameters (Organization Parameters window).
3. Set up the other account parameters (Organization Parameters window).
4. Set up the warehouse parameters (Organization Parameters window).
5. Set up the warehouse task management parameters (Organization Parameters window).

To set up the warehouse organization:

1. Navigate to the Organization window.
2. Set up your warehouse organization in the same way in which you set up a standard inventory organization. In the Organization window, make sure to specify an organization classification of Inventory Organization.
3. After you set up standard organization information, save your work, and then navigate to the Organization Parameters window. For more information about setting organization parameters see: Defining Default Inventory Parameters, *Oracle Inventory User's Guide*

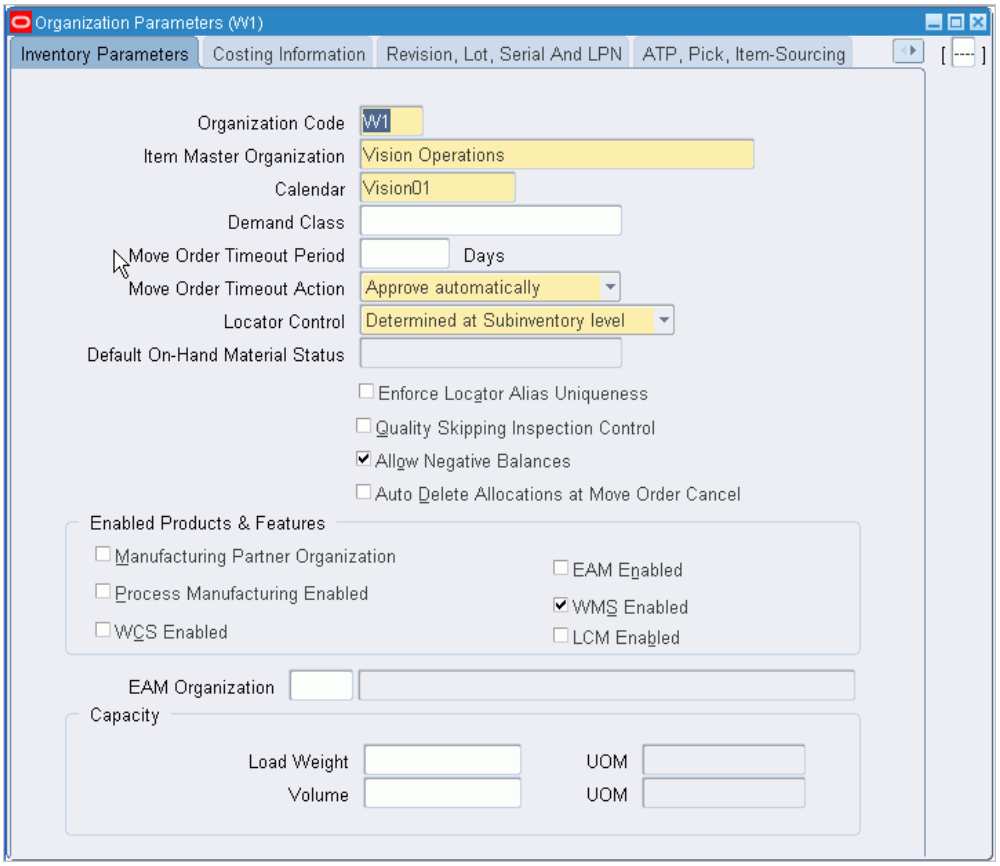
To set up the inventory parameters (Organization Parameters window):

1. In addition to specifying the standard organization parameters, set up the following parameters for the Warehouse organization:
2. Select the WMS Enabled check box to specify this organization as a warehouse management organization.

   Subinventories in a Oracle Warehouse Management enabled organization must be locator controlled even if only one locator exists in each subinventory. You must

make all subinventories in your organization locator controlled before you can set the WMS Enabled flag in the Organization Parameters window for a preexisting, organization.

Because every item in a subinventory for organizations that do not have Oracle Warehouse Management enabled must have the same cost group, you cannot switch Oracle Warehouse Management enabled organizations with on-hand balances to a standard inventory organization without significant effort. Consequently, do not select the WMS Enabled parameter, until you decide to implement Oracle Warehouse Management methodologies in the organization.



- If you specify an organization as warehouse management enabled, you can use LPNs, task management, cost groups, rules, and other warehouse management functionality in this organization. If the organization is not warehouse management enabled, but you licensed and installed Oracle Warehouse Management, as a product, you can use material status, lot and serial attributes, and lot split and merge.

- In an existing standard cost organization, do not enable

warehouse management for the organization if transactions exist in a current open period. If you want to enable Oracle Warehouse Management for the organization, wait until the end of the current period, close the period, and enable Oracle Warehouse Management for the organization before transactions are posted for the new period.

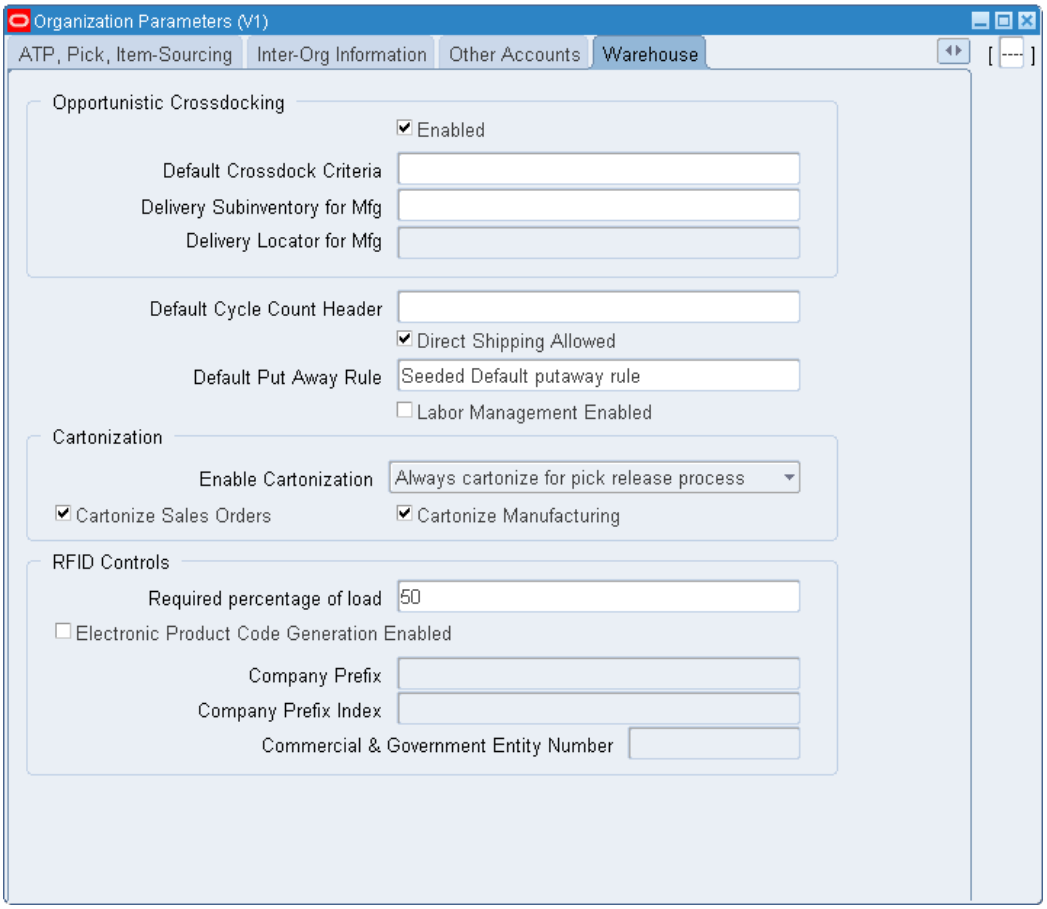
3. Select WCS Enabled to enable the Warehouse Control System. The Warehouse Control System provides a bridge between Oracle Warehouse Management and the control level for device automation and configuration as well as coordination of Oracle Warehouse Management directed task execution.

To set up the other account parameters (Organization Parameters window):

On the Other Accounts tab, select the default receiving accounts, profit and loss accounts, and other accounts (such as the additional account for catch weight transactions).

For more information, see *Oracle Inventory User's Guide*, Defining Other Accounts Parameters.

To set up warehouse parameters (Organization Parameters window):



1. Select the Enabled check box in the Opportunistic Crossdocking region to indicate whether you want the system to direct the user to crossdock material to meet demand from a backordered order. If you select this check box, then you can create a default crossdocking rule for opportunistic crossdocking.

2. Enter a default crossdock criteria rule. This is the default opportunistic crossdock criteria for the organization. To use opportunistic crossdocking, you must set up valid opportunistic crossdock criteria. If you do not set up criteria in the rules workbench, and you do not define default criteria for the organization, opportunistic crossdocking does not function. For more information about crossdock criteria, see Crossdocking Criteria, page 7-2

3. Enter a Delivery Subinventory for Mfg and a Delivery Locator for Mfg if you enabled crossdocking for the organization. Though the system transfers crossdocked directly from receiving to WIP, it must record a purchase order receipt and WIP issue transaction for costing and other technical reasons. The subinventory and locator you enter here are where the system posts the transaction.

4. Optionally, enter the Default Cycle Count Header that is used to request cycle counts.

5. Select the Direct Shipping Allowed check box to allow direct shipping for the organization.

6. Select the appropriate put away rule. If the system cannot find a matching rule or strategy in the Rules Workbench, the system uses this rule to allocate space or materials.

7. Select the Labor Management Enabled check box to enable labor management reporting for the organization.

8. Select the Enforce Locator Alias Uniqueness check box to require that locator names be unique across subinventories within the organization.

9. In the Enable Cartonization field, select the default option to control cartonization during pick release or task release. (The cartonization process suggests the type of container to use during picking.) Select from the following options:

   - Always cartonize for pick release process: The system cartonizes pick released lines regardless from which inventory they were allocated.
   - Never cartonize: The system does not cartonize pick released lines.
   - Cartonize for pick release process at subinventory level: The system first evaluates the cartonization check box on the subinventory definition before cartonizing pick released lines.
   - Always cartonize for task release process.
   - Cartonize for task release process at subinventory level.

   For information on how the task release options affect the task release process, see the *Oracle Warehouse Management User's Guide*, Setting Up Task Release Options, and Launch Task Release Concurrent Request.

10. Indicate whether cartonization is performed during sales order pick release or manufacturing component pick release. The system can use different pick methodologies for these different business flows.

    Important: The concurrent program Launch Task Release does not support manufacturing (MFG) tasks releasing. It only supports the releases for outbound tasks.

11. In the RFID Controls region, enter the minimum percentage required for a complete LPN in the Required percentage of load field.

12. Select the Electronic Product Code Generation Enabled check box to enable electronic product code (EPC) for outbound documents.

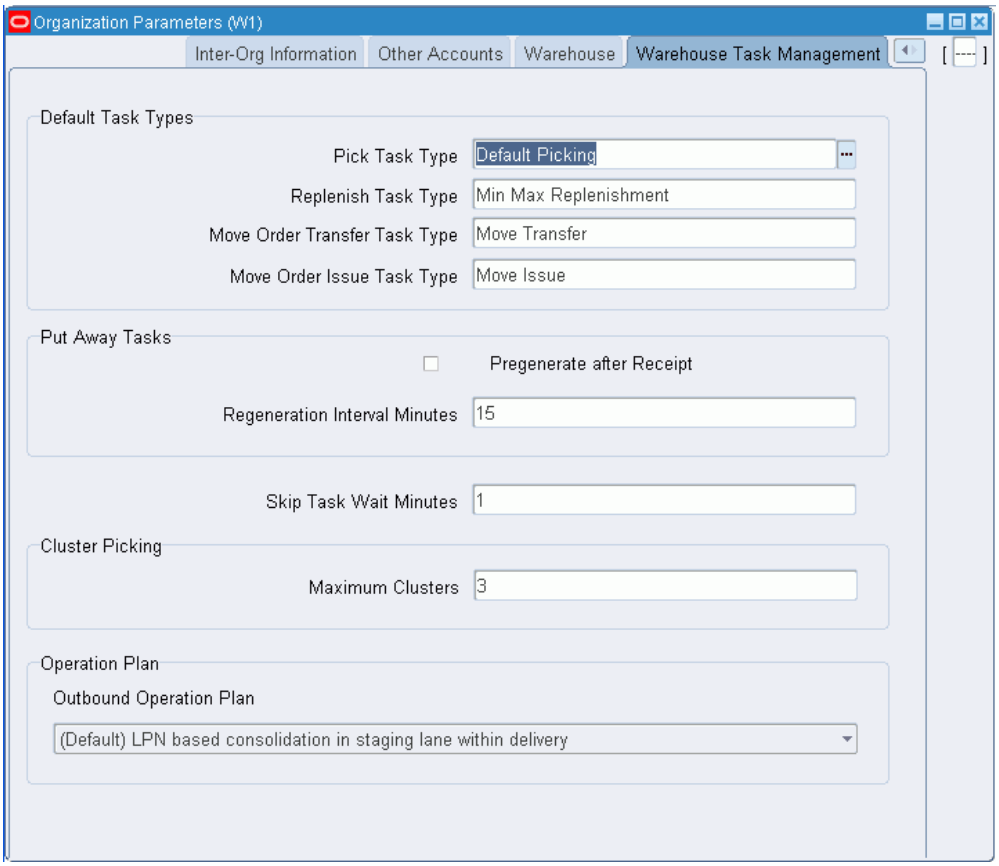
13. Enter the company prefix. This field identifies the company prefix for EPC generation in 96 bit tags. This field is enabled only if you enable Electronic Product Code Generation Enabled.

14. Enter the company prefix index. This field identifies the company prefix for EPG generation in 64 bit tags. This field is enabled only if you enable Electronic Product Code Generation Enabled.

15. Enter the Commercial & Government Entity Number (CAGE). This field identifies the company CAGE number for RFID tag generation for Department of Defense (DoD) specification. This field is enabled only if you enable Electronic Product Code Generation Enabled.

Set up the warehouse task management parameters (Organization Parameters window):

1. On the Warehouse Task Management tab, in the Pick Task Type and Replenish Task Type, specify default picking and replenishment task types that are required for your warehouse. If no task type rule with the right system task type and all restrictions being met can be found, then this task type will be used for the task.



2. In the Move Order Transfer Task Type and Move Order Issue Task Type fields, specify the default move order transfer and move order issue task types. If no task type rule with the right system task type and all restrictions being met can be found, then this task type will be used for the task.

3. In the Put Away Tasks region, select the Pregenerate after Receipt check box to specify whether the system should allocate space for the material when items are initially received.

   Important: The Pregenerate after Receipt check box must be selected for the Inbound Inspection operation plan to function correctly.

4. If you do not select the Pregenerate after Receipt check box, the system will allocate space only after the user initiates the put away process.

5. With a value in the Regeneration Interval Minutes field, if you elected to pre generate put away tasks, these tasks/suggestions will get regenerated if the elapsed time between initial pre generation and actual put away exceeds the value given in

the Regeneration Interval Minutes field. This is done so the suggested storage locations can be updated based on the latest space availability estimates.

6. Enter a value for Skip Task Wait Minutes. This is the number of minutes that a task skipped by a user will be held by the system before it is returned to the pool of pending tasks to be dispatched again.

7. In the Cluster Picking region, enter the maximum clusters for cluster picking. This is an optional field. Mobile users will see this as the default value in the Max Clusters field in the Cluster Picking mobile screen.

8. In the Consolidation region, enter the outbound consolidation plan. The outbound consolidation plan has three options:

   - LPN

     If LPN based consolidation is selected, all picked material that has to be consolidated together are directed to be dropped into the same License Plate Number.

     LPN based consolidation is the default option and ensures current system behavior is retained for existing customers who want to continue operating their facility as-is.

   - Locator

     If Locator based consolidation is selected, picked material is consolidated into locators.

   - Locator and LPN

     If Locator and LPN based consolidation is selected, picked material is consolidated into locators. In addition, consolidation LPN suggestions within the consolidation locator are provided.

9. Save your work.

Related Topics

Defining Costing Information, *Oracle Inventory User's Guide*

Defining Revision, Lot, Serial, LPN Parameters, *Oracle Inventory User's Guide*

Defining ATP, Pick, Item-Sourcing Parameters, *Oracle Inventory User's Guide*

Defining Inter-Organization Information, *Oracle Inventory User's Guide*

Defining Other Account Parameters, *Oracle Inventory User's Guide*

Defining Valuation and Other Accounts, *Oracle Inventory User's Guide*

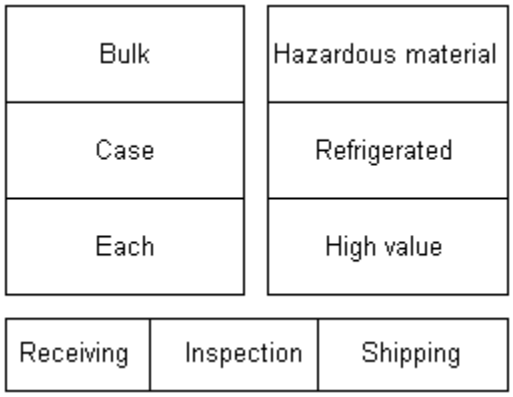
Defining Inter-Organization Transfer Accounts, *Oracle Inventory User's Guide*

Setting Up Subinventory Parameters

In Oracle Warehouse Management, the subinventory represents the physical zones of a warehouse or facility.

You need to define at least one subinventory for each warehouse organization. The following figure illustrates subinventories that you might define for a warehouse.

Warehouse Zones



> **Note:** Unlike Oracle Inventory, for warehouse subinventories, you do not need to set up or associate any accounts with the subinventory.

Oracle Warehouse Management extends the subinventory definition with the following additional parameters:

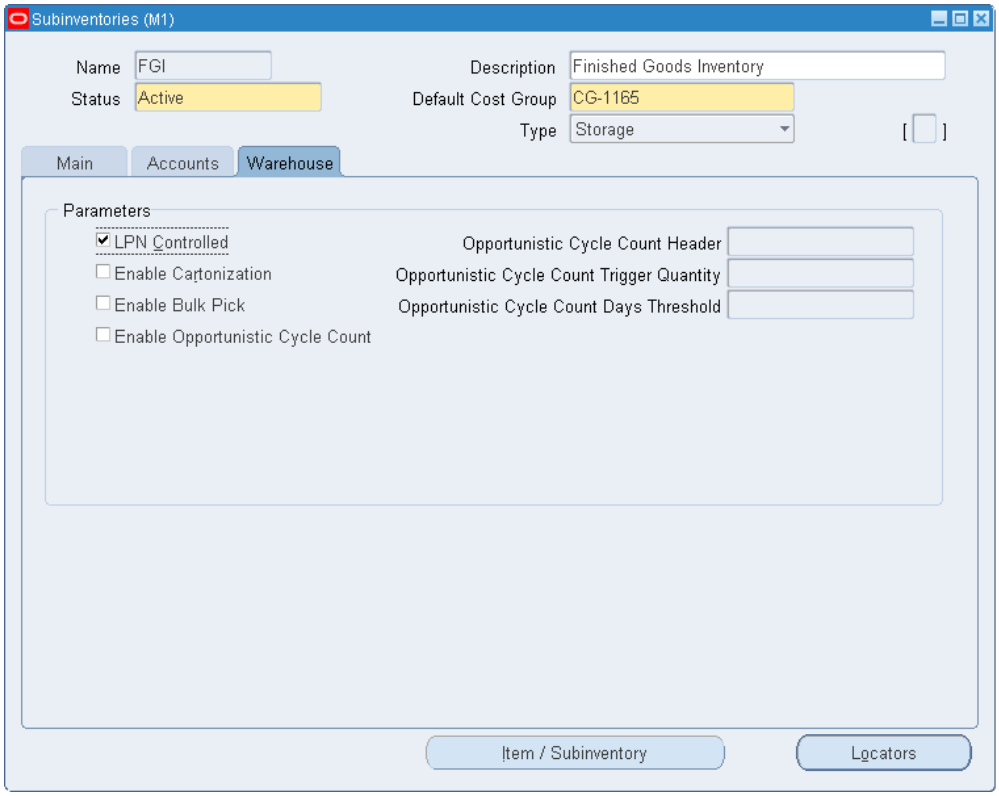
- Material status
- Default cost group
- LPN controlled option
- Cartonization flag
- Pick UOM
- Picking order
- Dropping order
- Default locator status

To define warehouse parameters (Warehouse tab):

The Warehouse tab on the Subinventories window is available only if Oracle Warehouse Management (WMS) is installed and enabled for your organization. (WMS is enabled when the WMS Enabled check box is selected in the Organization Parameters window.)

1. Navigate to the Subinventories window.

2. Select the Warehouse tab.



3. Enter the desired values:

Field	Description
LPN Controlled	Select this option to enable LPN controlled material in the subinventory.
Enable Cartonization	Select this option to enable cartonization for this subinventory.

Field	Description
Enable Bulk Pick	Select this option to enable bulk pick for this subinventory.

4. The following fields define the default controls for opportunistic cycle counting:
   - Enable Opportunistic Cycle Count
   - Opportunistic Cycle Count Header
   - Opportunistic Cycle Count Trigger Quantity
   - Opportunistic Cycle Count Days Threshold

   For complete information on using these fields for opportunistic cycle counting, see Setting Up Opportunistic Cycle Counting, page 10-11.

Related Topics

For more information on subinventories, see Defining Subinventories, *Inventory User's Guide*.

Setting Up Locator Parameters

Locators identify physical areas within subinventories where you store items, such as rack/bin or aisle/row/bin locations. You set up storage locations, dock doors, staging lanes, consolidation locations, and packing stations as locators. For detailed instructions on how to set up locators, see:Defining Stock Locators, *Inventory User's Guide* .

Stock Locators in an Oracle Warehouse Management Enabled Project Manufacturing Organization

The same definition of stock locators used in Oracle Inventory is used in Oracle Warehouse Management, but it may not be feasible for Oracle Warehouse Management users to affix multiple location labels to the same physical warehouse shelf. If the material in the location is not labeled with the project and task, the user may inadvertently scan the wrong location label and pick material from an incorrect project. To alleviate this problem, Oracle Warehouse Management has removed the project and task segments from the locator field in all mobile user interfaces. Users will instead see or scan the project and task in separate fields on each page. The system will convert the physical locator scanned to the logical project and task locator behind the scenes. The transaction in Oracle Inventory will be posted with the appropriate project and task locator.

Oracle Warehouse Management differentiates the actual locator in Oracle Inventory from the locator that the user scans by using the term Logical Locator. Logical Locator is used to indicate the stock locator, including project and task. Physical Locator is used to indicate the stock locator without the project and task. One physical locator may have multiple corresponding logical locators if material for more than one project and task combination is stored in that location.

Defining Stock Locators with Project Manufacturing

You can define a Physical Stock Locator that you want to receive project material against. When the system performs a receipt for a project into inventory, a corresponding Logical Locator with project and task information will be created. Logical Locators can be viewed in the Stock Locator window.

The example above indicates the following:

- The Physical Locator is B1.1.1
- The Logical Locator is B1.1.1.lr-042202.2, where lr-042202 is the project number and 2 is the task

  An unlimited number of project/task combinations can be associated to a single Physical Locator.

Setting Up Consolidation and Packing Station Locators

You set up consolidation and packing station locators the same as you do other subinventory locators. However, when you set them up, you specify a consolidation and packing station with locator types of Consolidation and Packing Station, respectively.

You can also enter a sequence number in the Dropping Order field, so the system can determine the locator sequence in which picked material should be dropped for consolidation. When a picked LPN is scanned for a consolidation drop, the consolidation logic determines the drop locator in ascending dropping order. If the dropping order is not set up, the system uses the existing picking order if it is defined. If neither are defined, drop locators are determined in a random fashion.

You set up consolidation locators exclusively for the purpose of consolidation. The consolidation locator provides a distinction between consolidation locators and other locators such as staging and stock. The consolidation locators and staging locators need to belong to the same subinventory.

1. Create a subinventory.
2. In the subinventory, create locators with locator type Staging to map to the actual physical staging lanes.
3. In the same subinventory, create locators with locator type Consolidation to map to

the actual number of physical consolidation locators.

If Locator based or Locator and LPN based consolidation is desired, creation of consolidation locators is mandatory. If Locator based or Locator and LPN based consolidation is desired and consolidation locators are not set up, the system will only perform the default LPN based consolidation.

You can optionally set up packing station locators if you want to perform packing after consolidation and prior to staging. The packing station is physically located in the locator. This enables you to get a real time picture of where the material exists at any given instance. If packing needs to be performed, material/LPNs should be moved to the packing stations so the consolidation locators are free for other incoming material.

Setting Up Dock Door to Staging Lane Relationships

In Oracle Warehouse Management, dock doors and staging lanes are both defined as stock locators.

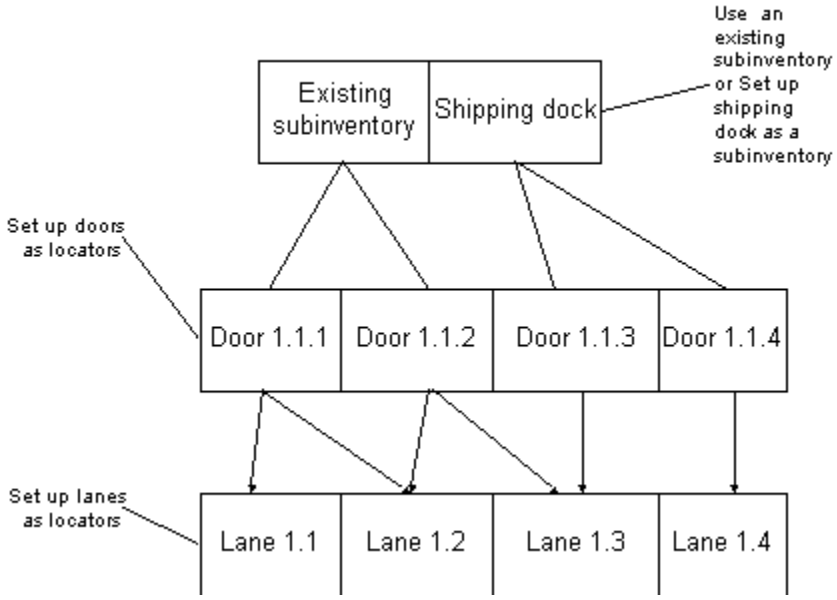
If you use Oracle Shipping Execution to plan trips for departures from your warehouse or facility, Oracle Warehouse Management enables you to schedule appointments for dock doors from which to load the LPNs for a specific trip.

The system can automatically select staging lanes near the scheduled dock door in which to stage the material prior to shipment. However, for the system to automatically select staging lanes, you must set up dock doors and staging lanes. After you set them up, you must define relationships between the dock doors and the staging lanes that service them.

> **Note:** With Oracle Warehouse Management, whether or not you are using trips and dock door appointments, you must create at least one staging lane.

The following figure provides an example of staging lane, dock door, and shipping dock relationships.

Staging Lane and Dock Door Relationships



Note: You do not need to create a new subinventory just to define dock door and staging lane locators. You can define dock door and staging lane locators as part of another existing storage subinventory. However, defining a separate subinventory excludes the dock door-defined subinventory from cycle counts. This prevents a staged item, in the process of being loaded onto a vehicle, from being included in the cycle count. Also note that staging lanes should be assigned to a subinventory.

You set up staging lanes and dock doors the same as you do other subinventory locators. However, when you set them up, you specify a staging lanes and dock doors with locator types of Staging Lane and Dock Door, respectively.

Note: It is recommended that you do not set capacity constraints for staging lanes and dock doors, because material allocation processes might fail due to limited space in a staging lane.

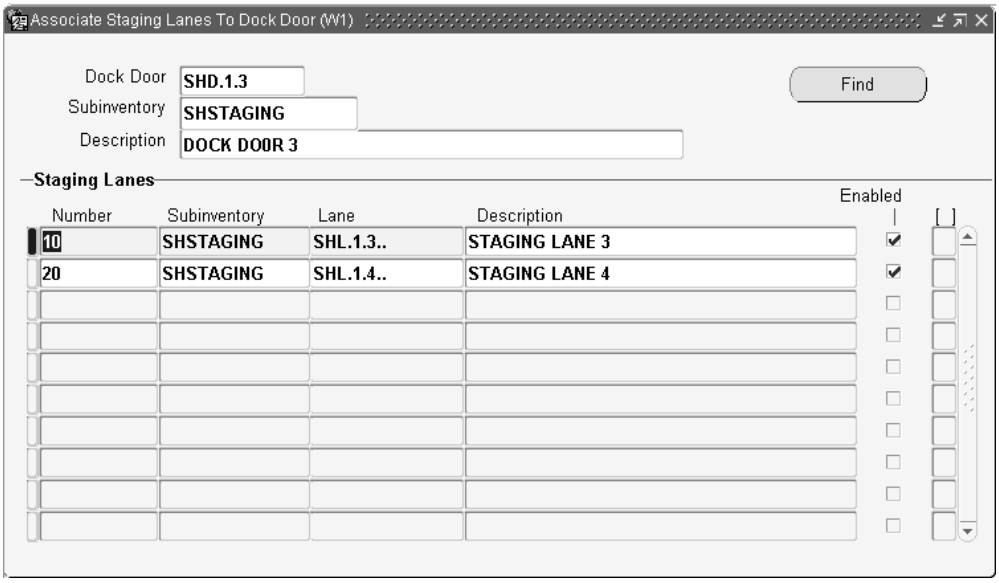
Dock Door Integration with Oracle Transportation Management

Integrating Oracle Transportation Management with Oracle Warehouse Management can improve shipment processing and capacity usage by providing more accurate committed dock appointments and load sequencing information. To use the Oracle Transportation Management appointment and load sequencing features in Oracle Warehouse Management, you need to synchronize dock door information and organization location information with Oracle Transportation Management (OTM).

When Oracle Transportation Management is integrated with Oracle Warehouse Management, you can optimize dock door usage, ensure dock doors are synchronized with the transportation plan, and stage material accurately to the correct dock door. You can use Oracle Transportation Management to maintain all dock door appointments and send the trip-related appointments to Oracle Warehouse Management.

For more information, see the *Oracle Transportation Management Integrating Oracle Transportation Management with Oracle E-Business Suite* guide.

1. Navigate to the Associate Staging Lanes to Dock Door window.



2. In the Dock Door field, use the list of values to select the dock door that you want to assign a staging lane.

   The system automatically populates the Subinventory and Description fields.

3. In the Staging Lanes region, Number field, enter a sequence number that represents the proximity of the staging lane to the dock door.

   When selecting a staging lane, Oracle Warehouse Management will select an available staging lane in the order of the sequence indicated here.

4. In the Staging Lanes region, Subinventory field, enter the subinventory and locator of the staging lane that serves the dock door.

5. Save your work.

Related Topics

Defining Stock Locators, *Oracle Inventory User's Guide*

Setting Up Locator Zones

A zone is a logical grouping of locators. A zone may represent a specific work area(s) such as a Packing station(s) or it may just indicate an area where material movement occurs. The locators for a zone may span one or more subinventories

You can specify a zone for an operation when you define the operation plan. This association determines the candidate set of locators where the particular operation is performed. You can use zones to define the path that material takes in the course of completing an activity. Defining zones is not mandatory especially if the warehouse is small and the operations are not complex where subinventories and/or locators could suffice.

Labor Planning Zone and Locator Restrictions

A locator that exists in one zone of type *labor planning* cannot exist in another zone of type *labor planning*. However, the locator may exist in one or more zones of type ATF (zones associated with Advanced Task Framework).

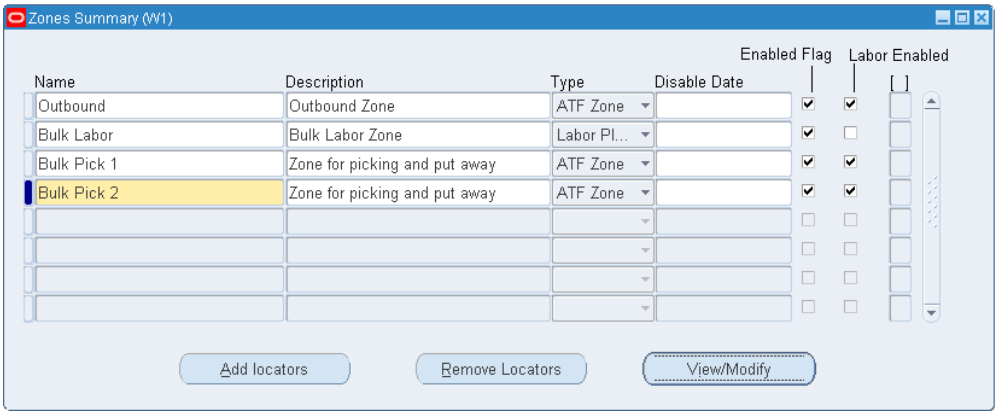
Consider the following example: a warehouse manager creates a zone named *BULKlabor* of type Labor Planning Zone for bulk picking employees and adds the following locators within the BULK subinventory: (B1.1.1, B1.1.2, B1.2.1, B1.2.2, B1.3.1, B1.3.2, B1.4.1, B1.4.2). The bulk area of the warehouse is quite large, so the warehouse manager creates two zones: one for *picking* and another for *put away* within the BULK subinventory. The warehouse manager creates the following two zones of type ATF Zone for picking and put away: BULKpick1 and BULKpick2 . The warehouse manager adds the following locators to each zone:

- BULKpick1: B1.1.1, B1.1.2, and B1.2.1
- BULKpick2: B1.2.2, B1.3.1, and B1.3.2

Because BULKpick1 and BULKpick2 are of zone type ATF Zone, the warehouse manager can add the locators to those zones. However, this would not be possible for zones of type labor planning zone.

To set up locator zones:

1. Navigate to the Zones Summary window.



2. Enter the name of the zone in the Name field.

3. Optionally, enter a description of the zone in the Description field.

4. Select the type of zone:

   - ATF Zone (zones associated with Advanced Task Framework): This is the default value for existing customers who use zones. You can add locators to multiple ATF zones so that a locator in one ATF zone can exist in many ATF zones.

   - Labor Planning Zone: Select this zone to enable labor planning calculations for wave planning.

     Important: A locator that exists in one zone of type *labor planning* cannot exist in another zone of type *labor planning*. However, a locator may exist in one or more zones of type ATF (zones associated with Advanced Task Framework).

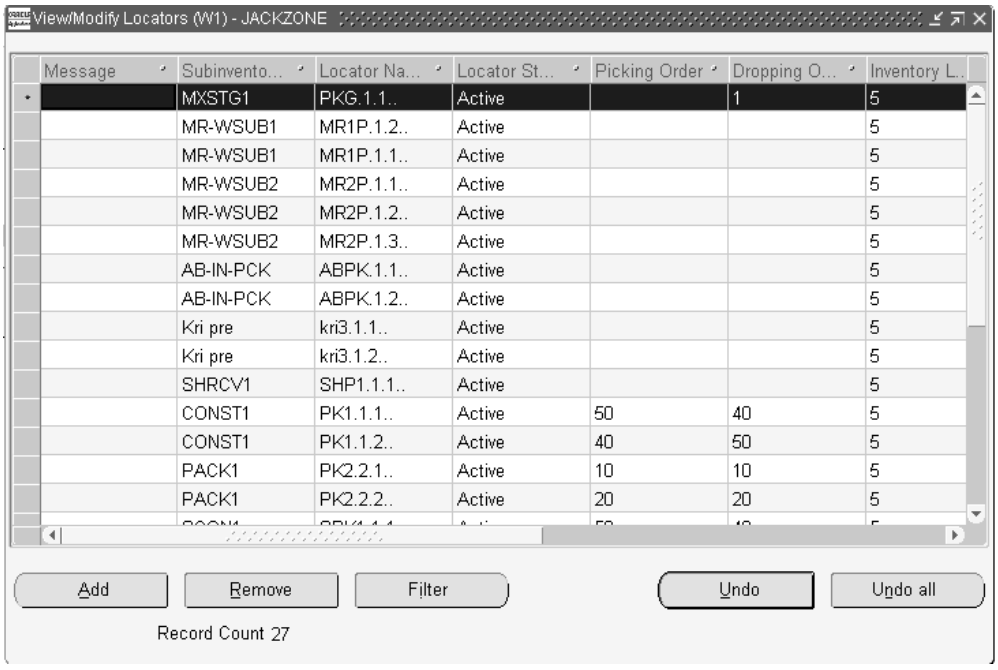
5. Optionally, select a Disable Date from the list of values. If you enter a date in this field, the zone is disabled on this date.

6. Select the Enabled Flag to enable the zone.

7. Select the Labor Enabled check box to enable labor planning for the zone. However, if Labor Planning Zone is selected as the zone, then the Labor Enabled check box is disabled for the row.

8. Save your work.

9. Choose View/Modify to open the View Modify Locators window.



The locators window contains the following fields:

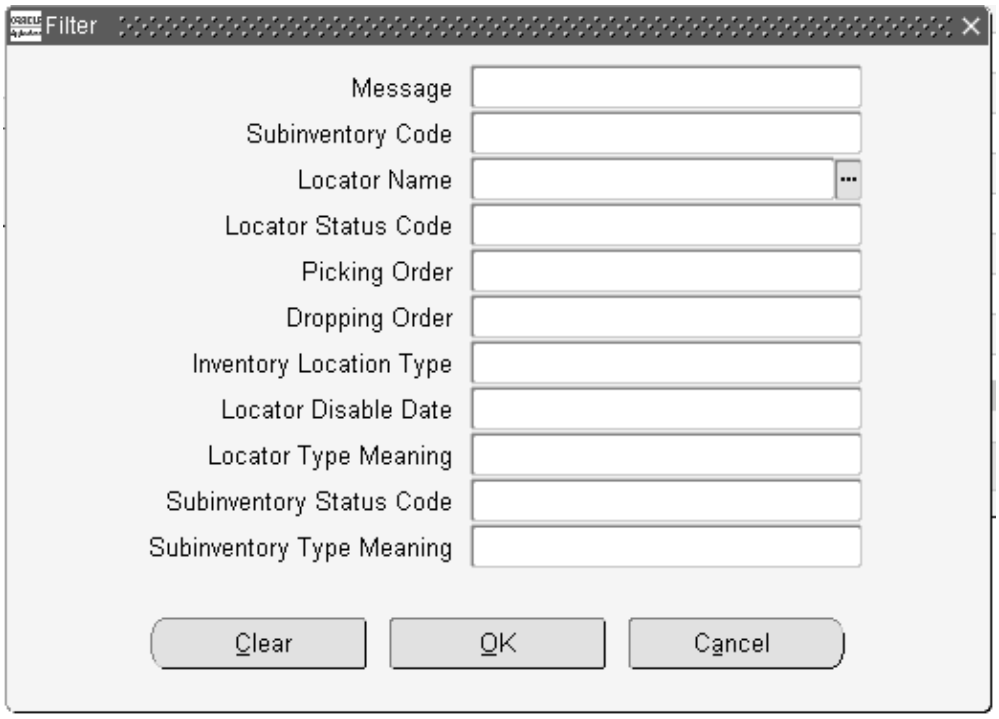
- Message
- Subinventory
- Locator Name
- Locator Status
- Picking Order
- Dropping Order
- Inventory Location Type
- Locator Disable Date
- Locator Type Meaning
- Subinventory Status
- Subinventory Type

  To sort the locator information by a particular field, select the field name in the header row.

To Filter Locators:

1. Navigate to the Locators window.

2. Choose Filter



3. Choose the filter criteria. The criteria are as follows:
   - Message
   - Subinventory Code
   - Locator Name
   - Locator Status Code
   - Picking Order
   - Dropping Order
   - Inventory Location Type
   - Locator Disable Type
   - Locator Type Meaning

- Subinventory Status Code
- Subinventory Type Meaning

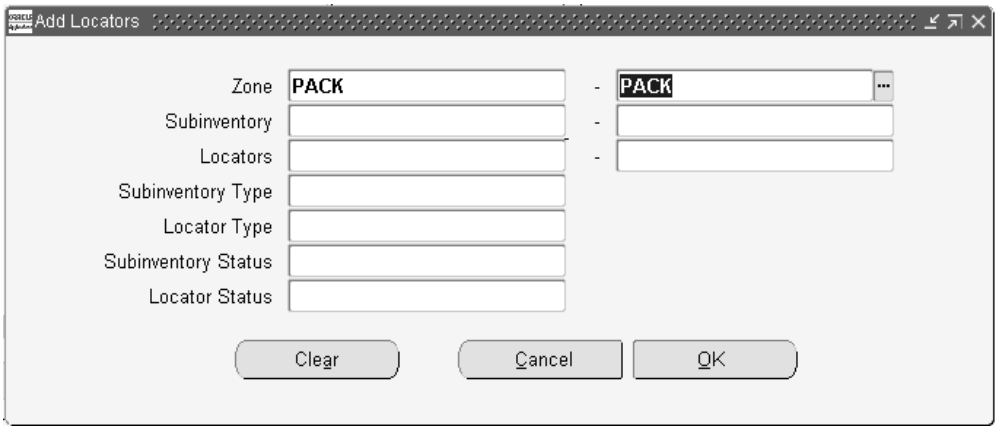
4. Choose Ok to add apply the filters, choose Clear to clear the fields, or choose Cancel to cancel the locator additions.

To Refresh the Locators Window:

1. To refresh the locators window to view the most current information, choose Refresh.

To Add Locators to a Zone:

1. Choose Add from the Zones Summary window.



2. Optionally, select a zone, or range of zones from the list of values to create zones within a zone.

   Note: If you choose to select a zone or range of zones, you cannot select a subinventory or locator.

3. Optionally, select a subinventory, or a range of subinventories from the list of values. If the subinventory, or subinventory range does not contain any locators, you cannot enter and locators in the Locators field.

4. Optionally, select a locator or range of locators from the list of values. You also have the option to select All locators within the subinventory or subinventories.

5. Optionally, enter the subinventory type the available types are Storage and Receiving. See: Defining Subinventories, *Oracle Inventory User's Guide*.

6. Optionally, enter the locator type, the available types are: Consolidation Locator, Dock Door, Inspection Station, Packing Station, Receiving, Staging Lane, and Storage Locator. For more information see: Defining Stock Locators, *Oracle Inventory User's Guide* .

7. Optionally, select the Subinventory Status from the list of values.

8. Optionally, select the Locator Status from the list of values.

9. Choose Ok to add the Locators to the zone, choose Clear to clear the fields, or choose Cancel to cancel the locator additions.

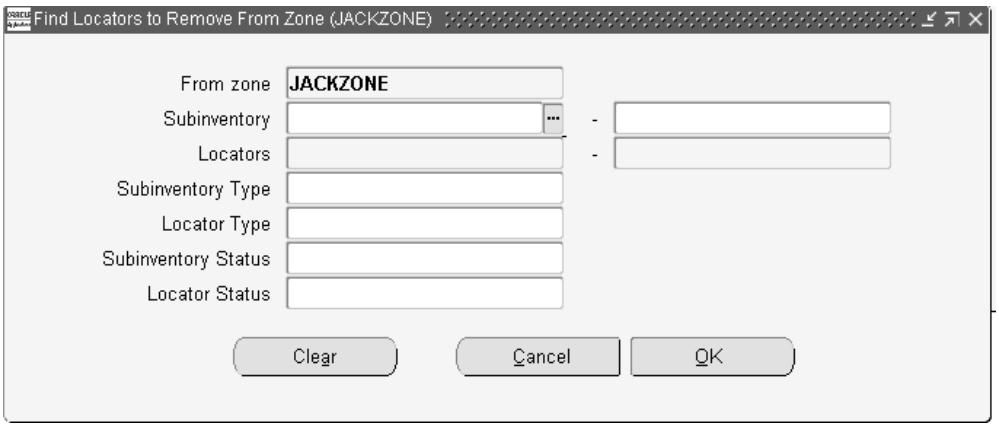
10. To add more locators to the zone repeat the procedure.

11. Save your work.

To Remove Locators from a Zone:

1. Navigate to the Zone Summary window.

2. Choose Remove Locators.



3. Enter the locators to remove from the zone.

4. Choose OK, to remove the locators, Clear, to clear the information from the window, or Cancel to cancel.

Related Topics

Set Up Operation Plans, *Oracle Warehouse Management User's Guide*

Defining Stock Locators, *Oracle Inventory User's Guide*

Defining Subinventories, *Oracle Inventory User's Guide*

Material Setup

In addition to setting up Oracle Warehouse Management related item attributes, you use the same item setup steps that you do for setting up items in Oracle Inventory. For instructions on how to set up inventory items, see: Defining Items, *Oracle Inventory User's Guide*.

Oracle Warehouse Management enables you to enter an item's dimensions. The system uses these dimensions to calculate space availability when generating put away suggestions, and to determine the appropriate container size when making cartonization suggestions.

> **Note:** To make put away and cartonization suggestions, you must make sure that the units of measure used to indicate weight, volume, and dimensions of the item can be converted into the unit of measure that is used to indicate the locator capacity and container item capacity.

> **Note:** To use item dimensions for cartonization, set up the length, width, height, and unit of measure of both the item being packed and the containers which are available to be packed. The fields are optional, and if they are not entered, cartonization will not use them. Specifically, if one of the values is blank for an item being packed, it will be assumed to be 0. If one of the values is blank for a container that is available to be packed, it will be assumed to be infinite.

Defining Shipping Parameters

Use the Shipping Parameters window, which is part of the Oracle Shipping Execution, to enter the shipping parameters for your warehouse. See: Defining Shipping Parameters, *Oracle Order Management Suite Implementation Guide* for more information.

Implementing Profile Options

During implementation, you set a value for each user profile option to specify how Oracle Warehouse Management controls access to and processes data.

The table below indicates whether you (the user) can view or update the profile option and at which System Administrator levels the profile options can be updated: at the user, responsibility, application, or site levels. The second column, User, references the user, while the next four columns, User, Resp, App, and Site, reference the System Administrator. The last two columns, Required and Default Value, reference requirements.

A required profile option requires you to provide a value. An optional profile option

already provides a default value, so you only need to change it if you do not want to accept the default.

Profile Option	User	Sys Admin User	Sys Admin Resp	Sys Admin App	Sys Admin Site	Req'd	Default Value
WMS: Allow Mixed Statuses in an LPN	--	Yes	Yes	Yes	Yes	--	--
WMS: Assign Task Types	Y	Y	Y	Y	Y	Y	Yes
WMS: Barcode Font Name	Y	N	N	N	Y	N	Sales Order
WMS: Barcode Type	Y	N	N	N	Y	N	-
WMS: Default Source Type for Control Board	Y	Y	Y	Y	Y	N	-
WMS: Deployment Mode	N	N	N	N	Y	N	N
WMS: EPC ASN LPN import column	N	N	N	N	Y	N	EPC
WMS: EPC ASN Serial import column	N	N	N	N	Y	N	ATTRIBUTE1

Profile Option	User	Sys Admin User	Sys Admin Resp	Sys Admin App	Sys Admin Site	Req'd	Default Value
WMS: EPC Generation Encoding	N	N	N	N	Y	N	Hex
WMS: Express Returns	Y	Y	Y	Y	Y	N	-
WMS: Ignore Equipment	N	N	N	N	Y	N	-
WMS: Item/Revision Delimiter	Y	N	Y	N	Y	N	-
WMS: Label Print Mode	Y	Y	Y	Y	Y	Y	Asynchronous
WMS: Label Printing for Cycle Count	Y	Y	Y	Y	Y	Y	At Approval
WMS: Label file prefix	Y	Y	Y	Y	Y	Y	LBL
WMS: Label output directory	Y	Y	Y	Y	Y	Y	/dbfiles/applcsf/outbound
WMS: PO Number/Line Delimiter	Y	N	Y	N	Y	N	-
WMS: RFID User	N	N	N	N	Y	N	-

Profile Option	User	Sys Admin User	Sys Admin Resp	Sys Admin App	Sys Admin Site	Req'd	Default Value
WMS: Sequence Picks Across Waves	Y	Y	Y	N	Y	Y	No
WMS: Subinventory/Locator Delimiter	Y	N	Y	N	Y	N	-
WMS: Synchronous TCP/IP label request delay	Y	Y	Y	Y	Y	N	0

Y = You can update the profile option value.

N = You can view the profile option value but you cannot change it.

WMS: Allow Mixed Statuses in an LPN

Controls whether material of different material statuses can be packed in to the same LPN. It has the following values:

- No: You cannot pack material with different material statuses into the same LPN.
- Yes: You can pack material with different material statuses into the same LPN. The LPN status will then appear as mixed and the on-hand stock within the LPN will retain its individual statuses.

> **Note:** To allow mixed statuses within an LPN you must enable on-hand material status for the organization.

WMS: Assign Task Types

This profile option indicates if task type stamping, cartonization, task consolidation and task splitting occur during pick release. The default value for this profile option is Yes. If you select yes, task type stamping, cartonization and task consolidation occurs. If you select No, task type stamping, cartonization and task consolidation does not occur. This

profile is changeable at all levels.

WMS: Barcode Font Name

This profile is used for the Shipment Schedule report. This report supports barcodes. You indicate the barcode font you want to use.

WMS: Barcode Type

This profile is used for the Shipment Schedule report. This report supports barcodes. You indicate the barcode type you want to use.

WMS: Default Source Type for Control Board

This profile option determines the default task source for the warehouse control board query. It has the following values:

- Cycle Count
- Internal Order
- Internal Requisition
- Job or Schedule
- Move Order
- Purchase Order
- RMA
- Sales Order

This profile option is updateable at all levels.

WMS: Deployment Mode

This profile option determines the deployment option for the instance. The available options are:

- Integrated Instance: This is the integrated enterprise resource planning (ERP) instance.
- Distributed Deployment: This is the distributed Oracle Warehouse Management (WMS) instance that enables WMS to be deployed in a distributed manner, that is, independent of the ERP instance.
- LSP: This provides multi-client support for the logistics service provider (LSP) industry.

This profile option can be updated only at the site level.

WMS: EPC ASN LPN import column

This profile option specifies which column is populated for EPC for the LPN in the wms_lpn_interface table

This profile option is updateable only at the site level.

WMS: EPC ASN Serial import column

This profile option specifies which column is populated EPC for the serial in the mtl_serial_numbers_interface table.

This profile option is updateable only at the site level.

WMS: EPC Generation Encoding

This profile option specifies the number system in which EPC provides information to labels. The available values are binary, hex, and decimal.

This profile option is updateable only at the site level.

WMS: Express Returns

Oracle Warehouse Management offers a one step or a two step process for returns. This option is determined by the WMS: Express Returns profile option. By disabling this option, you can perform a two step return process where, for example, a manager can initiate the return (step 1) and a picker can retrieve the material and deliver it to shipping (step 2). Otherwise, the return transaction is initiated and completed in one step.

WMS: Ignore Equipment

This profile option determines the meaning of a blank equipment field on the task sign-on page. The available values are Yes and No.

WMS: Item/Revision Delimiter

This profile can be set at the site level and is applicable to both the Oracle Mobile Supply Chain Application and Oracle Warehouse Management. The character defined in this profile option will be interpreted as a carriage return enabling a single scan to populate two different fields on the mobile device.

> **Note:** The delimiter feature is applicable only for revision-controlled items. However, because the system does not differentiate between revision and non-revision controlled items, it is important that the value entered for the profile option is not used as part of an item number (segment) for any other non-revision controlled items. If this

setup occurs, the item number may become truncated, and the system displays an error message *No result found*.

For example, if the profile option *WMS: Item/Revision Delimiter* is set to *P*, then errors may occur when a transaction such as a purchase order receipt or miscellaneous receipt occurs for an item whose name contains the letter *P* (for example, items SHP-1001, SBP-1001).

WMS: Label Print Mode

This profile determines the label print mode for the integration. The choices for this profile are Synchronous, Asynchronous, and Synchronous TCP / IP. Depending on the setting of this profile, the label print request will be processed according to the mode selected.

WMS: Label Printing for Cycle Count

This profile determines when you print labels for cycle counting. It has the following values:

- At Entry: Prints a label at cycle count entry.
- At Approval: Prints a label at cycle count approval.
- At Entry and Approval: Prints a label at both cycle count entry and cycle count approval.

WMS: Label file prefix

This profile is only used if the Label Print Mode selected is Asynchronous. The profile determines the prefix for the XML files that will be written to the output directory. Label print file names are generated according to the following format: PPPNNN.xml where PPP is the prefix specified in this profile and NNN is a sequential integer generated for each new label print request. It is possible to distinguish the user who generated a particular print request by setting this profile at the user level uniquely for each user.

WMS: Label output directory

This profile is only used if the Label Print Mode selected is Asynchronous. It determines the directory that the XML files are written to for the 3rd Party software to pick up and process. The directory specified here must be a directory that is accessible with read/write privileges to both the Oracle database and the 3rd Party printing software.

WMS: PO Number/Line Delimiter

This profile can be set at the site level and is applicable to both the Oracle Mobile

Supply Chain Application and Oracle Warehouse Management. The character indicated by this profile option will be interpreted as a carriage return, enabling a single scan to populate two different fields on the mobile device.

WMS: RFID User

This profile is used to determine which user's context is to be used when processing transactions triggered by RFID events. Since RFID transactions are not done through the normal user-interface, there is no user logging into application to perform an RFID transaction, we need to register the transaction as having taken place in the context of a valid user. The values for this profile option are any valid user registered in the application. You can change this profile option at the Site level only.

WMS: Sequence Picks Across Waves

This profile option determines whether tasks across waves can be sequenced together or not. This can be set at the site, responsibility, and user level. If the profile option is set to Yes, the tasks are sequenced based on the picking order across waves and not on the move order header id. If the profile option is set to No, the tasks are sequenced using the picking order within a wave only and based on the Move Order Header id. The default value is No.

WMS: Subinventory/Locator Delimiter

This profile can be set at the site level and is applicable to both the Oracle Mobile Supply Chain Application and Oracle Warehouse Management. The character indicated by this profile option will be interpreted as a carriage return, enabling a single scan to populate two different fields on the mobile device.

WMS: Synchronous TCP/IP Label Request Delay

You use this profile option to indicate a time delay, in milliseconds, for every request that you send to the print server in Synchronous TCP/IP printing. This profile option takes a default value of zero and any positive integer as user value.

2

Lot and Serial Control

This chapter covers the following topics:

- Lot and Serial Attributes
- Functional Business Flow Description
- Types of Attributes
- Attribute Functionality
- Context Setup
- Set Up Lot and Serial Attributes
- Lot Transactions
- Lot Transaction Setup
- Lot Transaction Examples
- Implementation
- Common Problems
- Frequently Asked Questions

Lot and Serial Attributes

Overview of Lot and Serial Attributes

Lot attributes are fields in addition to the lot number that provide additional information about a lot such as Country of Origin and Best By date.

Serial attributes are fields in addition to the serial number that provide additional information about a serial such as Serial Condition. The Serial Condition could indicate whether a particular piece is New or Refurbished.

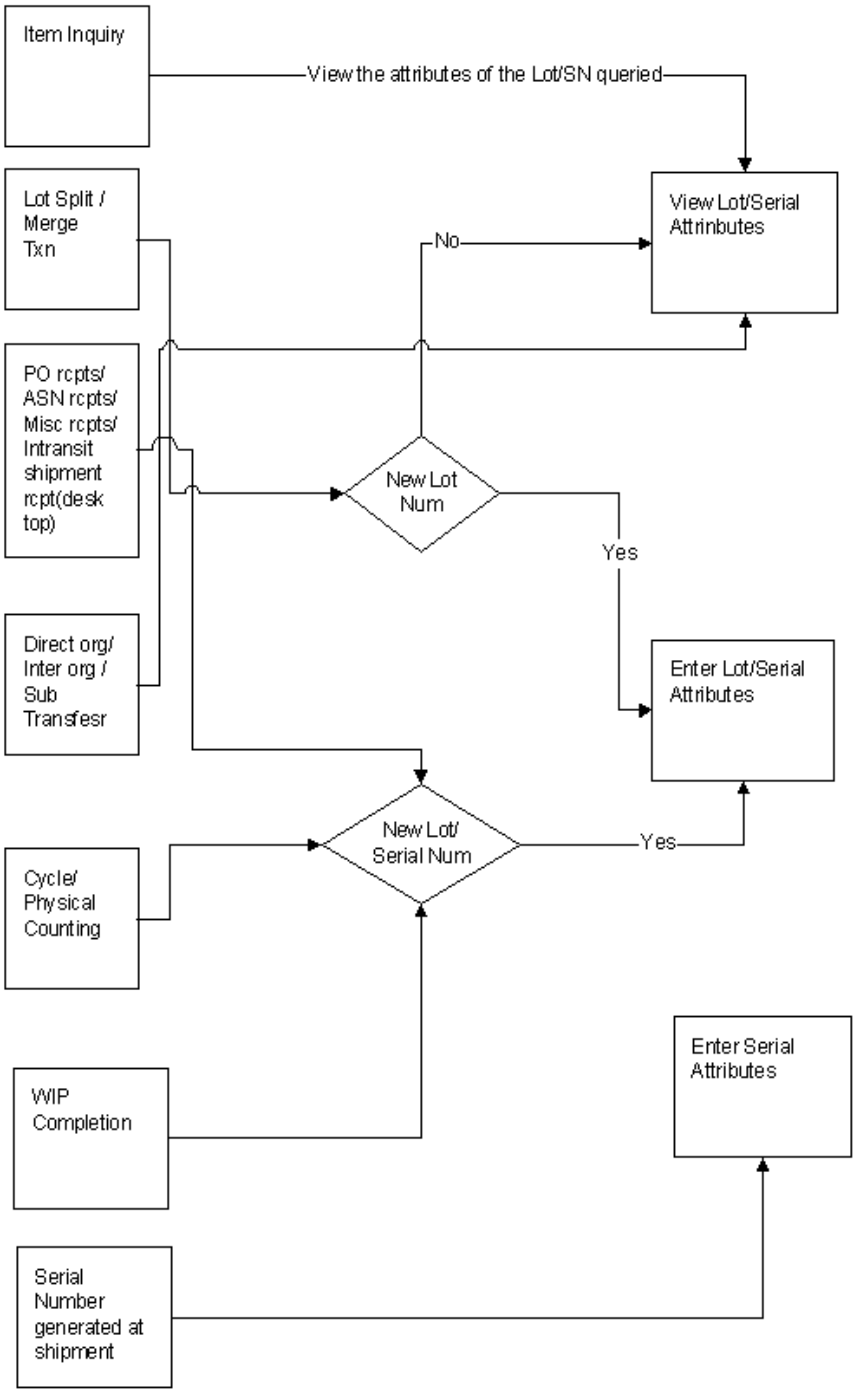
Related Topics

Lot Control, *Oracle Inventory User's Guide*

Serial Control, *Oracle Inventory User's Guide*

Functional Business Flow Description

Oracle Warehouse Management contains several seeded lot and serial attributes such as best by date. These seeded attributes are listed as column names in the MTL_LOT_NUMBERS and MTL_SERIAL_NUMBERS tables. There are also forty additional unnamed lot and forty named serial attributes you can modify so you can track important information for your industries. You can track different attributes for each item, that are customized for specific defaulting and validation requirements. The system can populate the attribute information any time you create new lots or serials, such as at purchase order receipt, miscellaneous receipt, cycle or physical counting, lot split transactions, lot merge transactions, lot translate transactions, or WIP completions.


Item Inquiry
View the attributes of the Lot/SN queried
Lot Split / Merge Txn
View Lot/Serial Attrinbutes
No
PO rcpts/ ASN rcpts/ Misc rcpts/ Intransit shipment rcpt(desk top)
New Lot Num
Yes
Direct org/ Inter org / Sub Transfesr
Enter Lot/Serial Attributes
New Lot/ Serial Num
Yes
Cycle/ Physical Counting
Enter Serial Attributes
WIP Completion
Serial Number generated at shipment

Types of Attributes

Oracle Warehouse Management stores attributes in the date, number, and character fields to simplify extensions you build on these attributes. There are three types of attributes:

- Date
- Number
- Character

Date Attributes

The system contains the following date attributes:

- Best by date
- Change date
- Maturity date
- Origination date (manufacturing date)
- Retest date

Maturity date is the date the lot matures and is ready for use and best by date is the date when the quality of the lot may degrade. You can write extensions to update the lot material status on the maturity date or best by date. You can set the default origination date to the current date upon receipt and override it to the date of manufacture at the supplier, if applicable. The default origination date for a WIP completion is the date the job completes. The re-test date is the date the material needs to be re-tested to re-verify the quality. You may define an item descriptive flexfield to track how frequently to retest an item. You can use this item attribute to default the re-test date.

You can define up to ten distinct date attributes for any given lot or serial number that reflects item information you capture This information is stored in the D_ATTRIBUTE1 through D_ATTRIBUTE10 columns on the MTL_LOT_NUMBERS and MTL_SERIAL_NUMBERS tables.

Character Attributes

One category of additional lot and serial information to track are characteristics of the lot. Some of these characteristics may include lot grade, color, country of origin, place of origin, and recycled content.

The following character attributes have been added as named lot attributes:

- Color
- Territory_code (Country of origin)
- Date code
- Grade
- Place of origin
- Supplier
- Supplier lot number

Territory_code has been added as a named serial attribute.

You may define up to twenty distinct character attributes for any given lot or serial number that reflects information which your organization captures for an item. This information is stored in the C_ATTRIBUTE1 through C_ATTRIBUTE20 columns on the MTL_LOT_NUMBERS and MTL_SERIAL_NUMBERS tables respectively.

Note that the material status may be controlled at the subinventory, locator, lot, or serial level. Therefore, the material status on the lot or serial number does not behave exactly as other lot or serial attributes. If the material status of the subinventory or locator is more restrictive than the material status of the lot or serial number, then the material status of the subinventory or locator will override the material status of the lot or serial number.

Numeric Attributes

Some industries track numerous dimensions and weights of each lot. Up to ten distinct numeric attributes can be used for any given lot.

The following numeric attributes have been added as named lot attributes:

- Age (in days)
- Length
- Recycled content
- Thickness
- Volume
- Width

There is a concurrent program that calculates the age of an existing lot by computing the time from the time it was created to the current date and stores this value. The advantage of this being, if the allocation rule requires some calculation based on age, the value can be straight away used from this calculated field rather than computing the

age at the time of performing the allocation or such task. Storing these values ahead of time, to be used in calculations, improves the performance during allocation or wherever the case maybe. The downside to this would be the age may not be quite exact, but again it depends on the frequency of this concurrent program.

It is recommended that the unit of measure (UOM) attributes (length UOM, thickness UOM, volume UOM, and width UOM) for each of the dimension attributes (length, thickness, volume, and width) be implemented together.

The following numeric attributes have been added as named serial attributes:

- Cycles since new
- Cycles since repair
- Cycles since overhaul
- Cycles since visit
- Cycles since mark
- Number of repairs
- Time since new
- Time since repair
- Time since overhaul
- Time since visit
- Time since mark

You may define up to ten distinct number attributes for any given lot or serial number which reflects information that your organization captures for an item. This information is stored in the N_ATTRIBUTE1 through N_ATTRIBUTE10 columns on the MTL_LOT_NUMBERS and MTL_SERIAL_NUMBERS tables respectively.

Attribute Functionality

Oracle Warehouse Management supports forms and APIs to populate, maintain, and use the lot and serial attributes.

> **Note:** The lot and serial attributes are available even if Oracle Warehouse Management is not installed.

Populate Attributes

Default by item number or category which attributes to collect at receipt.

The lot context or serial context of an item specifies which lot or serial attributes need to be maintained for each item. For example, lot controlled food product may include attributes such as best by date, grade, and age, while lot controlled textiles may include attributes such as length, thickness, and style. By specifying a context for the lot and serial attributes, only those attributes which are appropriate for each item can be collected.

Contexts can be assigned to item categories, therefore all lot controlled items in a particular category have the same context. All the categories where you want to assign context assignment should be in the same category set. However, there may be exceptions to the item category, so individual items may be assigned to a context that overrides any item category assignment. Default values for attributes can be specified when configuring the contexts. The currently supported default methods for attributes are constant, current date, previous field, profile option, and SQL statement.

Desktop functionality

Lot and serial attributes need to be populated when new lots and serials are created. If desired, the attributes may be defaulted and/or overridden by the receiver. When you receive against an existing lot, you may view but not update the attributes of the existing lot. The attributes of the material received will be inherited from the attributes of the pre-existing lot.

Populating lot and serial attributes is supported for the following transactions for non-Oracle Warehouse Management inventory organizations:

- Purchase order delivery
- Miscellaneous receipt
- WIP completion
- Work-orderless completion
- Flow schedule completion

> **Note:** Populating lot attributes is only supported in the Lot Entry window of the Miscellaneous Transactions form. You may find it easier if you remove the lot field from the Miscellaneous Transaction Lines window using the folder form functionality.

Mobile functionality

Lot and serial attributes must be populated when new lots and serials are created. If

desired, the attributes may be defaulted and overridden. When you receive against an existing lot, the attributes of the material received will be inherited from the attributes of the pre-existing lot.

Populating lot and serial attributes are supporting for the following transactions for non-Oracle Warehouse Management inventory organizations:

- Receiving Delivery transactions
- Cycle and Physical counting
- Lot Split/Merge transactions
- Miscellaneous Receipt

Populating lot and serial attributes are supported for the following transactions for Oracle Warehouse Management enabled inventory organizations:

- Inbound receipt (including ASN receipt)
- Cycle and physical counting
- Lot Merge/Split transactions
- Miscellaneous receipt

If the Serial Number is generated at the time of shipment you can enter Serial attributes at that time.

> **Note:** There are distinct differences between the receiving process for Oracle Warehouse Management enabled inventory organizations and regular inventory organizations. For inventory organizations, lots and serials may not be specified until the delivery transaction. Therefore, the lot and serial attributes may not be populated until after this time. For Oracle Warehouse Management enabled organizations, this limitation has been lifted. However, the introduction of the LPN functionality changes the business flow substantially. Incoming material is packed into an LPN at receipt. To specify the material being packed into the LPN, the lot and serial numbers are specified at this time. Consequently the lot and serial attributes are specified at this time.

Desktop functionality

The Maintain Lots and Maintain Serial Numbers windows enable authorized personnel to update lot and serial attributes. The View Lot Numbers and View Serial Numbers windows will give non-authorized personnel view-only access to lot and serial attributes. Limiting access is achieved by calling the Lots and Serials forms in query

only mode (using the QUERY_ONLY form function parameter). An audit log of changes to lot and serial attributes is NOT stored. However, viewing the attributes populated at receipt of the lot in the Materials Transactions desktop form may indicate whether the attributes have been updated since the original receipt of the lot or serial.

Mobile functionality

You may view lot and serial attributes through the mobile Item Inquiry form. If you wish to update a lot or serial attribute, this maintenance should be performed through the desktop form.

Use Attributes

Picking and Putaway rules may be based on lot and/or serial characteristics such as the country of origin or the age of the material.

Fulfilling sales orders based on lot and serial attributes

If material is manually reserved at sales order entry, you may search for appropriate lots by their characteristics in the Material Workbench. Once the lot with the appropriate characteristics has been located, that specific lot may be reserved. Reservations is *not* supported for serial numbers. Therefore, fulfilling sales orders based on the serial attributes will need to take place at pick release.

If material is not reserved at sales order entry, the material will be allocated when the sales order pick released. Complex picking rules may be configured to control the characteristics of the lots and serials you use to fulfill each order. For example, you may specify which grade of material each class of customer should receive. Other material allocation requirements could include picking lots with the best by date at least fourteen days from the current date.

Transfer attributes with lot or serial number

Lot and serial attributes are transferred to other inventory organizations within the supply chain, so that the attributes only need to be populated once. However, it is required that the SAME context assignments be defined in all the source and destination organization. Otherwise, there is no automatic way to identify that the first segment of one context is the same information as the first segment in a different context. To aid the requirement of transferring attributes when performing organization transfers, the context mapping can be made common to all organizations, which will result in the attributes always being transferred with the material.

Defaulting lot attributes when lots are split and merged

When a lot is split into multiple new lots, the lot attributes of the new lots are defaulted from the starting lot. You may override the defaulted attributes. When lots are merged into a new lot, the lot attributes of the new lot are defaulted from the lot attributes of the largest lot merged into the new lot. If two lots of the same quantity are merged, the lot attributes of the new lot are defaulted from the first starting lot.

Populating lot and serial attributes during cycle count and physical count

When you perform a cycle count or physical count and have to create a new lot or serial, you will be prompted to enter attributes based on context assignment for that item.

Context Setup

There are two steps to setting up lot and serial attributes. First, the lot and serial contexts must be defined. Contexts are supported by descriptive flexfields, so the setup is identical to the setup for descriptive flexfields. Second, the default context must be assigned to item categories and, if appropriate, items. The reason for this step is that standard descriptive flexfield functionality requires the reference field for the context be on the Transaction form. The Item Category field is not on the Transactions forms. Therefore, this additional piece of functionality was built to drive the context off of the item category.

Define Context

A context (set of attributes to be tracked for a lot or a serial), should be defined using the Segments form for descriptive flexfields, where the descriptive flexfield title is Lot Attribute or Serial Attribute. Different contexts should be defined for each type of item that tracks different groups of attributes. In addition, since default values are defined at the context level, different defaulting behavior will require different contexts.

Each context can have up to forty attributes (ten numeric attributes, twenty character attributes, and ten date attributes). Each attribute must specify which database column the attribute will be stored in. Database types of varchar, number, and date are supported. Each attribute may be required or optional, and can have a default value set based on any of the defaulting types. If any attribute is a required attribute it must have a default value. Finally, a value set must be specified for each attribute. The value set determines the length of the attribute, and the type of validation of the date (no validation, independent validation against a manually defined list of values, or table validation).

Assign Context

You will be prompted to enter the correct group of attributes for each type of item based on the assigned context. You may assign contexts by item category or item number, at the organization level, or globally (common to all organizations). You may assign by categories in any category set. Therefore, the attributes may be driven off of the Inventory category set or a new category set may be created to drive the attributes, but contexts can be assigned to only one category set.

The hierarchy for determining which context will be used is illustrated below:

Context Level	Assignment Type
Global	Item Category
Global	Item
Organization	Item Category
Organization	Item

For example, the organization level assignment by item will override the organization level assignment by item category and the organization level assignment by item category will override the global level assignment by item, and so on.

You can enable category sets so you can assign items to multiple categories with a category set. You will only be able to select category sets that do not have this feature selected. This is required so a unique context when receiving an item may be derived.

Set Up Lot and Serial Attributes

Setting up lot and serial attributes includes the following tasks:

- Setting up lot and serial control
- Configuring lot and serial attributes descriptive flexfields.

With Oracle Warehouse Management you can better control a lot item by specifying the following material status lot and serial control attributes:

- Enabling lot control
- Specifying a default lot status
- Enabling serial control
- Specifying a default serial control

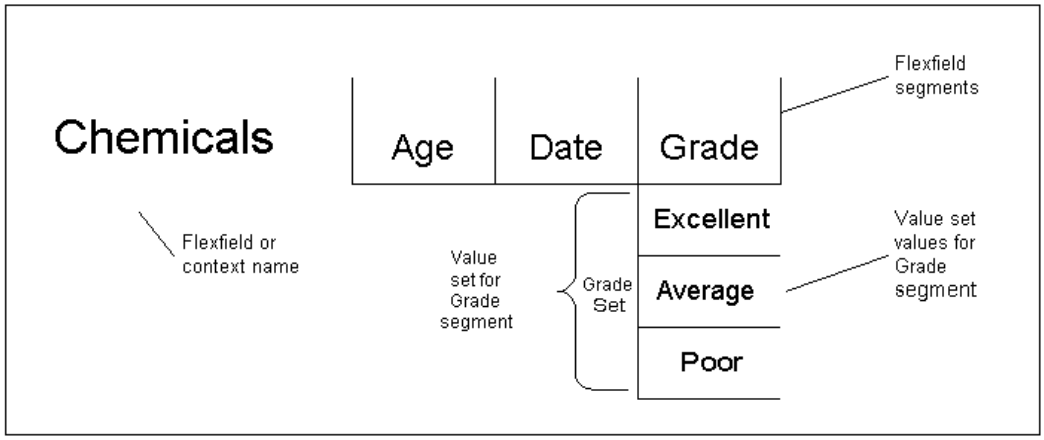
When you enable lot and serial control for the material status of an item, you can restrict or expand the item's use based on the level of material status control. You enable lot and serial control by selecting Lot and Serial Enabled check boxes on the Inventory tab of the Master Items window.

With Oracle Warehouse Management items, you can also decide whether lots can be split or merged, and whether you want an item to be bulk picked.

Note: To view lot attributes, you must select the lot attributes button on the mobile device before you enter a lot quantity. After you enter the lot quantity, the system process the lot and subtracts the available quantity from the total lot quantity. If you select the lot attributes button after you enter the lot quantity, the system does not recognize the difference between processing the lot and viewing the lot attributes.

Lot and serial attributes track the characteristics of items, based on lot and (or) serial numbers. Descriptive flexfields enable you to configure lot and serial attribute flexfields so that you capture only those lot and serial attributes that you need to maintain. The following figure provides an example of a flexfield defined for a lot attribute called, Chemicals.

Descriptive flexfield for a lot attribute



Value sets hold the actual values for a particular segment of a descriptive flexfield. Defining attribute value sets involves setting up the value set that is associated with a particular flexfield segment. For example, the following figures illustrates a value set for the Grade segment. In this case, the value set, Grade Set, includes three grades: Excellent, Average, and Poor.

Note: Before you define the value set for an attribute, you should determine its context requirements, including the types of values required for each of the context segment.

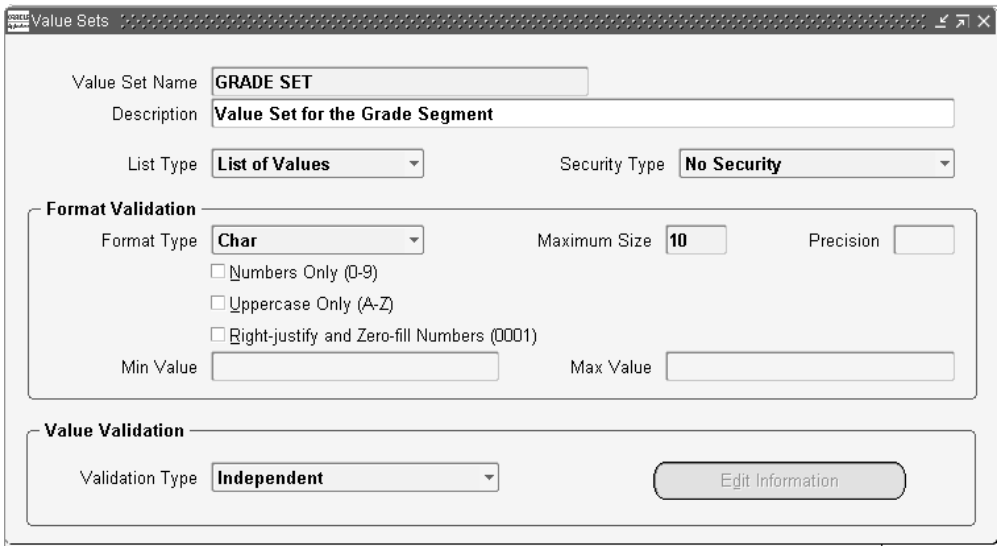
Global Lot Attributes

To ensure the consistency of lot attribute values across organizations, lot attributes can be enabled as global attributes. The values of global lot attributes must be the same across organizations and any differences are not allowed. You can update a global attribute; however, if that lot exists in other organizations then the attribute values will also be updated in the other organizations. For more information on global lot attributes, see Setting Up and Updating Global Lot Attributes, *Oracle Inventory User's*

Guide.

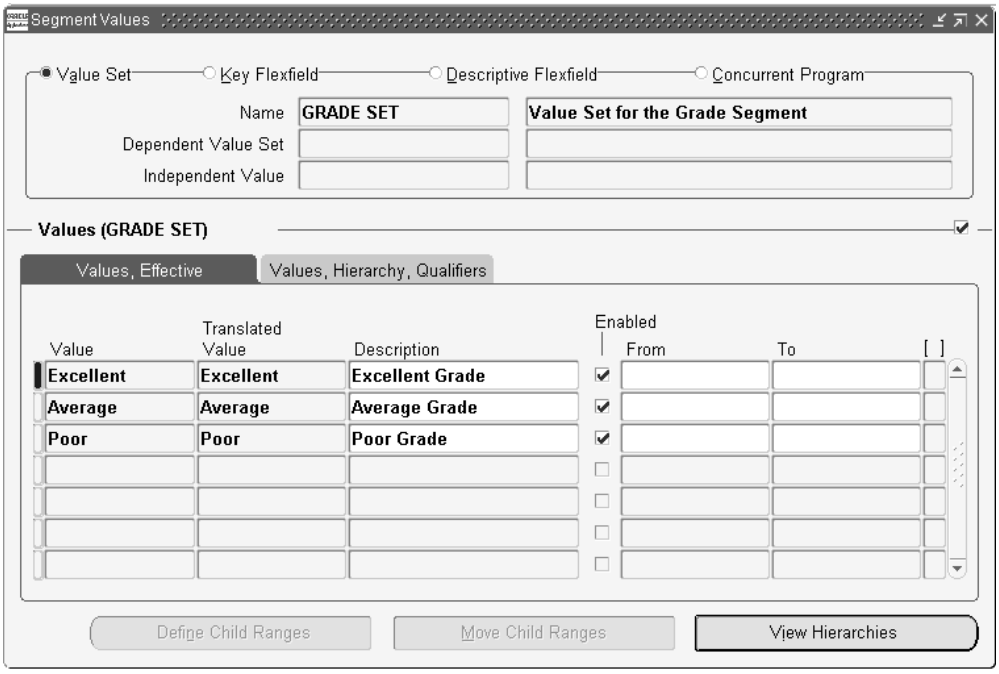
To set up lot and serial attributes:

1. Navigate to the Value Set window.



2. Define the value sets for your lot or serial attribute segments. For instructions about how to define value sets, see the *Oracle Flexfields User's Guide*.

3. After you finish setting up the value set, navigate to the Values window and enter the actual values for the value set.

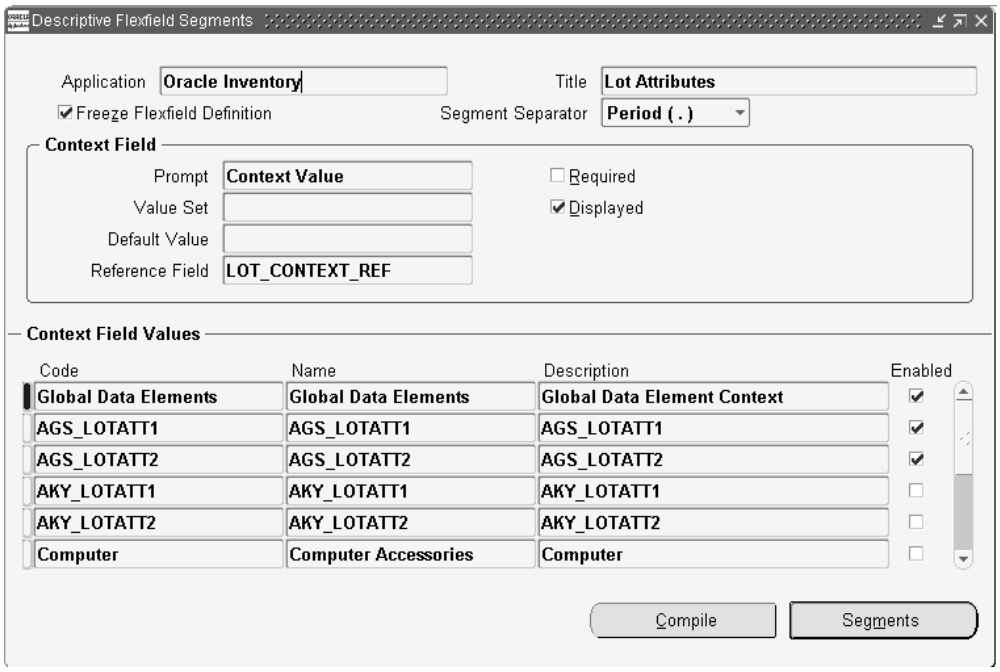


How to Set Up Load and Serial Descriptive Flexfield Contexts

Setting up lot and serial descriptive flexfield contexts involves defining a context for each type of item that will track different groups of attributes. You should define different contexts to do the following:

- Track different attributes for different types of items
- Provide different default values for different types of items

1. Navigate to the Descriptive Flexfields Segments.



2. In the Title field, query on Lot Attributes to display the context codes that currently exist for lot attributes.

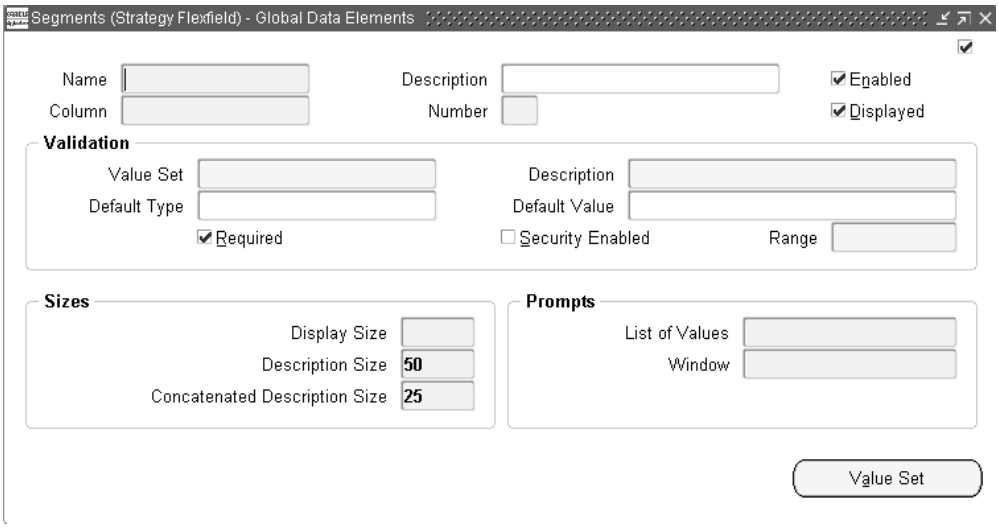
3. Set up lot and serial descriptive flexfield contexts according to the instructions in the *Oracle Flexfields User's Guide*.

How to Setup Lot and Serial Descriptive Flexfield Segments

When you configure each attribute for each context, you specify the following:

- The database column in which to store the attribute. Oracle Warehouse Management supports data types of varchar, number, and date.
- Whether the attribute is required or optional
- The default value for the attribute
- The value set for the attribute. The value set determines the following:
  - The length of the attribute
  - The type of validation of the data. Attribute validation types include: no validation, independent validation, and table validation. Independent validation means that the attribute will be validated against a manually define list of values.

1. Navigate to the descriptive flexfields Segments window.



2. Enter segment information according to the instructions in the *Oracle Flexfields User's Guide*.

How to Compile Descriptive Flexfields

After you define your descriptive flexfield, including all of its components, such as segments and values, you must freeze the flexfield definition by selecting the Freeze Flexfield Definition check box. Freezing the flexfield automatically compiles it. However you can compile your flexfield manually, by choosing Compile.

> **Note:** To modify a flexfield, you must clear the Freeze Flexfield Definition check box.

For detailed instructions on compiling descriptive flexfields, see the *Oracle Flexfields User's Guide*.

Assigning Context Mapping by Item or Item Category

After you compile your flexfield, you need to navigate to Descriptive Flexfield Context Mapping window and assign the attribute context to its associated item category or item. Only categories within one category set can be used in an organization to assign attributes at the category level.

When you assign a context to an item or an item category the following occurs:

- The system prompts the user to enter the correct group of attributes for each type of item.

- Users can assign default contexts by item category or item number.
- Users can assign by categories that exist in any category set. However, by assigning an item to a context that is different than its owning category, then the item takes the attributes assigned at the item level.

  Note: If an attribute is assigned to an item category, then the item inherits the attribute.

Related Topics

Overview of Item Categories, *Oracle Inventory User's Guide*

Item Category Flexfield Structure, *Oracle Inventory User's Guide*

Inventory Attribute Group, *Oracle Inventory User's Guide*

Lot Transactions

Oracle Warehouse Management provides sublot control functionality that enables you to split, merge, and translate lots. Lot splitting enables you to split lots into multiple lots to differentiate between quantities of material that are no longer similar enough to consider as a single lot. You can create a new lot, or child lot, from an old lot, or parent lot. The ability to split lots into child lots allows for more exact inventory lot tracking.

You can also merge multiple lots into a single lot. Lot merging enables you to merge lots that contain identical attributes. You can transfer or change lot attributes in the new or resulting lot.

Lot translation enables you to transform the entire available quantity of a lot into a new lot. The resulting item can be the same as the item of the start lot, or a different item. If you retain the same item, then the system transfers the lot attributes from the starting lot and you can modify them as necessary. If you change the resulting item during translate, and the lot attribute category is the same as the starting lot, then the system copies the lot attributes to the new lot. If the lot attribute category of the new item differs from the starting lot, then the system copies the default attribute values.

You can split, merge, or translate lots for a variety of reasons as material moves through a facility.

- PO Receiving: You can split lots that you receive from suppliers to create a sublot for each quantity of that material. For example, a supplier sends five rolls of paper from the same lot number. You can split the supplier lot into sublots, one sublot for each roll of paper.
- Putaway: You can merge lots at lots at putaway when lots are stored together and you can no longer maintain the identity of each lot; for example storing material in

a vat or silo.

- Issue Components or Raw Materials to Manufacturing: When material is issued to a work order or batch, the component or ingredient lot numbers are associated with the work order or batch.

- Complete Assembly or Final product into Inventory (Manufacturing completion): When production is complete, you can split subsets of the assembly or product batch with similar characters into sublots, for example one sublot per shift of a production batch.

Lot genealogy tracks the composition and where used history of a lot through the split, merge, and translate transactions. With lot genealogy, you can track the various transactions that are performed on any given lot. Lot genealogy is useful in product recall situations. Production problems or tampering are examples of when a product recall is required. In a recall situation, a company needs to be able to recall all assembly or final product lots that use a particular component or raw material in the manufacturing process.

Lot Split and Merge

Sublot functionality fundamentally consists of splitting and merging lots to track the genealogy of the lot. You split a lot to create a sublot; therefore, a sublot is a lot that has a child relationship to another lot. Sublots have the same functional support as lots. Oracle Warehouse Management supports an unlimited number of sublot levels.

Lot Splitting Features

Lot splitting enables you to split a quantity of material in to two or more lots. You can perform lot split when a portion of a lot has different characteristics. Lot splitting supports full and partial quantity splits, loose or packed material splits, and autosplit. The system supplies the lot genealogy automatically when you perform a lot split. You cannot split a reserved lot.

Full and Partial Split Support

Lot splitting supports full and partial lot splits. A full lot split enables you to split the entire quantity of a lot into new child lots and ensures that no remaining quantity of the starting lot is missing. A partial lot split splits a partial quantity of a lot into new child lots while leaving the remaining quantity in the parent lot.

Support Splitting Loose and Packed in LPN Material

You can split loose material into loose inventory or pack it in an LPN. You can also split lots within an LPN into loose inventory, within that LPN, or pack it in a new LPN. You can split the lot into an existing LPN or a new LPN.

Support Autosplit and Manual Split

Autosplit enables you to create numerous resulting lots with the same lot attributes. You can perform an autosplit when a lot is split into a large number of resulting lots. To perform an autosplit, you specify the number of resulting lots or the quantity for each lot. When you perform an autosplit, you must split the lot into at least two lots.

When a lot is split into a small number of resulting lots, you can manually split the lot by specifying the resulting lot numbers and lot quantities for each of the resulting lots. You can also specify different lot attributes of the resulting lots.

Lot Attributes

Lot splitting defaults lot attributes of resulting lots from the lot attributes of the starting lot. Users can update the defaulted resulting lot attributes after the resulting lot is specified.

Lot Merging Features

Lot merging enables you to merge multiple existing lots into a new lot, and merge multiple existing lots into an existing lot. You perform merging when you store lots together from multiple inventory locations or you can no longer maintain the identity of each lot. Lot merging supports full and partial quantity merges and loose or packed material merges. Lot genealogy is suppled when you perform a lot merge.

Support Full and Partial Merge

Lot merging supports full and partial lot merges. You use a full lot merge to merge the entire quantity of one or more lots into a new lot or an existing lot. You use a partial lot merge to merge a partial quantity of one or more lots into a new lot or an existing lot, while leaving a remainder quantity in the parent lots.

Support Merging Loose and Packed Material in LPN

You can merge loose material to loose inventory or pack it in an LPN. You can also merge lots within an LPN to loose inventory or within an LPN. When lots in different LPNs are merged, the system consolidates the LPN when you select an existing LPN or generate a new LPN.

Lot Attributes

Lot merging defaults lot attributes to the resulting lot from the starting lot with the largest quantity. If lots of equal quantity are merged, the lot attributes default from the first start merge lot.

Lot Translate Features

Lot translate enables you to translate an existing lot into a new lot. You can perform lot

translate when you want to transform the definition and characteristics of an existing lot into a new lot. The system supplies lot genealogy when you perform a lot translate.

Translate into the Same or Different Item

Lot translation enables you to move an existing lot to a new lot. The new lot can belong to the same item as the starting lot, or a different item. You can perform lot translation on the entire available lot quantity.

Support for Translating Loose and Packed Material in an LPN

You can translate a loose lot into loose inventory, or pack it in to an LPN. You can also translate a lot within an LPN to an LPN or into loose inventory.

Lot Attributes

If the resulting item changes during lot translate, and the lot attribute category for the new item is the same as the starting lot, then the system copies the lot attributes to the new lot. If the attribute category for the new item differs from the starting lot, then the system copies the default lot attributes. You can modify the default lot attributes if necessary.

Lot Genealogy

The system creates a lot genealogy transaction whenever you split, merge, or translate a lot. It also stores a reference to the transaction information. Lot genealogy also helps keep track of lot attributes. Lot genealogy includes online inquiry windows that display relationships between parent and child lots that are created during lot splits and merges as well as lot attributes, transaction history, and current on-hand quantities.

Related Topics

Viewing Lot Genealogy, *Oracle Inventory User's Guide*

Lot Transaction Setup

Lot Split Merge and Translate Setup

You can restrict or enable lot split or merge in two ways:

- Item Level Control
- Lot Level Control

Item Level Control

The Lot Split Enabled attribute enables you to split lots of the item. You must select this

attribute to enable lot splitting for the item.

The Lot Merge Enabled attribute enables you to merge lots for the item. You must select this attribute to enable lot merging for the item.

The Lot Translate Enabled attribute enables you to translate lots for the item. You must select this attribute to enable lot translate for the item.

Lot Level Control

Lot split, lot merge, and lot translate are transaction types. You can disallow these transactions for material statuses that you created. If the lot, locator, or subinventory has a material status that does not allow you to perform a lot split, lot merge, or lot translate, then you cannot perform the lot transaction.

> **Note:** Oracle Warehouse Management does not support lot split or merge for an item that is under lot and serial control, unless the serial number control is at sales order issue.

Lot Genealogy Setup

To view the lot genealogy properly, set the two profile options: INV: Genealogy Prefix or Suffix and INV: Genealogy Delimiter on the site, application, responsibility, or user level. The profile option INV: Genealogy Prefix or Suffix determines how the item and lot number should be displayed in the genealogy tree structure. The two possible settings are Prefix (the lot number is displayed before the item number), and Suffix (the lot number is displayed after the item number). The profile option INV: Genealogy Delimiter determines what should be the delimiter between the item number and the lot number. If the profile options are not set, then when the user views the lot genealogy, it shows NULL on the tree node instead of the lot number.

For Example, in the System Profile Values window, set INV: Genealogy Prefix or Suffix to Prefix and INV: Genealogy Delimiter to "." on the site level. In the Lot Genealogy Form, the node of the tree will show as L2-003.MR_LC2, where L2-003 is the lot number and MR_LC2 is the item number.

Lot Transaction Examples

Lot Split

Manual Lot Split

During a manual split, neither the number of lots nor the quantity per lot is mentioned; only the split quantity is mentioned. The user can split the lot loose or into an LPN. In this example the starting lot was split into two lots of five each. On each of the lots, one was split loose and the other was split in an LPN.

Auto Lot Split

While performing an auto split, the user mentions either the number of resulting lots or the quantity per lot. For example, if the number of lots are two, then a quantity of 7 was split into two lots of 3.5 per lot. The user can split the lot loose or into an LPN.

Lot Merge

Two different lots of different quantities are merged into a single resulting lot. The resulting lot is packed into an LPN. The total quantity is the sum of both the starting lots.

Implementation

1. Should I default the context at the global or organization level?

   Contexts may be assigned at the organization level when different organizations in the supply chain wish to track different information regarding a lot and/or serial. For example, a manufacturing plant may need to track more information about a lot and or serial than a sales office. On the other hand, inter-organization transfers of items with lot or serial attributes require that the same context assignments be defined in all the source and destination organization. To aid in this setup, the context mapping can be made common to all organizations. For example, material that is sent back from the sales office might lose the information originally gathered regarding the lot and this information would need to be reentered. In summary, the priority of these two requirements needs to be weighed to determine the optimal setup for your organization's supply chain.

2. How changeable is the Lot / Serial Attribute setup?

   It is recommended that a detailed analysis be completed regarding which attributes will be tracked for each item or category before receiving the material. In general, disabling lot/serial attributes and adding non-required lot/serial attributes should not pose problems (other than the issue that all existing lots will not have information populated for the new attributes). Problems mainly result from the addition of a required lot/serial attribute once lots/serials exist for that item. Once lots and serial numbers for an item have been defined with a given context, changing that context may result in an error when querying up the lot/serial due to a null value in for a required attribute.

   It is recommended that all the required attributes have default values defined.

3. What needs to be done before I set up Lot / Serial attributes.

   ICX: Numeric characters profile needs to be set up. For setting up this profile, you should logon as System Administrator, and then go to System Administrator > profile > System to set this values. An example of values for this profile are ICX

Numeric Characters "." which specifies the decimal separator for number fields displayed in the flexfield pop-up window. Similarly, there are other profiles like, ICX: Date language -> "American English", ICX: Date format -> "DD-MON-RRRR", which specifies the formats for date fields in the flexfield pop up window.

Common Problems

1. I am getting an error while compiling Lot / Serial Attributes Descriptive I flexfield

   If any of the segments, in any context associated with this descriptive flexfield (DFF) have a segment name that is an Oracle reserved word like varchar, number, date, or char, then concurrent request which will create a view for this descriptive flexfield (DFF) will fail. Please check to see non of the segments have Oracle reserved words as segment names.

2. The Lot or Serial attributes Mobile page gives an unexpected error.

   Please check to see your Lot or Serial attributes descriptive flexfield definition is frozen.

3. Not prompted for Lot or Serial attributes during transactions or prompted for wrong attributes?

   Here are the steps that should be taken to debug this issue:

   1. Check to see if there is any context assigned to the item that you are transacting in that particular organization. You can do this by opening the Assign Descriptive Flex context mapping window.

   2. Check the context assignment hierarchy.

   3. Check to see if the descriptive flexfield has been compiled properly.

   4. Check to see if the item is lot or serial enabled. Lot and serial attributes do not appear for non lot and serial controlled items.

4. The lot is not shown in the Lot LOV of the Lot Split, Lot Merge, or Lot Translate window.

   The reasons for this could be the item attribute Lot split enabled, Lot merge enabled or Lot translate enabled is not checked in the Item Master, or the item has a material status that disallows lot split, lot merge or lot translate.

5. Lot Merge shows the error Lot Belongs to a Different Cost Group. Cannot Merge

   This could happen because you are merging lots with different cost groups and it causes the commingling problem. When doing lot merge, the cost group of all starting lots must be the same.

Frequently Asked Questions

1. Can I assign Lot or Serial attributes to an item that has already been transacted in an organization?

   : You can assign lot or Serial attributes to an item that is already transacted in an organization, but it is very important to do the following steps. If there are any required segments for attributes and the following steps are not performed, then any inventory transaction for existing lots or serials will fail.

   - For Lot attributes go to the Maintain Lot numbers window and query up the existing lots for the item and give values for the required segments.
   - For Serial attributes go to the Maintain Serial Numbers window and query the existing Serial numbers for the item and give values for the required segments.

2. Can I change the Lot or Serial attribute context of an item that has already been transacted

   Yes, you may changed contexts.

   > **Warning:** Lots or Serials which are already transacted still have the old context and attributes corresponding to the old context.

3. Can I add new segments to a context that is assigned to an item or item category which has been transacted?

   Adding segments to a context does not pose any problems so long as the segments are optional segments. If you need to add required segments to an existing context, you must update the attributes of the on-hand lots or serials that are already assigned to that context to populate the newly required segments.

4. Is it possible to have different Lot or Serial attributes contexts for an item which are enabled in different organizations? How will the attributes be transferred for such an item in organization transfer transactions?

   Yes, you can have different Lot or Serial attributes contexts for an item which is enabled in different organizations.

   Mobile: When you transfer a lot or a serial from one organization to a different organization and if the contexts are different, then lot or serial numbers that are transacted will have the default values defined for the context in the destination organization. Then you can go to desk top Maintain Lot/Serial Numbers form and update attribute values if they are different from default values.

   Desktop: Direct organization transfer if the context is different the default attributes will be populated in the destination organization. For inter organization transfer at the time of in-transit shipment receipt on desktop you will be able update or enter

new set of attributes.

5. Who can alter Lot or Serial attributes of an existing lot or serial?

   Anyone with access to the Maintain Lot Numbers form and the Maintain Serial Numbers form can alter lot and serial attributes

6. How can I configure default values for Lot or Serial attributes?

   Lot and serial attributes functionality is an extension of descriptive flexfield functionality. Please refer to flexfield set up manual for the set up of Lot/Serial attributes descriptive flexfields.

7. Will Lot or Serial attributes behave differently in inventory organizations Oracle Warehouse Management organizations?

   Lot and serial attributes functionality will be enabled only if you purchase Oracle Warehouse Management Applications. Lot and serial attributes behave same way in inventory organizations & Oracle Warehouse Management organizations.

8. Are there any seeded Lot or Serial attributes?

   No.

9. Can lot and serial attributes be integrated with third party software?

   Oracle Warehouse Management sublot functionality includes all of the APIs to integrate with 3rd party systems.

10. Which segments would appear in the pop up window?

    For a descriptive flexfield with context-sensitive segments, a single structure consists of both the global segments plus the context-sensitive segments for a particular context field value, so for this case all the segments for the global and the segments for the context for flexfield Lot Attributes or Serial Attributes that have been setup for the item or the item category will show up as a pop up window.

11. Is there a limitation on the number of characters in the prompts for descriptive flexfield segments window?

    The standard length for mobile forms is nine characters. Therefore when configuring the Lot and Serial Attributes descriptive flexfields, it is recommended the length of the window prompt not to exceed nine characters.

12. Can you add more than one context value for the same flexfield Name (e.g. Lot attributes) and context column (e.g. item) in the Descriptive Flex Context Mapping window for an item?

    No. You can have only one context value for an item.

13. How are lot split and lot merge and lot and serial genealogy supported in inventory

organizations?

Lot split and merge and are supported in Oracle Inventory and Oracle Warehouse Management organizations and they are available only when Oracle Warehouse Management is installed. Lot and serial genealogy are supported in both Inventory and Oracle Warehouse Management organizations. See View Lot Genealogy, *Oracle Inventory User's Guide* and Viewing Serial Genealogy, *Oracle Inventory User's Guide*.

14. How do you perform a manual split and an autosplit?

    You can perform a manual split and autosplit in the same window. To perform an autosplit, in the start page, enter the Num Lot field or Ea Lot Qty field, then the `<Auto Split>` button appears. Select `<Auto Split>`. On the next page, the system generates the resulting lots and calculates the resulting quantity automatically. When you perform an autosplit, you cannot change the resulting quantity for each resulting lot and the starting lot must split into at least two resulting lots.

    To perform a manual split, from, the Start page, skip the NUM Lots and Ea Lot Qty fields, and select `<Save / Result>`. The Result page opens. In the Result page, you generate the lot and enter the result request manually. You can split the lot in to another lot with manual splitting.

15. Will the result lot default the LPN from the start lot when you perform a lot split / merge within an LPN?

    When you split lots within an LPN, the resulting lot does not default the LPN from the starting lot. you must specify the LPN if the lot is to be packed in an LPN. The same is true for merging lots.

    For an autosplit, if you split the lot in to three resulting lost and only specify the LPN in the first resulting lot, then select <Done>, only the first resulting lot is packed in the LPN, and the other resulting lots reside in loose inventory.

16. When should full lot splits be used, and when should partial lot splits be used?

    The ability to split lots into new lots allows for more exact inventory tracking by lot attributes. If some key lot attributes for a quantity within a lot no longer match the attributes of the rest of the lot, then that portion of the lot should be split into a new lot. In this example, should you have a partial quantity lot split, or a full quantity lot split?

    Proposed solution: In this situation you should perform a partial quantity lot split. This places the quantity that has different lot attributes into a new lot. The quantity that still has the same lot attributes remains in the same lot number.

    When new lots are created at WIP Completion, the quantity at the parent lot will usually be fully split into the child lot.

17. What cost group is associated with the new lot formed during lot split?

During lot split, the cost group of the parent low is assigned to the new lot.

18. What lot attributes are carried over to the resulting lot when two lots are merged?

    When two lots are merged the resulting lot takes the attributes from the lot that has the higher quantity. When two lots of the same quantity are merged, the lot attributes of the first parent lot are carried over to the resulting lot.

19. Can two lots of different items be merged?

    No, this not currently supported.

20. How can a lot packed in a nested LPN be merged with lots packed in nested LPNs?

    Merging a lot packed in a nested LPN with lots packed in nested LPNs is not supported.

21. Can you perform split and merge transactions on the desktop?

    No, you must perform split and merge transaction on the mobile user interface.

3

Oracle Warehouse Management Rules Engine

This chapter covers the following topics:

- System Rules Engine
- Rules Engine Methodology
- Top Down Approach
- Implementation
- Implementation Considerations
- Customization
- Maintenance
- Common Problems
- Runtime Execution Trace
- Debug Message from the Rules Engine
- Frequently Asked Questions

System Rules Engine

Warehouse Management provides a full-suite of tools that enable a warehouse to effectively dispatch tasks and manage inventory. Currently, many decisions within a warehouse are left for the operator to perform, demanding a high degree of operator training, but yielding suboptimal results and occasionally serious mistakes. Material handling rules, customer requirements, and storage constraints place complex demands on the warehouse. The rules engine provides a flexible repository for the many different types of rules and restrictions to effectively manage a warehouse. This chapter illustrates how the rules engine can automate this decision making process and includes detailed implementation notes, examples, common problems, and supporting test scripts.

The rules engine enables directed picking and put away, assigns newly received material to a cost group, ensures customer compliant labeling, assigns tasks to a resource with the appropriate training and equipment, and selects the correct operation plan for a task. You can also use the cartonization criteria to assign the four options of the cartonization algorithm at the organization or subinventory level. Rules can be based on nearly any attribute in the database, including user-defined flexfields. Strategies, or a collection of rules, can be organization specific, customer specific, item specific, or specific to one of many additional business objects.

Directed Picking and Putaway

The rules engine provides intelligent suggestions for put away locations of new material, based on virtually any business process. Some common processes the rules are capable of modeling include: minimizing item fragmentation, requiring no lot commingling in a locator, directing hazardous materials to a corresponding hazardous storage location, or placing seasonal items in a subinventory dependent on time of year. Other put away possibilities include: basing the location on inspection results, purchase order type, or item category. The rules engine also suggest material put away to intelligent locations suggested by the rules engine, for any items anywhere within the warehouse.

When the system releases a pick wave to the warehouse floor, the rules engine determines the allocation suggestions. You can create picking rules to model business practices such as: to ensure stock rotation, meet customer requirements such as stock condition or quality, lot expiration date, or country of origin. You can allocate material by a simple FIFO or FEFO (first expired, first out) rule at the organization level, picking rules that pick to deplete a location to free up additional warehouse space, or rules to pick by cost group ownership. You can also model customer requirements so a single lot fills an entire order, or warehouse preferences so an item is picked from a single locator.

Task Type Assignment

Task type assignment captures the skill sets and equipment required for a warehouse task so work is assigned to appropriate users. Operators can sign onto a mobile RF device, optionally specifying the equipment available to them. Tasks are assigned to operators based on the operators skill set, equipment requirements and capacity, or the subinventory in which the task occurs. For example, you can assign hazardous tasks to personnel with the appropriate HAZMAT training, and limit put aways to the top racks to operators who signed on with a high-reach forklift.

Related Topics

Explaining Task Type, Label Format, and Operation Plan Selection Rules, *Oracle Inventory User's Guide*

Cost Group Assignment

Cost groups capture the material valuation accounts necessary for tracking inventory value. For instance, you can set up different accounts for refurbished, consigned, and company-owned inventory. You can also keep different cost groups for different sales channels. When you receive new material into the warehouse the owning cost group must be determined.

Material handlers should not make Cost group decisions. The rules engine automates this decision making, removes complexity from the floor and still provides material valuation accounts tracking. Cost group assignment can be made by inspection results, with a failed item assigned to a Hold for MRB cost group. Cost groups can also be assigned by supplier site, item category, or by item. The system uses default cost group of the items storage subinventory when it cannot find a rule for the transaction.

Related Topics

Cost Groups Overview, *Oracle Warehouse Management User's Guide*

Label Format Assignment

Compliant labeling is becoming increasingly important, but also increasingly difficult as different customers or carriers may require a different label format. The rules engine can select the appropriate label format based on customer, carrier, item category, or transportation method. These formats are associated with the required information, barcode symbologies, and appropriate layout for each item or container. Additionally, odd sized items may require different label types, or some order types may require weather-resistant labels. The rules engine can print different labels for different freight carriers or shipment types. The rules engine can also select label formats for use inside the warehouse. When you receive lot controlled items, the rules engine can print the appropriate lot stickers automatically.

Related Topics

Explaining Task Type, Label Format, and Operation Plan Selection Rules, *Oracle Inventory User's Guide*

Setting Up Label Format Assignment Rules, *Oracle Warehouse Management User's Guide*

Operation Plan Assignment

Operation plans determine the routing, packing, and consolidation operations that a task must go through. Some outbound processes may require LPN-based consolidation, whereby the system suggests which LPN to consolidate a delivery into when dropping an LPN in a staging lane, while other deliveries do not use this LPN consolidation. The operation plan selected during task creation controls these options as well as several additional features. The Rule Engine selects the operation plan based on the source

subinventory, destination staging lane, customer class, or item type, or any number of different criteria.

Crossdock Criteria

Crossdock criteria determines the eligible supply and demand sources for crossdocking. You use crossdock criteria for both planned and opportunistic crossdocking. Crossdock criteria represent the business rules on which the system makes crossdocking decisions. After you create crossdock criteria, you use the Rules Workbench to assign the criteria. For more information on Crossdocking see Overview of Crossdocking, page 7-1 and Crossdock Criteria, page 7-2.

Rules Engine Methodology

The rules engine is a very powerful and complex tool, but approaching it from the top down can ensure an efficient, streamlined system of rules. You can share rules among strategies and organizations. Several well-defined rules can take the place of dozens of more restrictive rules. Improper planning can lead to unnecessarily restrictive and complex rules that make the system more difficult to setup, debug, and maintain.

Definitions

Rule is a generic term for the way the intelligence is encoded in the rules engine; however, for the rules engine, they have a much more concrete meaning.

Rule

A rule is one or more restrictions that must be fulfilled to satisfy a business or customer requirement. Picking and put away rules also have an optional sort criteria to place an ordering on the list of put away or picking allocations that meet the restrictions. Picking and put away rules also have a quantity function, which specifies the function used to determine the material available for picking, or the space available for put away.

Example

Example: Put away into any empty locator. Use the minimum of the destination locators volume and weight capacity to determine the amount of space available. Order the locators in ascending row, rack, and bin.

Picking rules also have optional consistency restrictions, to model requirements such as a pick must be for a single grade code, a single lot, or from a single subinventory. Picking rules also have an allocation mode, which controls whether allocations should be based on a pick unit-of-measure, and whether allocations should be made to the LPN detail level, or just to the locator level.

The following rules are used to develop a complete put away example.

1. Put away into any empty locator.

2. Put away into a locator, but do not commingle different lots of the same item.
3. Put away into any locator.
4. Put away into a refrigerated location.
5. Put away into any locator with a rack number greater than 3.
6. Put away into any locator with a rack number less than or equal to 3.

Cost group, task type, operation plan and label assignment rules have a return value instead of a quantity function. If all the restrictions are met, then the return value provides the name of the task type, label format, operation plan or cost group.

Example

Example: If an item has a HAZMAT code, then return the task type *hazardous*.

Strategy

A strategy is an ordered sequence of rules that are used to fulfill complex business demands. The system traverses the rules of a strategy in sequence until the put away or picking task is fully allocated, or until a cost group that meets the restrictions is found. Strategies are not used for task type, operation plan and label format assignments.

Some distinct strategies are as follows:

1. Default put away strategy: First try to put away into an empty locator. If that fails, try to put it in any locator, but do not commingle different lots of the same item. Finally, if that still fails, put into any locator.
2. Never commingle strategy: First try to put away into an empty locator. If that fails, try to put it in any locator, but do not commingle different lots of the same item.
3. Refrigerated strategy: Put away into a refrigerated location.
4. On season strategy: First try to put away into any locator with a rack number less than or equal to 3. If that fails, put it in any locator.
5. Off season strategy: First try to put away into any locator with a rack number greater than to 3. If that fails, put it in any locator.

Business Object

Business Object: A business object is any entity with attributes and parameters used by a business and tracked by Oracle, such as an organization, an item, or an item category. The rules engine comes seeded with the most common business objects.

Some of the most common business objects used within rules are as follows:

- Item

- Item Category
- Organization
- Subinventory
- Customer

Strategy Assignment

A strategy assignment is a strategy you associate to an instance of a particular business object. You specify an instance by naming both the type of business object (e.g.: item category), and the name of the instance (e.g.: winter seasonal).

Some distinct strategy assignments are as follows:

1. For the organization WH1, whenever there is a put away task, use the default put away strategy.
2. For items in the item category perishable, use the refrigerated strategy.
3. For the item PR11568, whenever there is a put away task, use the never commingle strategy.
4. For items in the category summer seasonal, use on season strategy if it is March to September, and use off season strategy is it is October to February.
5. For items in the category winter seasonal, use off season strategy if it is March to September, and use on season strategy if it is October to February.

Execution for Rules with Strategies

You assign strategies, or sequences of rules, to one or several business objects in the Rules Workbench. When a pick, putaway, or cost group assignment strategy is required, the rules engine evaluates all the strategy assignments in the Rules Workbench, returning the first strategy where the attributes of the strategy assignment match the attributes of the transaction for which the strategy is required. The system filters strategy assignments so the rules engine considers only enabled assignments that are currently effective.

Although you must set up the rules engine from the bottom up, starting with the rules, the best way to understand the rules engine is to approach it from the top down. You should use the most general restrictions at each level. Setup is slightly different for cost group assignments, picking, and put away rules than from the other three types of rules.

The three steps are defining strategies for each business object, deciding which rules belong in the strategies, and defining the rules.

Task Type, Label Format and Operation Plan Selection Rules

Task type rules, label format rules, and Operation Plan rules are not assigned to strategies, but are automatically linked directly to the organization. The rule weight determines the search order. You set the rule weight for each rule, and higher weights take precedence. The higher the number the higher the weight.

For example, an organization has these types of tasks:

- HAZMAT task - required whenever item has a HAZMAT code
- high reach - required whenever item is in a locator with rack number > 4
- default task - for all other tasks

Assuming that the HAZMAT task takes priority (i.e.: if a task is both a HAZMAT task and a high reach task, then HAZMAT task should be returned), three rules are required:

1. High weight rule: If item has a HAZMAT code, return HAZMAT task
2. Mid weight rule: If item is in a rack > 4, return high reach task.
3. Low weight rule: Return default task.

Top Down Approach

In the top down approach, you must first determine the different strategies required for the different business objects. Perhaps three different customers have the same restrictions on lot quality, and all other customers do not have any preference on lot quality. This means you may need two different strategies for the two different groups of customers. If one of the customers requires lots of a certain quality for most items, but of a different quality or with different attributes for a different item, you may need two different strategies for that one customer.

List out all the common strategies that are required - for picking sales orders, picking manufacturing requirements, picking replenishment tasks, and so forth. You may find that the strategies you use when allocating material for different documents are all very similar, or they may all be different. Look for the common attributes in the strategies to see where you can reuse the same strategy, and where you may require different strategies. Conduct a similar analysis for putaway and cost group setup. The output from this step is two elements for each of the rule types: what strategies are needed, and to which business objects those strategies are assigned.

> **Note:** You should generally avoid combining mutually exclusive conditions in a single strategy because you may often be able to separate them into two smaller strategies to get exactly the same

functional behavior from the rules engine, but with better performance.

Grouping Similar Instances

Another way to simplify rules is to group instances using defining attributes. For instance, instead of creating different rules for each item at the item hierarchy level, you can create a rule for a category of items.

Example

ExampleYou can assign the *refrigerated strategy* to each of the dozens or hundreds of individual items within the item category of perishable, but the rules and strategies are much easier to maintain if you group these items by item category and assign a strategy at the item category level.

Effective Dates

You can assign effective dates to Strategies and strategy assignments so you can create time dependent strategies.

The following are some of the allowed effective date types, and examples of each:

1. Always, when the strategy is not time dependent
2. Full date, to specify a particular starting and ending date

   - June 1, 2001 through July 15, 2002
3. Date, to specify starting and ending dates applicable to every year

   - June 1 through July 15
4. Month, for seasonal strategies

   - June through July
5. Day, from Monday through Thursday
6. Shift, for shift dependent strategies

Implementation

You must perform four steps to set up the rules engine for picking tasks, put away tasks, and cost group assignment rules. The steps are:

1. Create rules
2. Create crossdock criteria

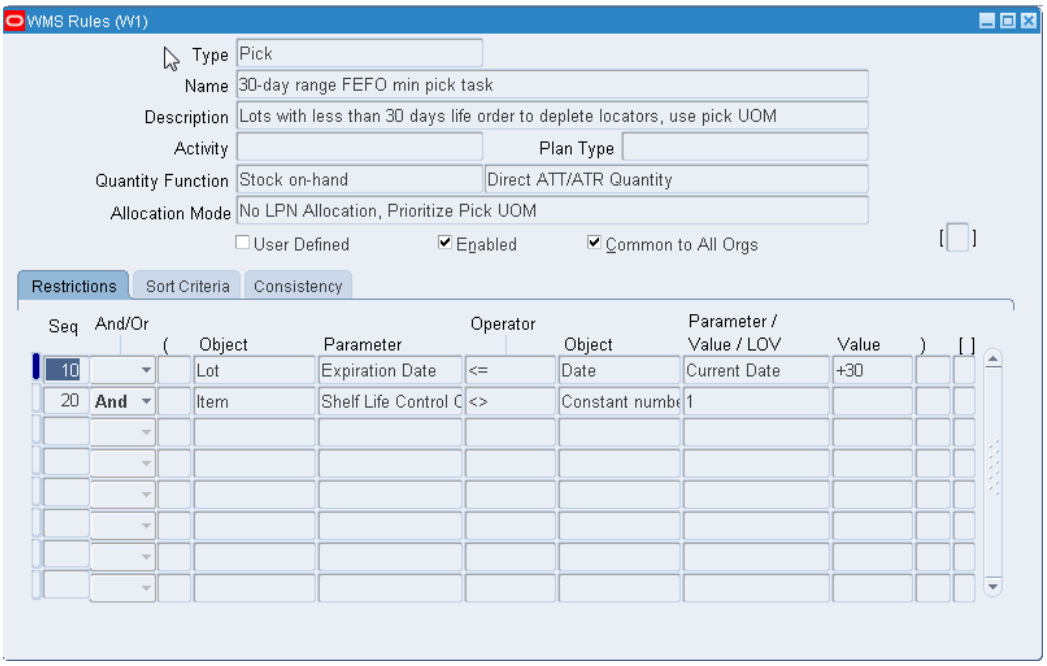
3. Create strategies out of rules,

4. Assign rules, values, or strategies to business objects.

> **Note:** Label format, operation plan, and task type assignment rules require only setting up rules.

Rules

Use the WMS Rules window to set up rules that can be used to build strategies, or to reuse rules for multiple strategies. Rules are slightly different for picking and put away tasks than they are for cost group, task type, operation plan, and label formatting assignments. For instance, picking and put away rules require a quantity function and use an optional sort criteria, while the assignment rules require a return value.



Restrictions

All rules have restrictions. Picking and put away rules apply these restrictions or constraints on the set of all possible locations to pare down the full list of locators from which material can be picked or put away. The assignment type rules evaluate the restrictions and return the value defined in the rule if all the restrictions are met.

For putaway rules, the restrictions answer the question "Of all possible locators in which this material could be put away to, what criteria must those locators have?" For picking rules, consider all the locators in which this material is stored; for all the different revisions, lots, and serials that are on-hand and available, consider what

attributes must that material have in order to be allocated? For task type, label format, and cost group assignment rules, consider restrictions as the list of requirements to be met to select that specific task type, label format, or cost group.

You usually define restrictions by comparing two different attributes. For instance, a putaway restriction that puts material away to the subinventory named BULK equates the destination subinventory with the text "BULK". The following are some of the different ways you can use elements to build restrictions:

Restrictions for Advanced Catch Weight

Oracle enables you to apply various sort and restriction attributes in the WMS Rules window to the Fulfillment Base parameter for sale order lines. This provides the flexibility to create picking rules with the sort criteria or restrictions that you assign. The following restriction objects are available for the primary and secondary quantity:

- Actual Transaction
- Delivery Details
- License Plate
- Move Order Line
- Outermost License Plate
- Sale Order Lines

Basic Operators

The most common operators used in rule restrictions are equality (=) and greater than / less than (<, <=, >, and >=). Other basic operators verify if the attribute is null or not null; these two operators require only one attribute.

Value Sets

You can define value sets to use in rule restrictions to meet complex customer requirements. For instance, a customer of a semiconductor warehouse may require microchips to be manufactured in one of an approved set of countries. The customer may change this list of countries over time and may give pending requirements to the warehouse, such as "on this coming July 15, we will begin accepting product from Thailand", or "at the end of this year, we will no longer accept product from Taiwan". Instead of creating multiple rules to define these changing requirements and setting up effectivity dates for these rules within a strategy, you can define a value set with values that have pending effectivity dates. In order to use a value set, use the IN operator and specify the name of the value set in the rule restriction.

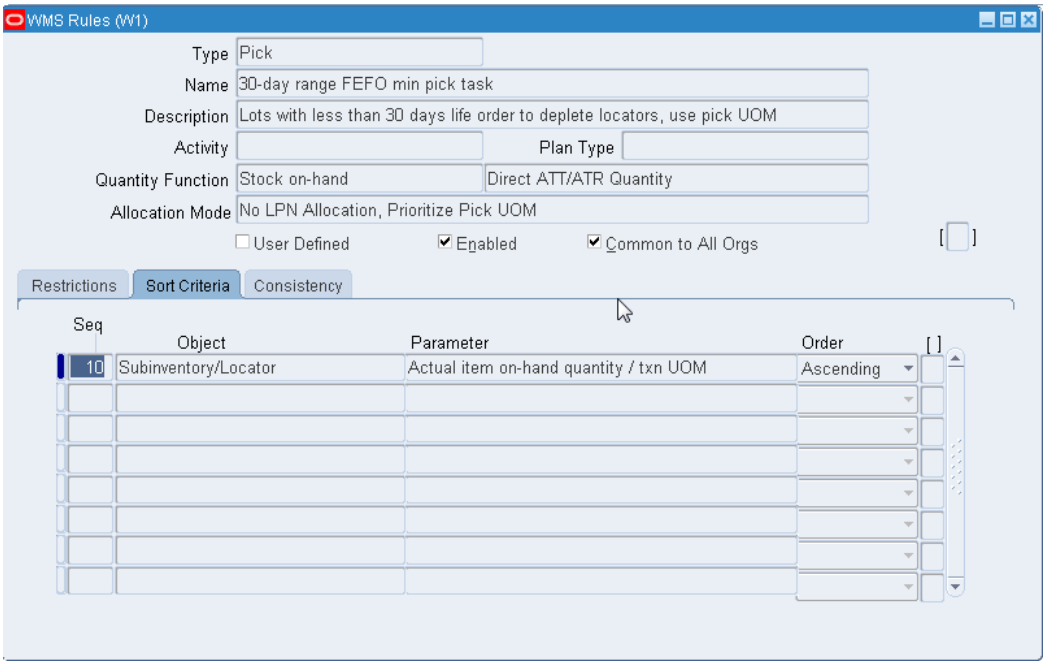
Expressions

Occasionally, the Rules engine must model logic that does not correspond exactly to the seeded objects and attributes, or perhaps mathematical functions or custom

user-defined tables must be referenced in the rule. By using a user-defined expression, a rule based on any data that can be accessed can be built. In order to use an expression, one of the basic operators defined above must be used, and the object on the right hand side should be set to Expression.

Sort Criteria

Picking and putaway rules have sort criteria. For putaway rules, the sort criteria determine which locators with available capacity to use. For picking rules, the sort criteria determines which specific on-hand quantity of an item to select for allocation among all the locators in which the material is stored and all the lots, serials, and revisions that are on-hand and available.



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- Actual Transaction
- License Plate
- Move Order Line
- Outermost License Plate
- Sale Order Lines

Consistency Requirements

Picking rules have consistency requirements. These are used to indicate that some characteristics must be identical across all allocations for that material request.

Allocation Mode

Picking rules have an allocation mode. The allocation mode controls several different ways in which the system can allocate material. Selecting the correct allocation mode allows a warehouse to take best advantage of the way in which material is packed and stored. The four allocation modes are as follows:

- No LPN Allocation
- No LPN Allocation Prioritize Pick Unit of Measure
- Allocation LPN and Loose
- Allocate Entire LPN Only

For instance, if items are typically stored in standard pack quantities, which are not modeled as LPNs, then the No LPN Allocation or Prioritize Pick UOM allocation mode should be used. Or if LPNs are used for storage, but the quantity stored within an LPN varies and multiple lots can often be found in the same LPN, then Allocate Entire LPN Only might be a good fit for the warehouse requirements.

No LPN Allocation

In this allocation mode, the rules engine considers loose and packed material equally. The allocation is not made to the LPN level, so the rules ignore the LPN. If the allocation is made to a locator where packed material exists, select specific LPNs unaided by the rules engine, though other attributes of the allocation such as particular lot or revision numbers must still be honored. If you defined a pick unit-of-measure and assigned it to the locator or subinventory, it is prioritized after the sort criteria that are defined on the rule.

No LPN allocation Prioritize Pick Unit of Measure

Packed and loose material is considered equally and the rules engine does not make allocations at the LPN level; however, the Rule Engine does prioritize the pick unit of measure above the sort criteria. The rules engine attempts to minimize the number of picks required for a task, subject to the rule restrictions. Units of measure and conversions are defined in Oracle Inventory, and optionally assigned to the subinventory and locator.

You can think of a pick unit of measure as the process by which a store clerk makes change for a cash transaction. Suppose the clerk has to return $0.99 to the customer. The clerk likes to make the customers happy by giving them the shiny coins first (sort criteria). The pick units of measure are the different coins: quarter, dime, nickel, and

penny.

If the first allocation mode is used, where sort criteria is prioritized before pick unit of measure, then the customer might end up getting 99 brightest pennies in the cash drawer. If there are quarters, nickels, and dimes that are just as clean and shiny as the pennies, then sort criteria cannot differentiate between which coin to select first, and the pick unit of measure takes precedence.

If you use the No LPN Allocation, Prioritize Pick UOM allocation, then the system honors the pick unit of measure above sort criteria. The customer receives the three shiniest quarters, then the two best dimes, and finally, the four brightest pennies, for a total of $0.99. If there are fewer than three quarters available, the operator then tries to find more dimes, or if necessary, more nickels, and finally, if necessary, more pennies.

The only difference between this example and how the rules engine actually allocates material using this allocation mode is when the clerk would be unable to make exact change. If there were only four quarters and five dimes in the clerk's cash drawer, it would be impossible to get exactly $0.99. The rules engine would allocate three quarters and two dimes as before. But when it fails to find any pennies for the last $0.04, it would roll back up to larger coins, on the assumption that while the warehouse does not want to break up those larger units of measure, it can if necessary to avoid a customer backorder.

If you use either the No LPN Allocation, or the No LPN Allocation, Prioritize Pick UOM, the system uses both the sort criteria and the pick unit of measure; the only difference is which takes precedence. If the item is lot or revision controlled, the system does not group the different lots or revisions together when it tries to allocate full units of measure. Therefore, this allocation mode works best for material without lot or revision control that is stored in a standard pack size.

Allocate LPN and Loose

This allocation mode considers packed and loose material equally; however, the rules engine selects a particular license plate if it allocates from a locator where packed material resides. Instead of allowing operator to select one of the LPNs that contain the required item, the rules engine chooses a particular LPN. You can define restrictions or sort criteria that restrict or prioritize packed material or loose material. The system displays the allocated LPN to the operator when the task is performed, and the allocated portion of the LPN is not available for other transactions. This allocation mode can allocate partial LPNs, so the operator can select LPNs with mixed items. When this allocation mode allocates packed material, the allocation is made to the innermost LPN.

Allocate Entire LPN Only

The system considers only LPNs that can be completely consumed by the current allocated move order line. The system does not consider LPNs that contain multiple items, material partially allocated or reserved to other move order lines, or an LPNs that have a quantity greater than the required quantity. In addition, if only part of the material in the LPN meets the rule restrictions, then the system does not allocate the LPN because the move order line cannot completely consume it. As in the Allocate LPN

and Loose mode above, this allocation mode allocates only the innermost LPN.

Exercise caution when you use this allocation mode as the only rule in a strategy, or in conjunction with consistency requirements. When it is the only rule (or last rule) in a strategy, the system does not allocate the move order if the allocation cannot completely consume the LPN. Unless the warehouse requires that only complete LPNs be picked and sales orders be backordered in the absence of complete LPNs, a rule that allocates packed or loose material should follow a rule with this allocation mode. This allows the system to allocate move orders with partial LPNs, or loose material, even if the system cannot allocate complete LPNs.

Suppose on hand and available are three LPNs with quantities of two, three, and four, and the rules engine attempts to allocate a sales order for quantity of five. If the rules engine comes across the LPN with four first, due to sort criteria or other reasons, the system allocates that complete LPN; however, it is then unable to allocate the remaining quantity of one. This allocation mode does not perform a best fit algorithm.

Using consistency requirements with Allocate Entire LPN Only allocation mode compounds the possibility to backorder, because if a consistency requirement is included the rules engine, the rules engine does not make any allocations if the entire allocation cannot be met. For instance, using the same example above, if the rules engine allocates the LPN with four first, the remaining quantity of one cannot be allocated, and the entire quantity of five is backordered.

The frequency of these issues is reduced if LPNs with standard sizes are used, or if rules that use this allocation mode, and particularly rules with this allocation mode that have consistency requirements, come in a strategy where subsequent rules loosen some of the allocation requirements.

You also need to consider the impact of reservations on this allocation mode. The rules engine applies reservations and rule restrictions together to make an allocation, and only if the requirements in both are met is an allocation made. The rules engine processes allocations one-by-one, before it attempts to gather additional unreserved material to allocate. When the rules engine attempts to allocate one reservation via a rule with this allocation mode, only LPNs that can be fully allocated by a single reservation are allocated. For example, if one LPN has a single item with multiple lots, and LPN-level reservations exist for all the lots in the LPN to a single sales order line; the LPN is not allocated with this allocation mode. When honoring the first reservation, the rules engine does not know additional unprocessed reservations will allow the remainder of the LPN to be allocated. This problem arises when multiple detailed reservations to a single LPN for a single source line are created in advance of allocation.

Allocate Entire LPN Only can be incredibly powerful when LPNs contain mixed lots, particularly when those lots have different attributes that are excluded or preferred by certain customers. It is also useful for manually reserving specific LPNs to sales orders when that LPN contains only a single lot or item without any controls, or when other attributes of an LPN are relevant during allocation and the warehouse wishes to best leverage the way the material is currently packed.

Quantity Function

Picking and putaway rules include a quantity function, although for picking rules, there is only one available quantity function that automatically defaults in the window and is not editable. The quantity function determines how the rules engine calculates availability of the item or of locators. For picking, material availability is calculated by the Available to Transact (ATT) quantity, which considers other allocations and reservations. For putaway, locator availability can be calculated in one of many ways that consider the locator capacity with respect to units, volume, or weight, or that use a custom, user defined, function to determine locator capacity.

Return Value

Task type, label format, operation plan and cost group assignment rules have a return value. This is the single value returned by the rule that specifies the format of the label, the specific cost group to assign, or the user-defined task type to assign if all the restrictions in the body of the rule are met.

Weight

Task type rules, operation plan selected rules, and label format rules are not assigned to strategies and do not have strategy search orders. The rules engine traverses all rules that are available under the organization, ordered by descending weight, when attempting to assign a task type to a task or selecting the correct label format.

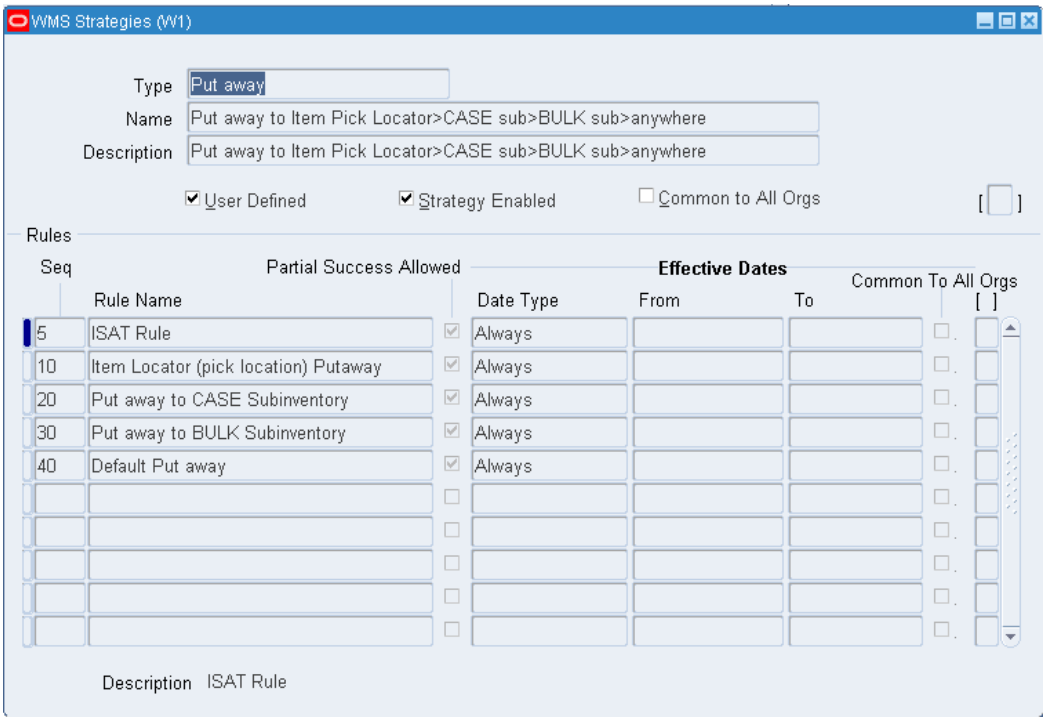
Related Topics

Defining Units of Measure, *Oracle Inventory User's Guide*

Defining Unit of Measure Conversions, *Oracle Inventory User's Guide*

Strategies

Strategies are a sequence of rules with which the rules engine tries to allocate material or space to fulfill a request. You construct strategies in the Strategies window from one or more rules. You can reuse rules for multiple strategies. In the case of the cost group assignment rules, the rules engine returns a value as soon as the rules engine comes to a rule where all the restrictions pass. For pick and put away tasks, the rules engine stops traversing additional rules as soon as the entire task is allocated. Therefore, unless the strategy fails if specific criteria are not met (and the task is unallocated or unassigned), a general default rule should always be the last rule in the strategy.



You can assign rules after you choose the type of strategy to create and enter a name and description. The sequence number specifies the order in which the rules are executed. The rules available to be assigned to the strategy are the rules that are the same type as the strategy, and are further limited by the current organization.

You can allow partial success for pick and put away rules. If the rules engine cannot fully allocate a pick or put away task within a rule, partial success allows a task to be allocated across several rules.

Example

- Suppose the warehouse preferred put away tasks to go first into subinventory A, then into subinventory B - but only if the task can be entirely allocated to that subinventory. Only if no space is available in those two subinventories should the task be allocated to any subinventory (including A or B) where space is available. Then there are three rules to the strategy:

- Put away to subinventory A, do not allow partial success

- Put away to subinventory B, do not allow partial success

- Put away to any available locator, allow partial success

You can also set up rules to be valid only during specific periods of time, as is necessary for seasonal rules or for rules begin some time in the future. *Always* is also an option for the effective date. A complete listing of the effective dates can be found in Appendix B.

The User Defined check box in the Strategies window is similar to the one in the Rules

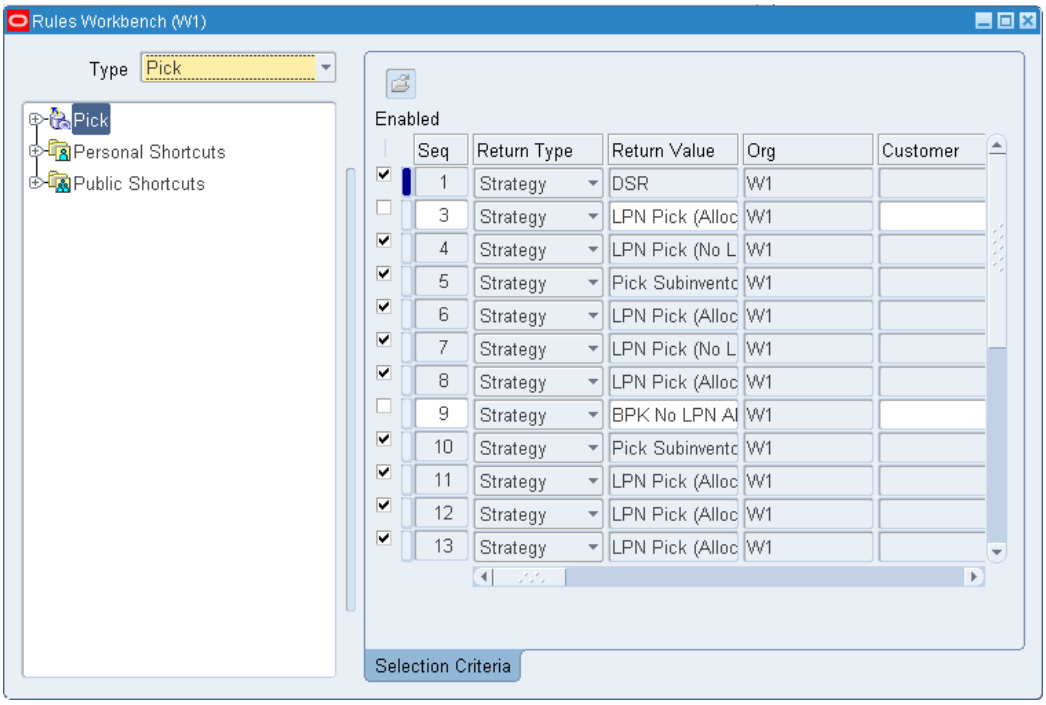
window in that it differentiates rules that have been seeded with the application from those that you define. You cannot modify seeded strategies. You cannot change an enabled strategy. You also cannot disable rules in an enabled strategy. You must disable all strategies that use a particular rule before disabling a rule; this prevents potential data corruption problems.

Rules Assignment

You use the Rules Workbench window to assign strategies to one or several business objects. As with rules within a strategy, the sequence number that you assign to strategy assignments indicates the order in which the rules engine evaluates strategy assignments. The rules engine stops searching for a strategy as soon as it finds an applicable strategy in the Rules Workbench. A strategy is applicable if the assignment is enabled and currently effective (based on the date effectivity of the strategy assignment), and all the assigned business objects match the values of the transaction to perform.

You can also assign a rule directly in the rules workbench instead of assigning a strategy. This means the rules engine searches for an applicable rule in the rules workbench instead of a strategy. If the rule type is either opportunistic crossdock or planned crossdock, you can specify only a rule as the return type.

In addition, you can assign a cost group rule value directly in the Rules Workbench. This enables you to avoid creating dummy rules and strategies that slow down system performance.



For instance, in the Rules Workbench, a picking strategy may be assigned to a particular customer and item category, so that the strategy executes for material allocation of items in that item category when an operator picks for a sales order to ship to that customer. There may be a generic organization policy for picking material for outbound sales orders, so you can assign the strategy to the sales order picking transaction type. However you must assign the generic strategy a sequence number higher than the customer-specific strategy assignment.

In the Rules Workbench window, the sequence numbers must be unique within the rule type and organization. Strategy assignments are specific to the current organization to which you have logged in to, so the organization assignment is always made for all new strategy assignments.

Only the objects to which strategy assignments are necessary should be displayed in the Rules Workbench. Use the folders feature to hide the columns for the other objects of the window, and make the folder the default folder.

> **Note:** You can hide only folders that do not have assignments in any organization.

Related Topics

Describing the Rules Workbench, *Oracle Warehouse Management User's Guide*

Implementation Considerations

Because the rules engine can model complex business logic, you must consider several areas when you set up rules so the rules engine works properly.

Staging Lane Put away Rule

For any move order that has an inventory source and destination to be allocated, there must be applicable picking and applicable put away rules. For the rules engine to allocate pick wave move orders, a put away rule must exist must that has the staging lane as an acceptable put away location.

A put away rule with no restrictions assigned to only the organization is not appropriate, because it allows put away from a purchase order receipt of refrigerated material into a staging lane when instead, it should be placed in a refrigerated locator. Instead, this default put away rule should be specific for sales order staging transfers. The easiest way to set this up is to assign a strategy with a single rule (without restrictions or sort criteria) to the transaction types of Internal Order Pick and Sales Order Pick in the Rules Workbench. In order to support transfers to supply subinventories of pull items pick released for manufacturing requirements, assign this strategy to the Backflush Subinventory transfer transaction type as well.

Staging lanes for sales orders are determined by: any trip planning / dock appointments, the default staging subinventory and locator on the Pick Release window, or the default staging subinventory and locator on the Shipping Parameters window. If the staging lane is selected by one of these three methods prior to getting to the rules engine, then the rules engine validates the staging lane capacity is sufficient and that the material status of the staging lane does not disallow this transaction.

> **Note:** It is recommended you leave the capacity fields null to define staging lane capacity as infinite. Otherwise pick release may backorder sales order line because staging lane capacity is unavailable.

It is possible to leave the locator field blank on the Shipping Parameters window, and in the absence of dock appointments or other defaults on the Pick Release window, the rules engine selects the staging lane among all the staging lanes that are in the staging subinventory. In this case, staging lane selection rules can be built based on the customer, ship method, freight carrier, or any number of other attributes related to the sales order. In these scenarios, it may make sense to model staging lane capacity as well.

Some move orders do not have both an inventory source and an inventory destination. Examples include purchase order receipt put aways (source is receiving), putaway from manufacturing completion (source is WIP), and requisition move order issues (destination is an account). The Rules engine allocates and validates only the inventory portion of the move order.

Manual Reservations

Any reservations of material that you make manually must meet the restrictions the rules create. Manual reservations do not override the rules engine, but are combined with the rules engine to further restrict potential picking and put away locators.

Example

Example A: A reservation for a sales order is manually placed on material in source subinventory of Case Pick; however, the applicable strategy for this pick has only one rule: pick from subinventory Each Pick. Therefore, because there are no rules that agree with the reserved subinventory, the pick fails and no pick wave move order lines are allocated. The delivery line is backordered.

Example

Example B: A reservation for a sales order is manually placed on material in source subinventory of Bulk Pick, and source locator of A.1.2 (Row, Rack, Bin). There is enough material in subinventories Each Pick, Case Pick, and Bulk Pick. The applicable strategy for this pick has two rules. The first rule restricts picks to the Each Pick subinventory. The rule fails because this does not agree with the reserved subinventory. The second rule has no restrictions. Therefore, all three subinventories pass the rule restrictions; however, the rules engine suggests only Bulk Pick A.1.2 because it is the only locator that satisfies the rules and agrees with the reserved subinventory and locator.

Example

Example C:: A reservation for a sales order is manually placed on lot A10, which has a lot expiration date six days in the future. The applicable picking strategy has only one rule which requires that all expiration-date controlled items have at least thirty days of life remaining to be picked for a sales order. Therefore, because there are no rules that agree with the reserved lot, the pick will fail and no pick wave move order lines will be allocated. The delivery line will be backordered.

Reservations can be made to the LPN detail level either manually by a reservation you create in the Reservations window, or systematically by an LPN-based completion of a work order tied to a sales order. Typically, this scenario applies in an ATO / CTO shop where LPN-based completions are used, or if a particular LPN must be reserved to a customer because of labeling or other packaging requirements.

Whenever a reservation is made to the LPN detail level, the rules engine allocates to the same level of detail, regardless of the allocation mode on the rule that made the actual allocation; however, the system still other rule restrictions are still honored.

Related Topics

Allocating and Transacting Move Orders, *Oracle Inventory User's Guide*

Defining Shipping Parameters, *Oracle Shipping Execution User's Guide*

Performance

The performance of the rules engine is critical for large warehouses with complex requirements. You can set up the business scenarios the rules engine models in several different ways, with varying impacts on performance. A slight change in the way a rule is defined can effect how the rule performs. There are several general guidelines when defining rules to help improve the rules engine performance. It is important to stress-test the rules with the expected transaction volume prior to go-live.

Strategy Depth

The rules engine can select the correct strategy to execute almost instantly, while evaluating rules within a strategy takes considerably longer. That means more strategy assignments, where each strategy has fewer rules, are generally preferable to fewer strategy assignments with deeper strategies. This type of change may be the most difficult to implement, but if done correctly can achieve exactly the same business logic in a much more efficient fashion.

The most common way you can make strategies shallower is when they contain several different mutually exclusive rules, and the attributes that differentiate the rules are available as business objects in the Rules Workbench. For instance, you can define business logic to putaway purchase orders to different subinventories based on the supplier in two ways. A single strategy like the following, with three rules, can be assigned to the purchase order receipt transaction type

Rule Name Putaway to Subinventory INSP for ACME

Strategy Base putaway from purchase order receipt on supplier
Strategy Description Put material to sub INSP for Acme, sub HOLD for Business World, and to sub BULK for all other suppliers

Rule Name: Putaway to sub INSP for Acme (Always)					
R	Supplier	Vendor Name	=	Constant Character	Acme
RAN	Destination	Subinventory Name	=	Constant Character	INSP
D	Subinventory				
Rule Name: Putaway to sub HOLD for Business World (Always)					
R	Supplier	Vendor Name	=	Constant Character	Business World
RAN	Destination	Subinventory Name	=	Constant Character	INSP
D	Subinventory				
Rule Name: Putaway to sub BULK (Always)					
R	Destination Subinventory	Subinventory Name	=	Constant Character	BULK

Alternatively, you can assign three different single-rule strategies as follows. This strategy is assigned to the purchase order receipt transaction type, and the vendor Acme:

Rule Name Putaway to Subinventory INSP

Strategy Putaway to subinventory INSP
Strategy Description Putaway to subinvenotry INSP
Rule Name: Putaway to sub INSP (Always)

R		Destination Subinventory	Subinventory Name	=	Constant Character	INSP		

The second strategy assigns the purchase order receipt transaction type and the vendor business world.

Putaway to Subinventory HOLD for Business World

Strategy Putaway to subinventory HOLD
Strategy Description Putaway to subinvenotry HOLD
Rule Name: Putaway to sub HOLD (Always)

R		Destination Subinventory	Subinventory Name	=	Constant Character	HOLD		

The final default strategy, used for all other vendors is assigned only to the purchase order receipt transaction type. This strategy assignment has the highest sequence number of the three strategy assignments.

Putaway to Subinventory Bulk

Strategy Putaway to subinventory BULK
Strategy Description Putaway to subinvenotry BULK
Rule Name: Putaway to sub BULK (Always)

R		Destination Subinventory	Subinventory Name	=	Constant Character	BULK		

The rules engine can quickly find an applicable strategy. It can almost instantly select the correct rule for an inbound receipt putaway with the latter setup. In the first setup, where a single three-rule strategy was used, the rules engine must evaluate the first two rules for all receipts where the vendor is neither Acme nor Business World before finding the correct rule to use. Also, the rules are simpler and more generic in the second example. They need only refer to the destination subinventory and not to the vendor. This allows rules to be re-used more frequently, simplifies setup and maintenance, and makes it easier to understand the existing setup from the Rules Workbench. While this process may not always result in single-rule strategies, it nonetheless can usually greatly shorten many strategies and make the rules engine execute more quickly.

Minimize Use of OR

Avoid using the connector OR in rule definitions because they are more difficult for the database to evaluate then AND. If you use OR to indicate multiple values are valid, then you can use the operator IN with a single restriction rather than multiple restrictions. If OR is used to group several mutually exclusive scenarios together and these strategies cannot be divided into separate smaller strategies, the rules engine

performs better if these mutually exclusive scenarios are broken apart into separate rules in a single strategy. This runs counter to minimizing strategy depth; however, in combination with correct rule sequencing, this performs significantly better than a single complex rule.

Rule Sequencing

In some picking, putaway, and cost group strategies, and for many of the rules defined for label format, operation plans and task type selection, the logic defined by the rules is mutually exclusive and cannot be broken up into separate strategies in the Rules Workbench because the business objects that would make that possible are not available. For instance, two task type assignment rules might be set up to assign one task type if the pick is from the lower racks, and a separate task type if the pick is from the higher racks. Because it is not possible for any task to meet the restrictions in one of these two rules, the two rules are mutually exclusive.

One of the mutually exclusive scenarios may occur more often than the other. The rules engine continues to evaluate rules until it has found an assignment rule for which the restrictions are met, or until it completes the entire allocation. If you rearrange the rules and place the more frequently used rules before the less frequently used rules, or if you change the rule weights, the rules engine does not have to evaluate as many rules overall, and you improve system performance without changing the business logic.

For instance, continuing the shipment priority code example above, suppose that priority code LOW was the most frequently used priority code, representing about 55% of sales orders, while about 30% of orders had priority code MED, and the remaining 15% were priority HIGH. Then the strategy would be more efficiently written as follows, with the rule returning the more frequently used scenario placed first in the strategy. For an average 100 sales order lines, the previous strategy that did not consider sequencing, would have evaluated a total of 240 rules, while the strategy below would end up evaluating 160 rules - a performance gain of over 30%.

> **Note:** This rule sequencing improves the average performance of a large pick release batch, even though the individual performance of a particular allocation may not improve or may even get worse by changing the rule sequencing. Stress testing under loads that approximate a production environment will provide the best guidance on the exact rule sequencing. And of course, not all strategies can be re-sequenced in this way.

Sort Criteria

You can define sort criteria for picking and put away rules. Sort criteria significantly slow down the performance of rules because the database must gather all the rows that meet the restrictions before beginning to sort. If you do not define sort criteria, the database returns the first rows that meet the restrictions without scanning the entire table. Sometimes sort criteria is critical to correctly modeling the required logic, while at other times, the sort criteria may add only marginal value, or perhaps it does not help with warehouse efficiency at all. You must weight the benefit sort criteria can add to rules against the performance impact it has on the rules engine.

Sometimes you can use multiple rules in a strategy to achieve the same logic that sort criteria provide. For instance, suppose you assign lot attribute, Grade, values A, B, or C, and a sort criteria indicates a preference of A, then B, and finally if necessary, Grade C. Instead, you use three rules in sequence to model the same scenario. The first rule indicates Grade A is valid; the second rule indicates Grade B is valid, and the third rule indicates Grade C is valid. Often, these three rules without sort criteria execute faster than the first rule with the sort criteria, if the rules engine is able to find sufficient material with the first rule. Because this leads to a deeper strategy, use data comparable to a production instance to evaluate the performance of both scenarios to provide realistic statistics on which setup would be faster.

Restrict Locators

You can add additional rule restrictions that can decrease the number of locators the rules engine query returns. This improves the performance for all picking and putaway rules, but is more helpful for picking and putaway rules that include sort criteria. For instance, if you can logically segregate items into several different categories and each category is directed to a different subinventory for putaway, the rules engine only needs to sort a fraction of the locators in the warehouse. Often, an operator performing the receipt knows the subinventory in the warehouse in which the item should be stored, but just does not know the specific locator. In this case, the operator could perform a direct receipt into a temporary staging locator. Different inbound staging locators be set up for each of the different areas in the warehouse to which material should be directed.

You could determine the subinventory based on the item category, so seasonal and non-seasonal items are directed to different subinventories to greatly reduce the number of locators the rules engine needs to evaluate. Rules could then restrict the list of valid locators based on the staging locator in which the material is located.

These types of restrictions enhance the speed of the rules engine, in some cases enabling use of sort criteria that would otherwise be too performance intensive to include in the rules.

Rule Expressions

Most of the seeded objects and attributes correspond directly to tables and columns. For instance, for a picking task, the input to the rules engine is a move order line. From the move order line, the system can join directly to the table MTL_SYSTEM_ITEMS, which contains attributes about the items. The attribute Width on the object Item in the rules engine corresponds to the column UNIT_WIDTH in this table.

You can include an expression you defined in a rule, where you can enter additional unseeded attributes, use mathematical expressions, or join to additional tables in ways to model some specific business logic. In developing the rules engine, the joins to all the required tables were made as direct as possible, slower views such as key flexfield views were avoided, and indices were added when necessary to ensure that the database could efficiently get the required data. When you define custom expressions, inefficient SQL can severely hinder the performance of the rules engine. For instance, expressions that require full table scans must be avoided for all but the smallest lookup tables. Joins should be made on identifiers when available, rather than on item or

customer names.

If a rule with a user-defined expression is performing poorly, have a DBA familiar with the Oracle data model and database performance review the expression.

Inefficient Attributes

While most of the seeded attributes correspond directly to columns in the database, some of the attributes are PL/SQL functions that perform complex calculations. The attribute Number of Other Items, counts the number of unique values of INVENTORY_ITEM_ID in the table MTL_ONHAND_QUANTITIES_DETAIL, restricted by the current organization and locator the rules engine is examining. This data cannot be obtained directly unless the database is denormalized. Using this attribute leads to slower rules.

To see if the parameter or attribute you are using directly accesses a column on a table, or instead is a potentially slower function, open the parameter list-of-values in the rules engine window. To the right of the parameter name and description is a table alias, table name, and column name. If the value in the column name field is "Expression", rather than the name of a column, then that parameter uses a PL/SQL function. If rules are performing slowly, evaluate if any of the attributes are PL/SQL functions, and if they are required to model the business logic or if you could use different attributes.

> **Note:** A PL/SQL function in sort criteria causes more performance problems than a PL/SQL function in rule restrictions.

Update Locator Capacity

Several frequently used attributes were denormalized so you can access the data available to the Rules engine directly from a table. You do not require a PL/SQL call or additional join to determine the data. The following four attributes are now part of the locator definition:

- Empty
- Only Item in Locator
- Item Resides in Locator
- Mixed Items

The system automatically updates these attributes upon material receipt. For instance, if a locator is empty, then the Empty attribute is set to Yes, an upon a material receipt, the system updates it to No; however, with the exception of the Empty attribute, the attributes are not automatically updated on material issues. If the system updated the attributes automatically, then it could cause a slow down in transaction processing. The system automatically updates the Empty attribute on every transaction because determining whether a locator is newly empty after issues or transfers is a quick calculation and does not cause a significant slow down in transaction processing.

You schedule the Update Locator Capacity concurrent request to update the other three

attributes, Only Item in Locator, Item Resides and Mixed Items. The frequency with which you schedule this report depends on the transaction volume of the warehouse, the system resources available, and how significantly a less-than-optimal locator selected by the Rules Engine affects warehouse efficiency. Because of the way the system updates these attributes, a rule that uses the Mixed Items attribute to find locators with only the same item returns a subset of the valid locators. It does not return locators that contain multiple items. It may also exclude other locators that no longer contain multiple items, but contained multiple items when the system last ran the concurrent request.

In addition to updating the attributes, the Update Locator Capacity concurrent request updates the locator capacity and the Empty attribute. While locator capacity and the Empty attribute are automatically updated on every transaction (including receipts, transfers, and issues), data, such as assigning a container item to an LPN that already resides in a specific locator, or changing physical attributes of the items on the desktop Item Master window, is not automatically reflected by locator capacity.

Lot and Serial Attributes

Rules based on lot or serial attributes apply items which have those attributes defined. They fail to generate allocation suggestions for items that are not lot controlled or serial controlled, or which use a different context mapping for the flexfields.

Example

ExampleThe general warehouse policy is that no item with less than thirty days before the lot expiration date will be shipped; however, the warehouse also carries other items that are not expiration date controlled. This can be handled by using two different rules within a single strategy. A shelf life code of 1 means there is no expiration data control, while values of 2 and 4 indicate expiration date control. Therefore the following two-rule strategy implements the organization policy efficiently.

Rules Strategy

R	Lot	Expiration Date	>	Date	Current Date	+30
RAND	Item	Shelf Life Control Code	IN	Expression	2,4	
R	Item	Shelf Life Control	=	Constant Number	1	

Performance Impact of Serial Attributes

The rules engine can allocate individual serial numbers. The standard approach for serial items is for the rules engine to direct the operator to locations where sufficient material can be found, based on any applicable rules, but not to allocate specific serial numbers. When the operator performs the picks, the operator specifies which serials were picked. This is sufficient when all serials of an item are identical, all serial attributes for a given item are identical within a single locator, or there are no material statuses assigned to serials that disallow picking. The system can allocate individual serial numbers if necessary. You can use this if business practices require allocation by

serial attribute, or when statuses that disallow picking are assigned to serials. This causes a significant performance reduction in the rules engine whenever serial controlled items are allocated. Do not use serial allocation unless particular business practices require it. To turn on serial allocation, check the Allocate Serial Numbers check box on the Organizations Setup window.

> **Note:** It is possible to base rules on serial attributes even when serial allocation is disabled. The rules engine would honor the rule restrictions, allocating only from locators that have serials with the correct attributes, but would not specify the specific serials on the allocation. It would then be left to the operator to pick the correct serials from the allocated revision, lot, and locator; the system would not validate the serials selected by the operator. Therefore, if selecting specific serials based on attributes is important and serial selection should not be left to the operator, serial allocation should be enabled for the organization.

Customization

The rules engine contains dozens seeded of business objects, and comes with hundreds of attributes from which you can build rules; however, it is possible that in very complex scenarios, the basic rules engine does not suffice. You can customize the rules engine with non-invasive changes in four different ways.

If the seeded objects and attributes from which rules are defined cannot completely model the business scenario, you can write custom expressions that grab onto additional attributes and tables. If you cannot model a business scenario even with these custom expressions, you can custom define the entire rule. If the objects available for assigning strategies to the Rules Workbench do not provide enough flexibility, then you can define our own custom strategy assignments. Put away rules use a capacity calculation you can base on volume, weight, dimensions, and units of the item in comparison to the physical capacity of the locators. In situations where more complex capacity algorithms are necessary, you can customize the capacity calculation. Detailed explanations on each of these areas, including how to implement them, are included below.

Custom Expressions

Often, a rule may seem to fit within the framework of the standard restrictions, but the required object or attribute is not available, or perhaps requires some mathematical or character manipulation to retrieve the right logic, or the data is stored in a custom table.

User-defined expressions can support all these possibilities, and are a completely non-invasive way to build a rule. A rule with a user-defined expression is handled exactly the same as other rules. You can define it on the desktop Rules window, and recompile it via the Generate All Rules concurrent program.

Defining Expressions

When the rules engine executes a rule, the user defined restrictions are appended to the where clause in the rule body. The rules engine translates the restrictions on the window to A OP B, where A is the attribute is the first attribute, and B is the second attribute. For instance, the restriction`Destination Subinventory / Subinventory Name = Constant Character / BULK` in a put away rule would be appended as`omsei.SECONDARY_INVENTORY_NAME = 'BULK'` . The column, `SECONDARY_INVENTORY_NAME`, is the name of the column on the table `MTL_SECONDARY_INVENTORIES` . The alias,`omsei` , is hard-coded in the seed data so whenever the rules engine needs to join to this table, the same identifier is used.

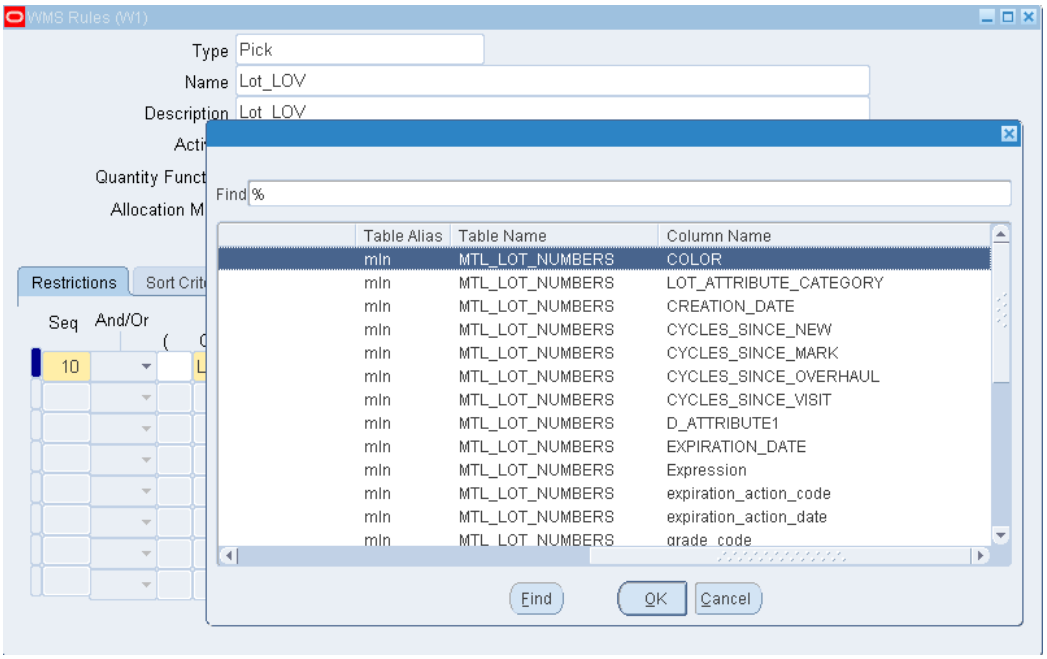
An expression replaces the second object with the SQL entered on the rule, exactly as you enter it. Therefore, you can manually code the exact same logic if, instead of entering the restriction `Destination Subinventory / Subinventory Name = Constant Character / BULK, Destination Subinventory / Subinventory Name = Expression / 'BULK'`. The rule body would be identical.

The expression can be much more complex than an alphanumeric constant. Suppose you assign a particular lot controlled item to an attribute context, mapping two columns `N_ATTRIBUTE1` and`N_ATTRIBUTE2` to two attributes that indicate the flammability of this particular lot. Different locators throughout the warehouse have different safety ratings, and the system stores the safety as a number on a locator flexfield column `ATTRIBUTE1` . Because of how the safety rating relates to the two lot attributes, a locator can store any lot so long as the product of the two attributes is smaller than the safety rating; otherwise, a hazardous situation results.

While there is no rule attribute to get at the product of `N_ATTRIBUTE1` and `N_ATTRIBUTE2`, this restriction can be easily modeled via a rule restriction with a user-defined expression. The restriction is as follows: `Destination Locator / ATTRIBUTE1 < Expression / mln.N_ATTRIBUTE1 * mln.N_ATTRIBUTE2.` Of course, this expression only works if both attributes are always populated for the item; if they are optional attributes, the function NVL should be used to control what should happen if they are null.

Table Aliases

Table aliases are hard-coded in the seeded data. The easiest way to get the table alias is directly from the rules setup window. The Parameter LOV shows, in addition to the parameter name and description, the table alias, the table name, and the column name.



In most scenarios, the table alias and table name are the same for all parameters of a given object, because an object typically corresponds to a table, and parameters columns within that table. There are occasional exceptions to the rule, it makes sense to group a parameter with others from a different table. Also, you can easily see here which parameters are expressions or call PL/SQL functions, rather than directly access a column of a table, as the text "Expression" will be displayed in the column name.

If a join to an additional table or a reference a table that is already included in the objects but for which a different join is required, be sure that a new table alias is used and that table aliases reserved by the Rules Engine is not inadvertently used. To see a list of all table aliases that the rules engine may already be using, execute the following SQL query:

```
select name, description, table_alias
from wms_db_objects wdo, wms_objects wo
where wdo.db_object_id = wo.object_id
```

For performance reasons, tables are added to the rule body only when they are required by the rule restrictions. The rules engine analyzes the seeded rule attributes to determine which tables to add to the base query when compiling the rule; it does not analyze any user-defined expressions. In the example above, if the only restriction in the rule is the one line `Destination Locator / ATTRIBUTE1 < Expression / mln.N_ATTRIBUTE1 * mln.N_ATTRIBUTE2`, then the table `MTL_LOT_NUMBERS` will not be added to the base, and thus the alias mln is not defined in the rule body. This rule does not compile.

In order to compile this rule, you must add an additional restriction to force the rules engine to define the alias mln. You can add a dummy restriction to the rule which is always true, joined to the real restriction by AND. The simplest dummy restriction is equating any attribute of the required object to itself, such as `Lot / Lot Number =`

Lot / Lot Number.

Joins to Additional Tables

You can refer to the table alias to access tables part of the base query, and embed a select statement in an expression to access tables that are not part of the base query. When you join to additional tables, several considerations must be made. Make sure you completely define the join conditions, and if you use an operator such as =, <, <=, >, >=, or LIKE, that the expression returns exactly one row. If you use the operator IN, the expression can return none, one, or many rows.

Finally, be sure to assess the performance impact of any user-defined expressions. Selecting additional columns from tables that are already in the base query or performing simple mathematical operations on those columns has little performance impact. Joining to new tables not referenced in the base query could potentially degrade performance, depending on table size and table indices. Finally, embedded PL/SQL functions, such as unit-of-measure conversions, can be used, but should be avoided unless the performance degradation is tolerable, and the scenarios in which they are used are limited.

Options for Arbitrary SQL

The previous examples define a subinventory name, and multiplying two lot attributes illustrate how to use custom expressions when you need to compare a standard attribute to a user-defined attribute. Though it is more complicated, you can also compare two user-defined attributes.

To compare user defined attributes you must first create a dummy attribute as the first expression in the rule. For example, you can define a restriction Item / Item Number = Expression / SQL , where , the <SQL> return the item number if the required restriction is true and returns null if the restriction is false. The <SQL> may appear as follows:

```
select msi.segment1
from custom_table ct
where mln.attribute1*mln.attribute2 > ct.attribute1
and ct.inventory_item_id = msi.inventory_item_id
and ct.organization_id = msi.organization_id
```

This SQL assumes that you used the item and lot objects somewhere else in the rule restrictions so you can use aliases without defining them. The custom table (custom_table) has the same primary key as the Oracle Inventory item table, inventory item identifier, and organization identifier. If the restriction mln.attribute1*mln.attribute2 > ct.attribute1 is true, then the SQL statement returns msi.segment1 (the item name), and the rule restriction evaluates Item / Item Number = Expression / msi.segment1 which is true for a single segment item.

If however, mln.attribute1*mln.attribute > 2 ct.attribute1 is false, then the rules returns nothing, and the rule restriction Item / Item Number = Expression / null is false. The Rules Engine continues to the next line, or if there are no other lines, to allocate the next rule.

You can also use parentheses in custom expressions to compare two user-defined attributes. For example, the custom restriction `Destination Subinventory / Subinventory Name = Expression 'Bulk'` is encoded as `omsei.SECONDARY_INVENTORY_NAME = ('BULK')`. These parentheses mean that the expression `"'BULK' AND mln.attribute1*mln.attribute2 > (select ct.attribute1 from custom_table ct where ct.inventory_item_id = msi.inventory_item_id and ct.organization_id = msi.organization_id)"` is not parsed correctly because it will be encoded into SQL as: `omsei.SECONDARY_INVENTORY_NAME = ('BULK' AND mln.attribute1*mln.attribute2 > (select ct.attribute1 from custom_table ct @ where ct.inventory_item_id = msi.inventory_item_id and ct.organization_id = @ msi.organization_id))`. This is not a valid WHERE clause because of the parentheses.

Instead, if you use the expression `("'BULK') AND (mln.attribute1*mln.attribute2 > (select ct.attribute1 from custom_table ct where ct.inventory_item_id = msi.inventory_item_id and ct.organization_id = msi.organization_id)"`, this is encoded as `omsei.SECONDARY_INVENTORY_NAME = ('BULK') AND (mln.attribute1*mln.attribute2 > (select ct.attribute1 from custom_table ct where ct.inventory_item_id = msi.inventory_item_id and ct.organization_id = msi.organization_id))`. The latter is a valid statement, and completely encapsulates the desired logic. To further simplify this, rather than using subinventory name, you can use the date so the restriction becomes `Date / Current Date = Expression / "sysdate) AND (<REST>"`, where `<REST>` is and arbitrary SQL restriction that the system must evaluate as either TRUE or FALSE.

Custom Rule Definition

The rule is the lowest level unit for the Oracle Warehouse Management rules engine. Each enabled rule has a corresponding PL/SQL package, named WMS_RULE_####, where #### is the rule ID. For a picking or put away rule, this package contains the SQL query and corresponding logic to return a list of valid locations. The rule package for a cost group assignment, task type assignment, or label printing rule also contains a main SQL statement, but in these rules, the query is used to determine if these rules are valid for this transaction.

Because each rule has a different package, it is easy to customize the code for individual rules to meet your specific business needs. You can create and enable a rule through the user interface and retrieve the rule rule_id (see the tables`WMS_RULES_B and WMS_RULES_TL`). When you enable the rule, a PL/SQL the system creates the package on the database. You can then change the rules package to carry out whatever additional processing is necessary. The rule package can make calls to custom APIs, or carry out extra validations.

This can be a fairly powerful and non-invasive way to customize the Oracle Warehouse Management rules engine, but there are two caveats to this customization approach. If

you regenerate a rules PL/SQL package, the system overwrites the customizations. Regeneration of a rule package happens in one of three ways: First, the rule can be disabled and then re-enabled through the window, or you can select Regenerate Rule Package from the Tools menu on the Rules window, or you can launch the Generate All Rule Packages concurrent program.

Second, the procedures in the rules package are expected to accept and return certain values. Customizations can change the logic of the procedures in the PL/SQL package, but changing the parameters or return values of the procedures causes errors in the rules engine.

All of the rule packages share some things in common. All have three procedures: `open_curs`, `fetch_one_row`and`close_curs`. `Open_curs` is called once at the beginning of the rule execution, and `close_curs` is called once at the end of each rule execution. For picking and put away rules, `fetch_one_row` can be called multiple times; for all others, `fetch_one_row` is only called once per rule. The package specifications for the different rule type codes are different.

Picking and Put away Rules

Picking and put away rule packages basically function the same, and they have the same package specifications.

```
CREATE OR REPLACE PACKAGE WMS_RULE_#### AS
 PROCEDURE open_curs (
   p_organization_id            IN NUMBER,
  p_inventory_item_id          IN NUMBER,
  p_transaction_type_id        IN NUMBER,
  p_revision                   IN VARCHAR2,
  p_lot_number                 IN VARCHAR2,
  p_subinventory_code          IN VARCHAR2,
  p_locator_id                 IN NUMBER,
  p_cost_group_id              IN NUMBER,
  p_pp_transaction_temp_id     IN NUMBER,
  p_serial_controlled          IN NUMBER,
  p_detail_serial              IN NUMBER,
  p_detail_any_serial          IN NUMBER,
  p_from_serial_number         IN VARCHAR2,
  p_to_serial_number           IN VARCHAR2,
  p_unit_number                IN VARCHAR2,
  x_result                     OUT NUMBER);
 PROCEDURE fetch_one_row  (
  x_revision            OUT VARCHAR2,
  x_lot_number          OUT VARCHAR2,
  x_lot_expiration_date OUT DATE,
  x_subinventory_code   OUT VARCHAR2,
  x_locator_id          OUT NUMBER,
  x_cost_group_id       OUT NUMBER,
  x_uom_code            OUT VARCHAR2,
  x_serial_number       OUT VARCHAR2,
  x_possible_quantity   OUT NUMBER,
  x_consist_string      OUT VARCHAR2,
  x_order_by_string     OUT VARCHAR2,
  x_return_status       OUT NUMBER);
 PROCEDURE close_curs;
END WMS_RULE_####;
```

Without customization, these three procedures manage interaction with a SQL cursor. This SQL cursor returns eligible locations to pick from or put away to. Open_curs and close_curs are called once per rule to open and close the SQL cursor. Fetch_one_row is called continuously until either all of the transaction quantity is allocated or no more rows are returned from the SQL cursor.

Without customization, open_curs is called once per rule to open the SQL cursor. This procedure also populates all the variables used by the sql statement. When customizing, open_curs is a good place to take care of any setup processing, as it is called at the beginning of the rule engine processing. Here are the parameters for open_curs:

Parameters for open_curs

Parameter	Parameter Type	Description
p_organization_id	Number	The current organization (primary key for MTL_PARAMETERS)
p_inventory_item_id	Number	The item to be allocated (primary key for MTL_SYSTEM_ITEMS)
p_transaction_type_id	Number	Identifies the transaction type (primary key for MTL_TRANSACTION_TYPES)
p_revision	Varchar2 (Length 3)	Identifies revision to be allocated, as specified on move order line or pre-existing reservation. If no specific revision has to be picked, this value is -99.
p_lot_number	Varchar2 (Length 30)	Identifies lot number to be allocated, as listed on move order line or pre-existing reservation. If no specific lot number has to be picked, this value is -9999.

Parameter	Parameter Type	Description
p_subinventory_code	Varchar2 (Length 10)	Identifies subinventory to pick from or put away to (depending on type code of rule), as listed on move order line or pre-existing reservation. If no specific subinventory has to be used, this value is -9999.
p_locator_id	Number	Identifies locator to pick from or put away to (depending on type code of rule), as listed on move order line or pre-existing reservation. If no locator has to be used, this value is -9999.
p_cost_group_id	Number	Identifies cost group to be allocated, if listed on move order line. If no specific cost group has to be allocated, this value is -9999.
p_pp_transaction_temp_id	Number	Identifies a unique record in WMS_TRANSACTIONS_TEMP and WMS_TRX_DETAILS_TMP_V (view based on above table). This record is used by the SQL cursor.
p_serial_controlled	Number	1 if item is serial controlled item, 0 otherwise.
p_detail_serial	Number	1 if allocation engine should generate suggestions for serial numbers; 0 if allocation engine should suggest locations, but not specific serial numbers

Parameter	Parameter Type	Description
p_detail_any_serial	Number	1 if allocation engine should suggest any serial eligible serial numbers; if any other value, allocation engine should suggest only serial numbers between p_from_serial_number and p_to_serial_number. Corresponds to MTL_PARAMETERS.ALLOCATE_SERIAL_FLAG
p_from_serial_number	Varchar2 (Length 30)	If p_detail_any_serial is not 1, and p_detail_serial is 1, then all suggested serial numbers should be between p_from_serial_number and p_to_serial_number
p_to_serial_number	Varchar2 (Length 30)	If p_detail_any_serial is not 1, and p_detail_serial is 1, then all suggested serial numbers should be between p_from_serial_number and p_to_serial_number
p_unit_number	Varchar2 (Length 30)	Identifies unit number of serial numbers to pick from, as specified on the move order line. If no specific unit number has to be picked, then this value is -9999
x_result	Number	This output variable must be returned by open_curs. The value is 1 if success, 0 otherwise. If x_result = 0, the rules engine will exit with error

When customizing, it is important to return 1 for x_result if there is no error.

The rules engine calls `fetch_one_row` continuously until either all of the transaction quantity is allocated or there are no more rows to return from the SQL cursor. In the existing code, this procedure fetches a record from the SQL cursor and returns it to the

calling procedure. This location record is then used to allocate. The following table contains the parameters for the function.

fetch_one_row Parameters

Parameter	Parameter Type	Description
x_revision	Varchar2 (Length 3)	The revision to pick or put away. If item is revision controlled, this value must not be NULL.
x_lot_number	Varchar2 (Length 30)	The lot number to pick or put away. If item is lot controlled, this value must not be NULL.
x_subinventory_code	Varchar2 (Length 10)	The subinventory code to pick from or put away to. This value must not be NULL.
x_locator_id	Number	The locator to pick from or put away to. This value must not be NULL.
x_cost_group_id	Number	The cost group to pick from or put away. This value must not be NULL.
x_uom_code	Number	The Pick UOM of the locator (as defined on the table MTL_ITEM_LOCATIONS). If the Pick UOM Code of the locator is NULL, this value should be equal to the Pick UOM Code of the subinventory (from MTL_SECONDARY_INVENTORIES). Alternately, if you do not want to use the Pick UOM functionality built into the Rules engine, then this value can always be equal to the Primary UOM of the item.

Parameter	Parameter Type	Description
x_serial_number	Number	If p_serial_controlled = 1, p_detail_serial = 1, and p_type_code = 2, then this value should contain the serial number to pick. If p_type_code = 1, then this value is not used.
x_possible_quantity	Number	For picking rules, this is the total available quantity for these return parameters (revision, lot, sub, locator, cost group). If x_serial_number is not NULL, return 1. For put away rules, this should be the available capacity in the locator.
x_consist_string	Varchar2 (Length 1000)	This string is used when a rule has consistency restrictions defined. Records returned from the fetch_one_row with the same x_consist_string can be issued together. Return NULL to disable the consistency functionality built into the rules engine.

Parameter	Parameter Type	Description
x_order_by_string	Varchar2 (Length 1000)	This string is used by the Pick UOM functionality. The value normally returned in this parameter is a concatenation of all the sort criteria values for this record. For example, if sort criteria is Lot number, and this record has a lot number of A, then x_order_by_string = A. If the sort criteria is lot number and lot expiration date, then x_order_by_string might look like A01-01-2001, a concatenation of the lot and the expiration date. Setting this parameter to NULL will affect the performance of the Pick UOM functionality built into the rules engine, causing sort criteria to be ignored.
x_return_status	Number	1 if record is successfully found and returned, and 0 if no more rows to fetch. If x_return_status = 0, all other return values are ignored.

- Returning a record from fetch_one_row does not insure that this record is used to allocate. The rules engine checks availability of the material on picking rules and capacity of the locator on put away. The engine makes other checks and orders records received from fetch_one_row based on order_by_string and consist_string.

  The last procedure in the rule package is close_curs. Without customization, this is used to close the SQL cursor after the rules engine is finished with the rule. There are no input or output parameters. When customizing, this is a good procedure to carry out any cleanup or post rule processing that must occur.

Validating the Picking SKU

Oracle Warehouse Management provides the following custom hook API that enables you to write your own logic to validate the picking SKU: `WMS_RE_CUSTOM_PUB.custom_validate_picking_sku`. For more information, see the Oracle Integration Repository available within the Oracle E-Business Suite instance.

Cost Group Rules

```
Create Or Replace Package WMS_RULE_#### AS
 procedure open_curs (
  p_line_id     IN NUMBER,
  x_result     OUT NUMBER);
 procedure fetch_one_row  (
  x_return_status       OUT NUMBER);
 procedure close_curs;
 END WMS_RULE_####;
```

Open_curs and close_curs function the same way as those procedure do in the packages for picking and put away rules; however, the arguments for open_curs are different:

open_curs Argument Parameters

Parameter Name	Parameter Type	Description
p_line_id	Number	Primary Key for an entry in WMS_COST_GROUPS_INPUT_V. This record represents either a move order line or a transaction temp record.
x_result	Number	This output variable must be returned by open_curs. The value is 1 if success, 0 otherwise. If x_result = 0, the rules engine will exit with error

Unlike the picking and put away rules, fetch_one_row only returns a status. If x_return_status = 0, then the cost group for this rule will not be used. If x_return_status >= 1, then the cost group rules engine will assign to the transaction the cost group associated with this rule.

Task Type Rules

```
CREATE OR REPLACE PACKAGE WMS_RULE_#### AS
 procedure open_curs (
  p_pp_transaction_temp_id     IN NUMBER,
  x_result                     OUT NUMBER);
 PROCEDURE fetch_one_row  (
  x_return_status       OUT NUMBER);
 PROCEDURE close_curs;
 END WMS_RULE_####;
```

The procedures in the task type rules package behave exactly like the cost group rules. If `x_return_status >= 1`, then the task type associated with that rule is used. The parameter`p_pp_transaction_temp_id` corresponds to a single entry in the `MTL_MATERIAL_TRANSACTIONS_TEMP` table.

Label Printing Rules

```
CREATE OR REPLACE PACKAGE WMS_RULE_#### AS
  procedure open_curs (
  p_label_request_id           IN NUMBER,
  x_result                     OUT NUMBER);
 PROCEDURE fetch_one_row  (
  x_return_status       OUT NUMBER);
 PROCEDURE close_curs;
END WMS_RULE_####;
```

The procedures in the label rule package behave like the procedures for cost group and task type assignment rules. The only difference is the parameter p_label_request_id. This value is the primary key for the table WMS_LABEL_REQUESTS, corresponding to the column label_request_id.

Operation Plan Rules

```
CREATE OR REPLACE PACKAGE WMS_RULE_XXXXX AS
 procedure Get_OP (
  p_pp_transaction_temp_id     IN NUMBER,
  x_return_status              OUT NUMBER);
 end WMS_RULE_XXXXX;
```

The procedures in the operation plan rule package behave like the procedure task type assignment rules. The parameter `p_pp_transaction_temp_id` is the `transaction_temp_id` of the task in `mtl_material_transactions_temp`. If `x_return_status >= 1`, then the operation plan associated with that rule is used.

Custom Selection Process

Oracle Warehouse Management enables you to develop your own selection process, using both seeded objects and user-defined objects. The package `WMS_RE_CUSTOM_PUB` contains a procedure, `SearchForStrategy`, that you can customize. When looking for a strategy, rule or value to use during allocation or cost group assignment, the rules engine calls this procedure, which returns a strategy, rule, or value identifier. Without customization, this procedure returns NULL for `return_type_id`, and uses the normal process using the Rules Workbench to select the appropriate strategy, rule, or value. You can customize `SearchForStrategy` to use customer-specific algorithms to find an allocation strategy , rule or value . When `SearchForStrategy` returns a non-NULL return ID, that ID is used as the pick, put away, or cost group engine , and the assignments in the Rules Workbench are ignored.

You can find the following procedure specification for `WMS_RE_CUSTOM_PUB` at `$WMS_TOP/patch/115/sql/WMSPPPUS.pls`

```
procedure SearchForStrategy (
            p_init_msg_list            in      varchar2  :=
fnd_api.g_false
           ,x_return_status          out  NOCOPY  varchar2
           ,x_msg_count              out  NOCOPY  number
           ,x_msg_data               out  NOCOPY  varchar2
           ,p_transaction_temp_id  in      number   :=
fnd_api.g_miss_num
           ,p_type_code              in      number   :=
fnd_api.g_miss_num
           ,x_return_type            out  NOCOPY   varchar2 -- 'V' for
Value , 'R' for Rule , 'S' for strategy
           ,x_return_type_id       out  NOCOPY   number
           );
```

Parameter Name	Parameter Type	Description
p_init_msg_list	Varchar2 (Length 1)	This parameter indicates whether message stack should be initialized. When customizing you can ignore this parameter.
x_return_status	Varchar2 (Length 1)	S = Success; E = Error; U = Unexpected error. Returning S means that the custom procedure found a strategy. Returning E means that the custom procedure did not find a strategy, and the rules engine should find a strategy using the normal algorithm. Returning U causes the rules engine to error out. The procedure should return one of these three values.
x_msg_count	Number	This value represents the number of error messages in x_msg_data (see subsequently). If there no errors occur, then return 0.
x_msg_data	Varchar 2 (Length 240)	This string holds the names of the error messages that are encountered in the procedure. If there no errors occurs, then return NULL.

Parameter Name	Parameter Type	Description
p_transaction_temp_id	Number	This number is the line *ID* for the move order on which the rules engine is running. It corresponds to the line_id column on MTL_TXN_REQUEST_LINES table. This value is always passed.
p_type_code	Number	The type code of the strategy that should be found. Every strategy has a type code: Pick (2), Put Away (1), or Cost Group (5).
x_return_type	Varchar2(1)	The return type values are: • S: Strategy • R: Rule • V: Value
x_return_type_id	Number	This return type identifier is a strategy_id, rule_id, or value identifier based on the value of the return_type (S, R, or V)

Even after you customize the procedure, the Rules Engine can still use the Rules Workbench if SearchForStrategy returns a NULL value for x_return_type and x_return_type_id. This is useful if you want to use only a custom algorithm. When the criteria are met, the procedure returns a return_type_id. When you want the engine to find a strategy, rule or value using the rules workbench, the procedure returns NULL for x_return_type and x_return_type_id.

Custom Capacity Calculation

When determining locations eligible for put away, the rules engine examines the capacity of the location. Current capacity for each location is stored on the MTL_ITEM_LOCATIONS table. The rules engine looks at these numbers to determine how much is available to put away. There are three ways that capacity is measured - by weight, by volume, and by units.

Depending on the quantity function on a put away rule, the rules engine uses available capacity by weight, volume, units, or some combination thereof, on the locator definition to determine the locator's capacity for the given item. An additional quantity function is Available Capacity by Customer-Specific Algorithm. This function should return the capacity for the given item in that items primary UOM. The rules engine takes the minimum of that quantity, and the available capacity where units, weight, and volume also considered, to be the available locator capacity for this transaction

You can also use capacity information in the restrictions and sort criteria of a put away rule. The Subinventory/Locator, contains four parameters which call customized functions.

Object Subinventory/Locator Customization Parameters

Parameter Name	Function Name	Description
Available Capacity by Customer-Specific Algorithm	WMS_RE_CUSTOM_PUB.GetAvailableLocationCapacity	The unoccupied capacity in a locator that is not already reserved for other put away allocations
Occupied Capacity by Customer-Specific Algorithm	WMS_RE_CUSTOM_PUB.GetOccupiedLocationCapacity	The capacity taken up by material currently in the locator
Remaining Available Capacity by Customer-Specific Algorithm	WMS_RE_CUSTOM_PUB.GetRemainingLocationCapacity	The available capacity of the locator after the current transaction
Total Capacity by Customer-Specific Algorithm	WMS_RE_CUSTOM_PUB.GetTotalLocationCapacity	The overall capacity for the locator, regardless of what is currently occupied or available

Without customization, these functions return 0.

Custom Quantity Function Example

Example

The following example shows an example of a custom quantity function for a putaway rule; however, these details should be used only as a guide. You should test any custom functions on your own system to ensure that the results meet your expectations.

The warehouse operation is split across two subinventories, called PICKFACE and RESERVE. The RESERVE subinventory is a bulk storage area. Stock is received in pallets and generally stored in RESERVE. Min-Max replenishment is used to move stock from RESERVE to PICKFACE as required

RESERVE is LPN controlled, but PICKFACE is not LPN controlled. Putaway is always to empty locators.

For maximum efficiency, during putaway the logic should first check the on-hand for that item in PICKFACE. If this is below the min-max minimum level then putaway should be directed to PICKFACE to take it up to the min-max maximum level, with any remainder being put away to RESERVE. Other considerations, such as perform this special putaway directly to PICKFACE only if the stock in RESERVE is not older than the stock in PICKFACE, may also be included.

You can define restrictions that direct you to PICKFACE if the subinventory quantity is below minimum, but there would be no way to indicate to the system that the putaway should be split so that PICKFACE does not exceed maximum. To place a limit on the capacity of the floating locator below the weight or volume capacity implied by the physical attributes, a custom quantity function is required.

Desired Output

Consider an item with the following setup:

- Min-Max minimum = 15
- Min-Max maximum = 30
- PICKFACE locator capacity = 10
- Current on hand = 12
- LPN contents = 50

The desired output from the rules engine is as follows:

Subinventory	Locator	Quantity	Cumulative Pending & On-Hand Subinventory
PICKFACE	1	10	22
PICKFACE	2	10	32
RESERVE	1	30	30

Note: This brings the cumulative on-hand balance in PICKFACE to 32 rather than the maximum 30. This is acceptable because only empty locators are used. Replenishing the locators to full quantity rather than a partial quantity postpones the next required replenishment and does

not take up extra space.

Reasons for Custom Quantity

The difficulty in meeting this requirement with the standard quantity functions, or even with custom rule restrictions, lies in the way putaway rules are executed. The operation is as follows:

- The system evaluates the rule restrictions to generate a list of all allowable locators.
- Rule sort order is applied to the sort list.
- The rule quantity function is evaluated for the first locator. The system will put away the LPN, or a part of the LPN if the locator capacity is less than the LPN quantity.
- The system evaluates the quantity function for the next locator in the list, and repeats the previous steps until the LPN is completely put away, or no capacity exists.

Maintenance

If a strategy search fails or if all the rules within a strategy fail, the rules engine cannot assign or allocate the task, or assign a label or cost group. If you do not set up the rules, strategies, or correctly, the rules engine returns an illogical or suboptimal result. To track the causes of these problems, Oracle Warehouse Management provides the following diagnostics features:

- Rule and Strategy of Transaction, page 3-45
- Rule Where Used, page 3-45
- Simulation, page 3-46

Rule and Strategy of Transaction

Determine which rule strategy the rules engine used. The rules engine stamps the rule and strategy that generated each pick and put away suggestion on the transaction. You can view this from the desktop View Material Transactions window after the transaction completes.

Rule Where Used

To determine which strategies use a particular rule, the Rule Where Used window provides a view of all strategies that use that rule, within that organization. If a rule is

common to all organizations, you must perform this check must in each organization that uses the rule.

Simulation

The best way to debug the rules engine setup is to use the rules engine Simulator. The simulator takes an unallocated move order as input, and can display the allocation details that would be created with any enabled pick or put away rule or strategy. It can also simulate the entire strategy selection process to help debug the strategy assignments. Details about the allocation indicate why specific material or locators were not selected.

Related Topics

Explaining the Oracle Warehouse Management Rules Engine Simulator, *Oracle Warehouse Management User's Guide*

Common Problems

Common problems and their causes and solutions, including debugging scripts (if applicable) are discussed below.

1. No orders lines selected in pick release

   This happens when no unreleased or backordered order lines meet the selection criteria specified in the pick release rule or Release Sales Order window. Selection criteria could include the order number, delivery number, trip number, customer, order type, scheduled ship date, requested date, or order line status. Available order lines are limited to booked orders that are unreleased or backordered, so if no lines meet the specified criteria, no lines are released. You can check the pick release request log to confirm no lines are release. Search for text like:

   No lines selected for organization V1

   The system generates a request when pick release is run in concurrent mode, and the request number is given when Concurrent is selected. See: Overview of Pick Release., *Oracle Shipping Execution User's Guide*

2. Orders selected but lines backordered

   Lines are backordered when no material is available that meet the picking rule restrictions, or when there is not enough capacity available in the selected staging lane. Model staging lanes as locators with infinite capacity (by leaving the capacity fields blank on the locator definition window) so that the latter problem does not occur. The former problem, however, indicates the rule restrictions are incorrect or too restrictive, or if they are correct, that there is no available material in the warehouse that meet those restrictions. Either problem will be indicated in the pick release request log with the text like:

Pick Release process could not allocate 12 of item JCNOSTK for order 5000726 as there was insufficient quantity available.

The first step in debugging this situation is to check the available quantity of the item using either the mobile item inquiry window or the desktop material workbench window. Picking allocates from available quantity, rather than on-hand quantity, because available quantity excludes material that has already been reserved.

If there is a material reservation of this item to the sales order, then the reservation quantity does not appear as available, but the rules engine still validates that the reserved material meets the picking restrictions. You can find Reservations in the Desktop Reservations window. A reservation could have been made manually or by Order Management during Auto-Scheduling. See Availability and Reservations, *Oracle Order Management User's Guide*Availability and Reservations . If the reservation specifies a revision, lot number, subinventory, or locator, verify the reservation meets the rule restrictions.

If there is available material, determine which picking strategy should have been selected. This can be done by checking the strategy assignments in the Rules Workbench, and then searching for (currently effective) strategy assignments that match the order line, or by pick releasing the sales order with Auto-Allocate disabled and using the rules engine Simulator to better understand why the sales order is not getting allocated.

Use the rules engine Simulator to determine exactly why a sales order is backordered. The most common cause is incorrect put away rules setup that does not validate the staging lane that is defaulted by the pick release process The common causes are capacity limitations on staging lanes, incorrect effective dates on the rules or strategies, or mistakenly disabling the Partial Success Flag on the strategy definition. Other considerations to check for are the material status on the material, or the source and destination locators. All of these validations are displayed by the rules engine Simulator.

Check the selected strategy rule by rule to determine if the desired behavior is properly coded in the rule restrictions and consistency requirements (the sort criteria only impacts the order in which material is chosen, assuming that multiple material units are available). If consistency requirements are specified, verify that there is enough material available with those particular attributes. For instance, if consistent lot is specified, check if there is enough available in a single lot. If not, then that rule returns no allocations and the rules engine will go to the next rule in the strategy. Verify that the rule restrictions are correct and that if lot or serial attributes are specified, the correct attribute columns are referenced. The lot and serial attribute columns can be found in the descriptive flexfield definition window.

Other possible causes could be incorrect effective dates or incorrect selection of the partial success flag on the strategy definition. Verify that if any effective dates other than Always are used, that they encode the proper system behavior. Effective dates can be used in two places: rules may be effective only during certain periods on a

strategy definition, and strategies may be effective only during certain period on a strategy assignment. Finally, unless a specific scenario exists where material must be allocated using entirely one rule, the partial success allowed flag on the strategy window should be enabled. Otherwise, even if partial allocations can be made using multiple rules within a strategy, no material will get allocated unless the allocation can be made entirely from a single rule.

Material may not get allocated if no strategy can be found and there is no default picking and put away rule defined on the Organization Parameters window.

3. Allocations Not What Expected

   The picking and putaway strategy and rule that were selected by the system are stamped on the temp transaction prior to performing the transaction, and on the transaction history after the transaction has been completed. Therefore, the selected rule or strategies can be seen by a SQL query on mtl_material_transactions_temp prior to transaction, or via the View Material Transactions window on the desktop after the transaction has taken place.

4. Lines Allocated But Task Type Not Assigned

   After the material allocation is made for a picking or replenishment task, task type assignment is performed. If the allocation was made but no task type was assigned, then no enabled task type rule was applicable. Note that a default task type rule can be specified at the organization level. This scenario can be detected with the following script, which returns all the task lines in the table mtl_material_transactions_temp of a given move order or batch number:

```
--Replace &batch with the pick release batch number within single
quotes
select bom.operation_code as task_type, item.concatenated_segments
as item,
    transaction_quantity as qty, transaction_uom as UOM,
temp.subinventory_code as subinventory, loc.concatenated_segments as
locator
 from  bom_standard_operations bom, mtl_material_transactions_temp
temp,
    mtl_txn_request_lines mol, mtl_item_locations_kfv loc,
    mtl_txn_request_headers head, mtl_system_items_kfv item
where temp.move_order_line_id = mol.line_id and
item.inventory_item_id = temp.inventory_item_id
  and item.organization_id = temp.organization_id
  and mol.header_id = head.header_id
  and head.request_number = &batch
  and bom.standard_operation_id = temp.standard_operation_id
  and loc.inventory_location_id = temp.locator_id
```

   Check for null entries in the task type field. To debug this scenario, determine which rules should apply to the line, and verify that the rules are enabled. A list of all enabled task type rules of a given organization, in the sequence they are applied, can be seen with the following script:

```
--Replace &org_code with the 3 character within single quotation
marks
select rule_weight, name, description, type_hdr_name
from wms_rules_v rule, mtl_parameters mtl
where type_code = 3
  and rule.organization_id = mtl.organization_id
  and organization_code = &org_code
  and enabled_flag = 'Y'
  order by rule_weight
```

5. Task Type Assigned But Task Not Available to User

   The most common cause of this problem is problems with the task type setup, such as the resource or employee definition. See System Task Management, page 9-1 for additional information.

6. Rule Cannot be Compiled

   The system performs several syntax checks are on a rule when you enable it. The system checks parentheses to make sure they match and are closed properly. Also, if the rule includes a user-defined expression, the system verifies that the expression is correctly defined. For custom expressions, verify that the correct table aliases are used, and that the tables identified by the aliases would be included in the rule. Recall that a dummy restriction may need to be added for some user-defined expressions.

   If the rule still does not compile, there may be a problem with the seeded objects. If the rule has multiple restriction (or sort criteria) lines, make a copy of the rule and remove the restriction or sort criteria lines one by one; attempt to compile the rule at each removal. (Ensure that the parentheses match at all times by removing all parentheses, even though this does not correctly model the rule logic.) If, after removal of a particular line, the rule can then be compiled, that attribute is the offending component. Contact Oracle Support and provide them with that particular restriction line, and with the entire rule.

7. Rule Not Available for use in Strategy

   Only enabled rules can be used in strategies; verify that the rule is enabled. If both the Rules window and the strategy window are open at the same time, the enabled rule must be saved before the rule will be available for strategies. Rules are organization specific, unless they are shared across all organizations by checking the Common To All Orgs check box. Also, rules can only be used in strategies of the same type. For instance, a put away rule cannot be used in a picking strategy.

8. Strategy Not Available for use in Strategy Assignment

   Only enabled strategies can be used in strategy assignments; verify that the strategy is enabled. If both the strategy and the strategy assignments window are open at the same time, the enabled strategy must be saved before the strategy will be available for strategy assignments. Strategies are organization specific, unless they are shared

across all organizations by checking the Common To All Orgs check box. Also, strategies can only be used in a strategy assignment of the same type. For instance, if the selected strategy type on the strategy assignments window is picking, then only picking strategies appear in the list of values.

9. Cannot Disable rule

   A rule can only be disabled if it is not used in any enabled strategies; all strategies in which that rule occurs, even if the strategy is in a different organization, must first be disabled. The rule where used window indicates in which strategies a particular rule is used.

10. Cannot Disable Strategy

    A strategy can only be disabled if it is not used in any enabled strategy assignments in the Rules Workbench. All strategy assignments in which that strategy is used, even if in a different organization, must be disabled or deleted before that strategy can be disabled.

11. Unable to Allocate Error

    This error occurs on the mobile device from a user-triggered LPN put away. This indicates one of the following:

    - None of the locators chosen by the rules in the selected put away strategy have available capacity
    - The restrictions on the rules do not return any locators even before capacity considerations
    - No put away strategy was found and no organization default put away rule was defined on the Organization Parameters window.

    This may also indicate that the current locator of the LPN is a valid locator returned by the rules engine. A user-triggered LPN put away creates a move order in the background, and a move order cannot have the source and destination locators be the same.

    Finally, this may indicate that the current location of the LPN is not a valid picking location for that item. Both picking and put away rules are used for every move order, so if current LPN locator does not meet the restrictions in any of the rules of the applicable picking strategy, then the system cannot allocate the move order. The best way to ensure that the source of a move order validates is to assign a pick strategy with a single rule with no restrictions to the transaction type Move Order Transfer. This is used for both requisition move orders and put aways initiated on the mobile device, so verify this is the logic desired. Perhaps some material should not be allocated for these move orders and thus should be excluded by rule restrictions (or material status) this material could still be moved by a user initiated subinventory transfer.

12. Allocation violates consistency restrictions on rule

    When multiple manual reservations are created on a single sales order, the consistency rules may not work as expected. The system treats each reservation as a different input record for the rules engine, meaning that allocations occur separately for each reservation. Since allocation for each reservation occurs independently of allocation for the other reservations, the system does not check consistency restrictions across reservations.

    Example: Customer JBC orders quantity 20 of item K100. JBC specifies that they want 10 from lot A and 10 from lot B. The user creates 2 reservations on the sales order - one for quantity 10 on Lot A and one for quantity 10 on Lot B.

    The first rule encountered when the rules engine is run says Pick from a consistent subinventory. The rules engine could allocate 10 of Lot A from subinventory EACH and 10 of Lot B from subinventory STORES.

13. The rules engine suggest a putaway locator but commingle occurs error on dropping

    Cost group commingling is supported in a single locator as long as there is some differentiable characteristic of the material other than only its cost group, such as its innermost LPN if packed, lot, serial, revision, or item number. Therefore, because rules engine based material movement generally occurs with LPNs, there is only one circumstance when a cost group commingling error could occur from a directed putaway.

    If the destination subinventory is non-LPN controlled then the system attempts to unpack the LPN when the material is dropped. This implicit unpack transaction may remove the only characteristic (innermost LPN) that differentiated the material in transit from the material already in the locator. In this situation, the drop will fail and the user must select a different locator to put the material away to.

14. Material not allocated in FIFO fashion even though the FIFO rule is used.

    The way the system records the date that is used for FIFO depends on the setting of the profile option INV: FIFO for Original Receipt Date system chooses the oldest receipt date of lines with same item/sub/loc/lot/CG.

    If the profile option is disabled, then the system records the receipt date as the earliest date at which that item / revision / lot / cost group was first received in that locator. Material movements that create new on-hand records reset the receipt date to the date at which the transaction occurred, so a subinventory transfer of material into a new locator sets the receipt date of that item in that new locator to be the transfer date.

    If the profile option is enabled, then the system records the receipt date as the current date for transactions that create material, and as the receipt date on the on-hand record for material transfers. In this case, a subinventory transfer retains the original receipt date. To use true FIFO (to the extent that the system can

distinguish the inventory), the profile option should be enabled, or set to Yes.

When the sort criteria Stock On-hand Receipt Date is used, the rules engine is looking at`ORIG_DATE_RECEIVED`, or if this is null, `DATE_RECEIVED`, in the on-hand record in `MTL_ONHAND_QUANTITIES`. `DATE_RECEIVED` is always the date at which that material was first received into the locator, while `ORIG_DATE_RECEIVED` is controlled by the profile option as described above.

Because material is consumed from `MTL_ONHAND_QUANTITIES` on a FIFO basis with regards to `DATE_RECEIVED`, there may be a mismatch between the consumption of the material via transactions and the allocation of the material by the rules engine. This potential mismatch only occurs when there are no other criteria beyond item, revision, lot, subinventory, locator, and cost group to uniquely track material, so there would be no way to indicate to the operator which material to select. With multiple `MTL_ONHAND_QUANTITIES` records, the system selects the oldest date from records with same item/rev/sub/loc/lot/CG.

15. After applying a patch, sales orders are backordered and/or put away fails.

    When a rule is enabled, in the background, a PL/SQL package is generated with the rule restrictions and sort criteria. This is done so that pick release can run efficiently. The package includes SQL that references the tables and columns in the data model that are required for the rule. When patches are applied to the instance that change the data model, such as seed data changes or schema changes, these rule packages become invalid and must be recompiled. The rules engine will error and not allocate the move order if it attempts to apply a rule with an invalid package.

    Run the concurrent request to regenerate all rules, available from Other ->Requests -> Requests -> Run -> Generate All Rules in the Warehouse Manager responsibility. The PL/SQL package for all rules that are enabled will be regenerated by this request. Alternatively, there is an option in the Tools menu of the Rules form to regenerate the PL/SQLpackage for each rule individually.

Runtime Execution Trace

When you enable Runtime Logging from the logging preferences, the rules engine records a trace of all the strategies and rules that were evaluated, as well as which material or locators failed validation prior to coming to the final suggestion. Even when a move order is backordered, and no allocations are made, this data is recorded. You can view the data can be viewed in the Runtime Execution Trace window available from the desktop Warehouse Manager responsibility. The user-interface of this window and the type of information available is almost identical to that available in the rules engine Simulator. See Explaining the Oracle Warehouse Management Rules Engine Simulator, *Oracle Warehouse Management User's Guide*.

Debug Message from the Rules Engine

The Oracle Warehouse Management rules engine records debug messages in the pick release log. These debug messages help identify which strategies and rules were execute, reasons why various pre-suggestions were bypassed, and other information useful in identifying problems. Writing this log files slows performance of pick release. This log should be enabled when it is necessary to debug an issue. Please include this log whenever reporting an issue to Oracle Support.

This log is enabled or disabled using profile options. Please note that logging must also be turned on in order to use the Rules Engine Trace Mode.

Frequently Asked Questions

1. When are picking/put away rules used?

   The picking and put away rules engine is used for every move order within Oracle Warehouse Management-enabled organizations. This includes manual move orders, replenishment move orders, and sales order staging move orders. This also includes move orders which are created in the background via the mobile LPN put away page.

2. When are cost group rules used?

   All material in the warehouse has a cost group. Therefore, the cost group rules are used whenever new material, or material that does not already have a cost group, is received into inventory. This occurs on miscellaneous receipts, purchase order receipts, RMA receipts, WIP completions, and WIP component returns, for instance.

3. When are task type rules used?

   All tasks that are dispatched must have task types, and therefore use the task type rules. This includes replenishment, picking, and requisition move order tasks.

4. When are operation plan rules used?

   Operation plan rules are used to assign an operation plan to sales order picking tasks. They are not used for other types of tasks.

5. When are label format rules used?

   Label format rules are used for every label print request here the label format is not already specified by the user. This includes manual, user-triggered print requests, as well any labels that are triggered by transactions. To setup label formats and printers see: Defining Label Formats, *Oracle Warehouse Management User's Guide*

6. How is the appropriate staging lane selected?

   The put away locator for a sales order staging transfer is always a staging lane. The

staging lane is selected by any dock door appointments, or by the default staging lane indicated on the pick release window or on the Shipping Parameters window. At a minimum, the Shipping Parameters window must have a staging subinventory defined. If no locator is defaulted, however, the rules engine can be used to select the best staging lane from the defaulted staging subinventory based on any number of criteria, such as freight carrier, ship method, or customer specific lane.

The rules engine is always used to validate the staging lane, regardless of how the lane was initially suggested. The rules engine verifies that the lane is valid based on any rule restrictions in the applicable strategy, and also checks staging lane material status and capacity.

7. Can the rules engine Over allocate?

   The rules engine cannot over allocate material in Oracle Warehouse Management. The rules engine allocates the quantity indicated on the order line, or less if some quantity needs to be backordered.

8. What does the Allocate Serial Numbers check box on the Inventory Organizations window do?

   When this check box is checked, the rules engine suggests which serial numbers the operator should pick. When the check box is not checked, the rules engine just suggests the revision, lot number, subinventory, locator, and quantity for the material to be picked, and the operator enters the serial numbers during pick confirm. If serial allocation is turned off, the rules engine does not direct operators to serials with a material status that disallows picking or to serials that do not match any serial attribute (or other serial specific fields) specified in the rule restrictions. Enabling suggestions of serial numbers could result in poor performance, so the check box should be set only in certain business scenarios.

9. What if the contents of an LPN require put away to different locations?

   It could be that the contents of an LPN must be put away to different locators. For instance, an LPN might contain two different items that need to go into different locators. Or an LPN may contain different lots of the same item, where the lots have different material statuses and the put away rule directs material to a locator of like material status. The system directs the operator to put away each content item, revision, and lot in the license plate separately.

10. How do consistency requirement, pick UOM, and sort criteria interact?

    Consistency requirements are always maintained regardless of sort criteria or pick unit-of-measure. If the allocation mode No LPN Allocation, Prioritize Pick UOM is used, then the pick unit-of-measure of the locator is considered more important than sort criteria when choosing which material to pick. Sort criteria are still used to determine which material to pick, but only among locators that have the same pick unit-of-measure. If the allocation mode No LPN Allocation is used, then the sort criteria take priority over the pick unit-of-measure of the locator. Pick

unit-of-measure is still used, but only to choose among material for which the sort criteria does not differentiate.

11. What rules and strategies come seeded?

    The application has several common picking and put away rules and strategies seeded and ready for use. The strategy search order and strategy assignments still must be defined. Note that seeded rules and strategies cannot be disabled or modified, but can be copied and the copies can be modified. These picking and putaway rules and strategies are seeded in the application and do not depend on any organization or installation specific data. The list of seeded rules and strategies can be found in Appendix B.

12. What if only one range parameter is specified in an effective date?

    The effective dates, assigned to rules within a strategy and strategies within a strategy assignment, have two optional fields for all date type except date type of Always. If both fields are entered, then the effective date is the range indicated, including the two endpoints. If only one parameter is entered, then the date range is treated as effective only up to, or effective beginning at that date, and ending at the end of the sequence for cyclical date types.

    Example

    Example: Date type of Full Date, date range of 1/1/2000 - 12/31/2000 means the effective date is every day in the year 2000. If only 1/1/2000 is indicated in the From field, then the effective date begins on the indicated date, and continues indefinitely. Similarly, if only 12/31/2000 is indicated in the To field, then the effective date ends on the indicated date, and is applicable for all dates prior to that date.

    Example

    Example: Date type of Day, date of Tuesday indicated on the From field but the To field left blank, assuming the week is defined as beginning on Monday, means that the effective date is from Tuesday to the end of the date type cycle, Sunday.

    If both date parameters are left blank, then the date type acts as if Always were indicated.

13. How do the Oracle Inventory allocation rules relate to rules engine based allocation?

    Oracle Inventory allocation rules are not used when Oracle Warehouse Management is enabled for an organization. Oracle Inventory allocation rules can be modeled with the Oracle Warehouse Management rules engine if the warehouse needs to maintain these allocation rules.

14. What are the differences in transactions when LPNs are allocated?

    When an allocation has been made to the LPN detail level, some features of tasks behave differently.

- Transactions that invalidate the allocation, such as moving an allocated LPN to a different located are prevented.
- Cartonization is skipped when an entire LPN is allocated, but is still performed if only pat of an LPN is allocated, assuming that cartonization is setup and enabled for the subinventory.
- Tasks that allocate LPNs are not merged for bulk picking though they mat still be split on equipment capacity.
- Allocations for different LPNs are always split into different tasks so that there is either zero or one allocated LPN per task.
- Allocations are visible on the desktop Transact Move Order window but they cannot be updated if an LPN has been allocated.

15. How does the rules engine know when an LPN is full?

    The rules engine does not have a concept of when an LPN is full or not; however, when using the allocation mode Allocate Entire LPNs Only, the rules engine considers only LPNs which can be entirely consumed by the allocation. So a pallet that is only half full based on the capacity of the pallet could be allocated in this mode, so long as the entire half pallet can be consumed. Note that it is possible, with user-defined expressions, to also encode that the LPN must be "full" in order to allocate it.

4

Cost Groups

This chapter covers the following topics:

- Cost Groups
- Setting Up Cost Groups
- Implementation
- Common Problems
- Debugging Notes
- Frequently Asked Questions

Cost Groups

A Cost Group is the set of accounts that hold on hand inventory. Before the advent of Cost Groups, subinventories in an Oracle Inventory organization defined both the physical and accounting attributes of the material. Different subinventories represented functional/processing requirements, packaging/material handling characteristics or storage/control characteristics. In each warehouse zone, different accounts were maintained by creating separate subinventories, and preassigning locators to each subinventory. Thus a single physical area of the warehouse was subdivided to represent the different accounts which are present in this area.

Cost groups associate account information with its related inventory item. Cost groups provide a way to track both physical and accounting attributes for a subinventory, and enable you to manage inventory that is owned by multiple owners within the same subinventory and locator. Thus, with cost groups, inventory account information no longer needs to be tracked in a separate inventory or physical location.

Several business needs arose due to the limitations of this architecture, including:

- Improve space utilization by eliminating pre-assignment of each subinventory (and all associated locators) to a unique account
- Maintain inventory valuation as a characteristic of inventory, rather than as a

characteristic of the subinventory and locator

- Change valuation separately from physical movement
- Allow multiple inventory asset accounts within the same subinventory

Cost Groups were introduced in Oracle Warehouse Management to separate tracking of physical and accounting attributes. The subinventory now represents the physical characteristics of the warehouse and the Cost Group tracks the accounts of the inventory that is held in the warehouse.

With the introduction of Cost Groups, it is now possible to have a 1:1 mapping of the zones in the warehouse to the subinventories in the system resulting in more accurate representation of capacity. Cost Groups are assigned by the rules engine based on the Cost Group rules setup. Cost Groups provide the following functional enhancements:

- Provide a two-dimensional matrix for tracking physical and account characteristics
- Derive Cost Groups dynamically based on a variety of information including supplier, customer, item, locator, item-status, item-category, and so on.
- Allows inventory of the same item with different Cost Groups in the same locator or LPN
- Support multiple item costs per organization (in Average, LIFO, or FIFO costed organizations)

With the introduction of cost groups, subinventory transfers do not trigger accounting changes. They are now purely physical moves. A new transaction called the Cost Group Change can perform accounting moves.

Process Overview

A Cost Group is assigned whenever inventory is introduced into the warehouse. inventory enters the warehouse by:

- Receiving (from external source), including:
  - Standard receiving
  - Direct receiving
  - Receiving with inspection
  - Miscellaneous receipt
  - Intransit receipt
  - Direct org transfer

- WIP transactions (from internal Manufacturing), including:
  - WIP Assembly completion
  - WIP Component Return

The Cost Group engine can be driven off of numerous pieces of information of these transactions including:

- Supplier
- Descriptive flexfield information
- Customer
- Item
- Location
- Item category
- Item status
- Item disposition (used, new, and refurbished)

Oracle Warehouse Management does not allow Cost Group to be the only distinguishing characteristic between two quantities of loose inventory within a single locator or LPN. After the Cost Group is derived by the Cost Group rules engine, the Transaction Manager checks to see if there is any conflict between the assigned Cost Group and Cost Groups of existing material in the location. If there is a commingle error then the Transaction Manager reports an error condition. Once a Cost Group is assigned to material, it can be changed only by a Cost Group Update transaction.

Business Cases

Receiving from Multiple Suppliers to Same Subinventory

Without Cost Groups, multiple logical subinventories are created to receive material from multiple suppliers. Multiple logical subinventories are required to separate the accounting information of items coming from different suppliers. With Cost Groups, it is possible to receive all the inventory to the same subinventory and have it associated with different Cost Groups. During the receiving transaction, the Cost Group rules engine allocates a different Cost Group to the item based on the value of supplier business object.

Once these items have been received into inventory, the onhand would reflect a case like this:

On-Hand Example

Subinventory	Locator	Item	Qty	LPN	Cost Group
BULK	BLK1.1.1	Item1	10	1	CG-Suppl1
BULK	BLK1.1.1	Item1	20	2	CG-Suppl2

Receiving Item of Different Grade to Same Zone

In this case, Cost Group Rules engine could be set up to look into some attribute of the item. Supposing the Cost Group Rules were setup to assign different Cost Groups to a Lot-controlled item based on the attribute of the Lot.

In this scenario, after the item has been received, the onhand could reflect a case like this:

On-Hand Example 2

Subinventory	Locator	Item	Qty	Lot Number	Cost Group
BULK	BLK1.1.1	Item1	10	GoodLot	CG-Good
BULK	BLK1.1.1	Item1	20	BadLot	CG-Reject

Setting Up Cost Groups

Cost group rules define the conditions under which a specific cost group should be assigned to a specific set of inventory. After you define cost group rules, you assign strategies that define the sequence in which a set of rules should be executed to determine the cost group.

For example, you might define a strategy that evaluates several rules to determine whether inventory is consigned from a specific supplier, and subsequently evaluate other rules to determine whether the item is of a category that should be associated with a specific account.

When you set up cost groups, you modify or add attributes to existing organizations and subinventories.

Cost group setup involves the following general steps:

1. Defining an inventory cost group for a particular organization.

2. Specifying the default cost group in the Organization Parameters window.

3. Setting up , *Oracle Warehouse Management User's Guide* cost group rules.

   Steps 1 and 2 represent the incorporation of cost groups into the standard inventory organizations and subinventories setup. For instructions on how to set up cost groups, see: Defining Project Cost Groups, *Oracle Cost Management User's Guide*.

The Oracle Warehouse Management Rules Engine enables you to set up rules that assign items to cost groups, based on business criteria, such as the item's material status, or the item's ownership.

First, for all costing methods, accounts are determined by the cost group, not by the subinventory or the organization parameters. The cost groups allow items in the same subinventory to be held in different accounts.

For actual costing, such as Average, FIFO, and LIFO, organizations, item costs are held by the cost groups. When cost groups are assigned by item status, the cost groups hold different item costs for items of different status. In FIFO and LIFO organizations, the layer cost is maintained with the cost group.

A new transaction, called Cost Group Update, now enables the costs associated with one item to be transferred to another, without physically moving the item. In organizations with both Project Manufacturing and Oracle Warehouse Management enabled, the Project cost group overrides the Oracle Warehouse Management Cost Group.

Implementation

Cost Group setup consists of these four setup operations

1. Define organization and specify default Cost Group

2. Define inventory Cost Groups for a particular organization

3. Define subinventories and assign default Cost Groups

4. Define Cost Group Rules

   Steps 1 - 3 reflect the incorporation of Cost Group associations into the basic setup of inventory organizations and subinventories

   Step 4 reflects the additional setup required to specify new rules to assign accounts to inventory with specific characteristics. See:

   A Summary of the steps involved in defining Cost Group rules include:

   - Configure The strategy search order

- Define cost group rules

  Cost Group rules define the conditions under which a specific Cost Group should be assigned to a specific set of Inventory.

- Configure the strategy search order

- Define cost group strategies

  Cost Group Assignment Strategies define the sequence in which a set of rules should be exercised to determine Cost Group. For example, a specific strategy might evaluate several rules to determine whether inventory is consigned from a special supplier, and subsequently evaluate other rules to determine whether the item is of a category that should be associated with a specific account.

- Assign cost group strategies to business objects

  Assigning the strategy to a specific business object indicates that the specific strategy should be invoked when the inventory is created in association with that specific object. For example, a specific strategy could be assigned to the business object 'Transaction Type = Account Alias Receipt,' a second strategy could be assigned to 'Item = M9571A,' a third strategy could be assigned to 'Item Category = ASSEMBLY.FINAL,' and so on. If an Account Alias Receipt is performed, the first strategy is invoked. If some other transaction is performed for Item M9571A, the second strategy is invoked. If a different transaction is performed for a different item of Item Category ASSEMBLY.FINAL, the third strategy is invoked. If none of these conditions are met, the default cost group for the subinventory is invoked.

Common Problems

1. Receiving causes a Cost Group commingle error.

   A Storable Unit is a quantity of inventory, uniquely identifiable by a combination of Item Number, Revision, Lot, Serial Number, LPN, and Locator. If any one of these six identifying characteristics varies between two quantities of inventory, then each quantity represents a distinct Storable Unit, capable of carrying a distinct Cost Group. If all of the characteristics are identical, then the two quantities are really a single Storable Unit of the combined quantity, which must carry a single Cost Group.

   Any on-hand inventory that exists for a specific Item carries some Cost Group. For example, LPN 123 contains 100 Each of Item M9571A in Organization WM1, Subinventory Bulk, and Locator BLK1.1.1. The Item is not Revision, Lot, or Serial controlled. This Storable Unit carries Cost Group Alpha. A receipt for Item M9571A is performed against a purchase order. As the Cost Group rules have been established, this new inventory will be assigned Cost Group Beta. If the newly

received quantity is destined for LPN 123 in Locator BLK1.1.1, this transaction is attempting to co-mingle inventory of two different Cost Groups into a single Storable Unit. The Transaction Manager will report a co-mingle error, and the transaction will fail.

For the transaction to succeed, the new inventory must be a distinct Storable Unit. This can be accomplished by receiving or performing the put away into a different locator or into a different LPN (this includes the option to store the inventory loose in Locator BLK1.1.1). For other items that are Revision, Lot, and/or Serial controlled, co-mingling errors may be prevented by using distinct Revisions, Lots, or Serial Numbers. There is no circumstance under which a co-mingling error may arise for serial tracked inventory, since every unit of inventory is its own Storable Unit, uniquely identified by the serial number.

2. Failure to assign a Cost Groups when performing a transaction.

   Changing the definition of a rule in one user session could cause a failure in other user sessions if the rule being changed is used by the other sessions. The Inventory Transaction Manager would fail in this case with an error message of 'Failed to assign Cost Group to Item'. The solution to this problem is log out of the affected session and log back in and retry the transaction.

Debugging Notes

The Inventory Transaction Manager log file provides details on the various steps involved in deriving the Cost Group when processing a transaction. This trace is enabled by the Transaction Manager trace profiles. Please refer to *Oracle Warehouse Management Mobile Inventory Transaction Technical Manual* for details on enabling trace.

List of common error conditions in deriving cost groups

- FOB (Free on Board) point is not defined for the organization
- The onhand quantity is zero for the selection criteria entered
- Error Updating Entity

Frequently Asked Questions

1. What is a Cost Group?

   A Cost Group is a set of related financial accounts, representing ownership of inventory. Think of this as the accounts that used to be on the accounting tab of the subinventory form.

2. Does the Cost Group change when inventory is moved?

Cost Group is not changed by a Subinventory Transfer. Inventory retains the originally assigned Cost Group throughout any movements within the same organization. When an InterOrg Transfer is performed, a new Cost Group is assigned based on the Cost Group Rules for the destination organization.

3. How can I change the Cost Group assigned to inventory?

   The Cost Group Update transaction is specifically designed to do this. The physical location of the inventory is managed by a Subinventory Transfer, and ownership is separately managed by a Cost Group Update.

4. What is the difference of a Oracle Warehouse Management Cost Group and a Project Manufacturing Cost Group?

   They are the same thing. If the organization is a Project Manufacturing organization, the PJM cost group will always be assigned to project inventory regardless of the rules you set up. A user cannot transfer material that belongs to a project out of the project's cost group.

5. What if I want to derive the Cost Group from the subinventory?

   The final, underlying default for the Rules Engine is to assign the default Cost Group of the subinventory to new inventory arriving there. If no other, more specific rules are created, the Default Cost Group of the subinventory will always be used (similar to functionality before Cost Groups). However, the Cost Group will not be changed by a subsequent Subinventory Transfer. That functionality will remain the province of the Cost Group Update.

6. Do multiple Cost Groups enable multiple costs?

   In an Average, LIFO or FIFO costed organizations, a distinct cost is maintained for each Item/Cost Group combination. In a Standard costed organization, a single Standard Cost is maintained for each item. All inventory of that item, regardless of Cost Group, carries the same Standard Cost.

7. What is commingling?

   Commingling is an attempt to assign two distinct Cost Groups to a single Storable Unit of inventory. Oracle Warehouse Management will prevent co-mingling by failing any transaction that would result in co-mingled inventory. The user can avoid co-mingling errors by ensuring that at least one of the characteristics Item Number, Revision, Lot, Serial Number, LPN, or Locator differ between any two quantities of inventory that should belong to different Cost Groups.

8. How does Cost Group assignments differ between Oracle Inventory and Oracle Warehouse Managment?

   Cost Groups in Oracle Warehouse Management are assigned by the Cost Group Rules Engine. In Oracle Inventory, Cost Groups are derived based on the Primary Cost Method of the organization and the location where the material is being

moved. If the costing method is Standard-Costing, then the Cost Group associated with subinventory is assigned to the material. For the other costing methods, the Cost Group associated with the organization is used. In Oracle Warehouse Management, once a Cost Group is associated with a material, it does no change when the material is moved within the organization. In Oracle Inventory, the Cost Group associated with the material changes with the location where it is residing.

5

Advanced Task Framework

This chapter covers the following topics:

- Overview
- Advanced Task Framework Concepts
- Framework
- Advanced Task Framework Setup Considerations
- Execution
- Common Problems

Overview

Advanced Task Framework allows you to configure and execute complex material flows for inbound items. You can plan and configure material flows to address specific business objectives. Advanced task framework also facilitates the inbound movement of material by simplifying the execution process.

Advanced Task Framework Concepts

Advanced Task Framework uses basic concepts that dictate the movement of material within a warehouse. These concepts are explained using a hypothetical example involving Jim. Jim is a traveling salesman who is based in Miami Florida. Jim travels frequently to meet customers and give product demonstrations. In Advanced Task Framework concepts, his travel from his home base to the client location is analogous to material movement in the warehouse. Some of the underlying concepts for making travel arrangements are similar to the way material movement is planned in a warehouse.

Final Destination and Location Routing

The business needs always dictate the destination location. Continuing with the

previous example, the location of his clients determines Jim's final travel destination. If he has a meeting with a customer in the San Francisco Bay area, the nearest airport will likely be his final destination. His other needs are destination arrival time, ticket price, and total travel time to his final destination. Taking his needs into consideration, the airline uses its route plan and schedules to suggest a travel plan for Jim. The airline determines the most optimum travel plan based on his needs and may decide to route him through a hub airport such as Atlanta.

Advanced Task Framework helps select the most suitable routing for inbound material from the receiving area to the final location in the warehouse. This routing is known as the operation plan. Similar to the airline analogy, multiple operation plans may exist in a warehouse to move the material to a destination location. However you may configure operation plan selection rules to model constraints and business requirements so the system selects the most suitable operation plan for inbound material execution.

Consolidation and Deconsolidation

Why does Jim take a connecting flight? There are only a few direct fights between Miami and San Francisco, and the ticket prices on these flight are expensive. Why?

The routing through a hub airport allows the airline to improve asset utilization and offer cheaper and more frequent fights than a point-to-point flight routing. Routing through a hub airport allows an airline to consolidate passengers flying to multiple nationwide destinations into a single flight to a hub airport. The passengers on this flight are then deconsolidated and routed to flights going to multiple nation wide destinations.

In a warehouse the same principles apply. You can use consolidation and deconsolidation at intermediate drop off points to make material movement more efficient in you warehouse. Advanced task framework allows you to group material with similar attributes. Material grouping allows you to consolidate or deconsolidate items for execution. Advanced task framework allows you to consolidate material based on similar attributes in a location or LPN. Material grouping allows you to optimize warehouse resources so you can perform a particular warehouse operation on a group of items instead of the same operation multiple times on individual items.

An example of grouping is receiving the same item against multiple purchase orders. Assume the items are identical and are bound for the same final storage location. It is more efficient to group the items into an LPN and the putaway the LPN. This LPN can be putaway in a single movement rather than multiple moves to the same storage location for the same item. You can also use material grouping to separate items from a mixed LPN. You can deconsolidate the mixed LPN into individual LPNs that contains the same item.

Non-deterministic Final Destination Location

Jim's travel arrangements often depend on the outcome of a particular meeting. In such cases, he cannot determine the final destination with certainty. For example, Jim

performs a product demo to the end users at a plant in Salt Lake City. If the end users like the product demo, Jim makes travel arrangements to the client head quarters in San Francisco for further discussion with management.

The situation is similar in a warehouse. Often the result of an operation on inbound material Often the result of an operation on inbound material dictates the final storage location and subsequent routing.

An example is a receipt of an item that requires inspection. In this case the final storage location and routing depends on the result of the inspection operation. The requirement may bye putaway accepted material in storage, and putaway rejected material in a staging area for customer returns. When you use Advanced Task Framework you can perform a mid-course correction of the final location and operation plan. in the example above, the system determines the new putaway location and the operation plan following the inspection.

Handling Exceptions

Jim plans his travel carefully. However sometimes his travel plans go haywire. When it odes happen usually one of the following two things occur:

- Travel plans are aborted: This happens when an unplanned event such as weather forces the aircraft to be routed to a different location. Jim calls this exception an inexcusable exception. Jim works with the airline to make a new travel plan for the original destination.

- Travel plans continue with exception: This happens when the airline reschedules Jim's flights or routes him to another airport in the same metropolitan area. Jim calls this exception an excusable exception. No replanning is needed.

In a warehouse, similar exceptions may occur and Advanced Task Framework handles the situation in a similar fashion. If an inexcusable exception occurs, Advanced Task Framework aborts the planned routing and replans the inbound movement for the destination location. A new operation plan is also assigned for the inbound movement. However in the case of an excusable exception, Advanced Task Framework retains the original plan for the inbound movement of material to the final storage location.

Framework

Advanced task framework consists of the following elements:

- Warehouse physical representation: Oracle Warehouse Management uses receiving locators and zones to represent the layout of the warehouse. Advanced task framework leverages the warehouse layout to route material from receiving to storage.

- Material Routings: Oracle Warehouse Management uses operation plans to route material through the warehouse.

Advanced task framework leverages the layout and operation plan information to create tasks that direct you to perform operations in conformance with the operation plan.

Receiving Locators

Advanced task framework uses the physical layout of the receiving area to specify intermediate drop off points for inbound material. It also uses the information to specify the physical location for inbound activities such as inspection or packing.

The receiving area layout should clearly segregate the inventory and receiving area in the warehouse. An inventory area is where you store on-hand stock, reserve material, and pick material for outbound fulfillment. The receiving area stores inbound material that is not yet part of on-hand stock. The material in the receiving area is an asset from an accounting perspective. Once you separate these areas, you can define the receiving and inventory subinventories as receiving and storage subinventories.

Before you can define receiving locators, you must define receiving subinventories. you can further decide receiving subinventories into receiving locates with locator types such as packing station or inspection station.

You may also have zones within your warehouse. Advanced task framework uses material zones to simplify the definition of material flow. Zones can be a logical grouping of locators that have a common attribute such as packing. Zones provide improved flexibility to define inbound material flow by grouping together similar locators and referencing this group in the material flow.

Putaway Rules

You can configure putaway rules to suggest a final destination location for inbound material based on specific business requirements. The rules engine framework provides multiple objects and parameters to achieve a specific result such as:

- Avoiding lot commingling in a locator
- Directing hazardous material
- Minimizing item fragmentation
- Segregating of seasonal items
- Putaway based on inspection result

Advanced Task Framework uses putaway rules to determine the final storage location. However, the putaway rules doe not determine intermediate storage locations.

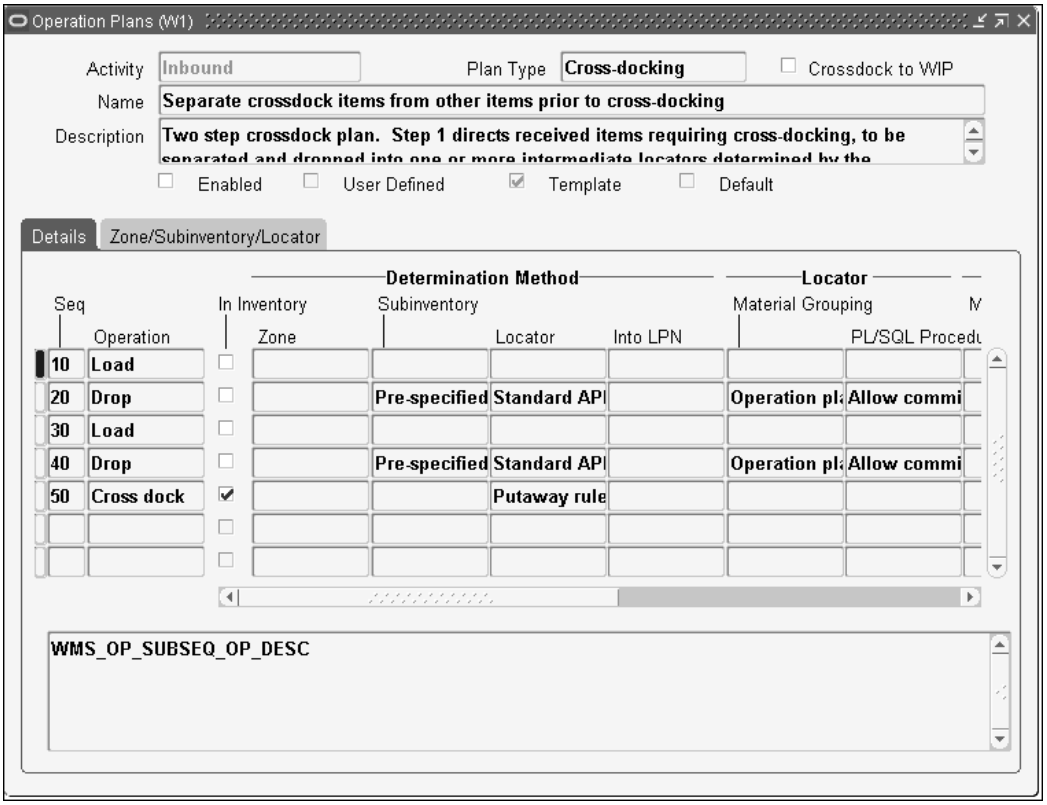
Operation Plan

Advanced Task Framework uses operation plans to define the routing of material from

a receiving area to the storage area. It does not apply to movement of material received against a direct routing because that material is automatically transferred to inventory upon receipt.

An operation plan is similar to a manufacturing routing. Like a routing, an operation plan defines the sequence of operations and when the operations occur. An operation plans has a unique name, and you can create a description to describe what the operation plan does. The following sections describe the operation plan required inputs.

> **Important:** For the Inbound Inspection operation plan to function, you must select the Pregenerate after Receipt check box in the Organizations Parameters form (Warehouse Task Management tab).



Operation Plan Type

The operation plan type determines the type of operation you perform. An operation plan may be one of the following types:

- Inspection: You use this plan type for material that requires inspection.
- Crossdock: You use this plan type for material that needs to be crossdocked.
- Standard: You use this plan type for material with a standard routing that does not

qualify for crossdocking. You also use this plan type for inspection required material that does not qualify for crossdocking, and for which the inspection is complete.

Crossdock to WIP

The Crossdock to WIP check box indicates whether this operation plan is used for WIP crossdocking instead of for sales order crossdocking. WIP crossdocking is used only with opportunistic crossdocking.

Operations

The operation sequence indicates the order of operations in the material routing. Unlike a manufacturing routing, there are relatively few warehouse operations. Typical warehouse operations are as follows:

- Load: Operation to initiate material movement.
- Drop: Operation to complete a material movement.
- Inspect: Operation to perform an inspection.
- Crossdock: Operation to move material to an outbound staging area.

Advanced Task Framework imposes the following operation sequence restrictions on an operation plan.

- Load and Drop must always be consecutive operations, with a load always followed by a drop.
- Multiple load and drop operations can be assigned to an operation plan.
- Inspect and crossdock are always the last operation in an operation plan of their respective type. You cannot perform crossdocks or inspections in any other type of operation plan.
- You can only perform one inspection within an inspect operation plan.

In Inventory Flag

The In Inventory flag indicates when the inbound material crosses the invisible line that separates the receiving area from inventory. If you check the inventory flag it indicates the arrival of the flag in inventory when the operation completes. A deliver transactions, and the associated financial transactions for goods receipt occur at this time.

Advanced Task Framework does not allow material to revert back to receiving. Once you check this flag on an operation, it is automatically checked for all subsequent operations. The inventory glad controls the physical locator where the operation is

carried out.

- If the In Inventory flag is checked, the locator where the operation is performed must reside within a storage subinventory.

- If the In Inventory flag is not checked, the locator where the operation is carried out my reside within a receiving subinventory.

Locator Determination Parameters

Locator determination parameters are required for drop operations. The locator determination indicates the physical locator where you drop the material. You can use one of the following methods to determine locators.

- Pre-specified: You can use a pre-specified locator determination if you always use a specific locator for execution of a particular operation i.e. you always carry out inspections at one inspection station, or you use a specific P&D locator in a material routing. You enter the pre-specified locator in the Sub/Zone Locator tab of the operation plan window.

- Standard API: You can use locator determination to plan consolidation of material with similar attributes into a locator. The locator determination criteria determines how you should consolidate material. You can use either a standard API or a custom API to perform locator determination. You must enter a pre-specified subinventory or locator if you choose to determine locators by the standard or custom API. The API determines the locator based on consolidation criteria. The locator determination criteria consists of the following two parameters:

  - Material Grouping: The standard API in Advanced Task Framework allows you to consolidate locators based on either destination locator, destination subinventory, or operation plan type. If you set material grouping to operation plan type, the system consolidates material that belongs to the same operation plan type in the same location. If you set material grouping to destination subinventory, the system consolidates material with the same final destination subinventory in the same location. If you set material grouping to destination locator, material with the system consolidates material with the same final destination locator in the same location.

  - PL / SQL Procedure: There are two type of standard APIs in Advanced Task Framework. One allows commingling of items within a locator, and one does not.

    Example

    Pallets of Items A and B are stored in a narrow aisle area (subinventory VNA) in the warehouse. The pallets are brought to a P&D area (zone PND) using a forklift. From the P&D area, the pallets are transferred to VNA using a turret truck. Items can be commingled in the P&D area. The operation plan for this situation can be configured as follows:

Operation Plan Example

Seq	Operation	Pre-specified Zone	Locator Determination	Locator Consolidation Criteria
10	Load	-	-	-
20	Drop	PND	Standard API	Destination subinventory with item commingling
30	Load	-	-	-
40	Drop	-	Putaway Rule	-

- Custom API: If needed you can also use a custom API to determine an intermediate drop location. Advanced Task Framework provides a hook that allows you to write your own PL/SQL logic and register it with Oracle Warehouse Management. You can then specify the custom API to suggest the locator during execution.

  To use a custom API you must write your own PL / SQL API. The API signature must follow a given specification. Use the seeded API as a reference. The seeded API for locator suggestion is in the file WMSADLOB.pls. Refer to the code logic in these files when writing your code logic.

  After you compile the custom PL/SQL API you must use the concurrent program Register Custom APIs to register the program with Oracle Warehouse Management. This populates records into the WMS_API_HOOK_CALLS table. It also places the custom API in the Define Operation Plan window list of values.

- Putaway Rules: You can only use a putaway rule if the operation is an in inventory operation, and is the last operation of the operation plan. It is recommended to have locator determination use putaway rules for the last operation in the operation plan.

LPN Determination Parameters

You may enter LPN determination parameters for drop operations. Advanced Task Framework uses LPN determination to suggest an LPN where material needs to be dropped. You can use LPN determination to plan consolidation for material with similar attributes. You can use one of the following methods to perform LPN determination.

- Standard API: Similar to the standard API for locator determination, the standard

API for LPN determination consists of the following two parameters.

- Material Grouping: The standard API allows you to bas LPN consolidation on destination locator, destination subinventory, or operation plan type. If you set material grouping to operation plan type, the system consolidates the material that belongs to the same operation plan type within the same LPN. If you set material grouping to destination subinventory, the system consolidates material with the same final destination subinventory in the same LPN. If you set material grouping to destination locator, the system consolidates material with the same final destination locator in the same LPN.

- PL / SQL Procedure: There are two type of standard APIs in Advanced Task Framework. One allows commingling of items within a locator, and one does not.

  Example

  Pallet of items A and B are stored in a narrow aisle are (subinventory VNA) in the warehouse. Floor loaded cases of items are brought to a P&D area (Zone PND) using a forklift. Since the pallets should not be broken during final putaway. Palletization is performed by consolidation the same items bound for the same destination locator. From the P&D area, the homogenous pallets are transferred to VNA using a turret truck. The operation plan for this situation is configured as follows:

  LPN Determination Parameters Example

Seq	Operation	Pre-Specified Zone	LPN Determination	LPN Consolidation Criteria
10	Load	-	-	-
20	Drop	PND	Standard API	Destination Locator with No Item Commingling
30	Load	-	-	-
40	Drop	-	-	-

- Custom API: You can use a custom API to suggest LPNs during drop operations. Advanced Task Framework provides a hook that allows you to write your own PL / SQL logic and register with Oracle Warehouse Management. You can then specify the custom API to suggest LPNs during execution. The seeded APIS for LPN

suggestion are in the file WMSADLPB.pls. The procedure to register and use this custom API is similar to the procedure for custom API locator suggestion.

Crossdock Method

If the operation plan is a crossdocking plan, then you must link it to a seeded outbound operation plan unless it is a WIP crossdocking operation plan. You cannot link a WIP crossdocking plan to an outbound seeded operation plan. These seeded outbound operation plans control the consolidation of material for shipping. The outbound seeded operation plans are:

- LPN-based consolidation in staging lane within deliveries: This plan is the default operation plan for crossdocking. It consolidates material based on LPNs within a staging lane for the same delivery. With this plan you cannot merge more than one delivery within the LPN. This is the default outbound operation plan.

- Locator-based consolidation in consolidation locator within deliveries: This plan enables you to consolidate material based on the consolidation locator into which you drop the shipment before you move it to a staging lane. If you choose this plan, then the consolidation locator can contain only material for one delivery. You cannot mingle material for different deliveries if you choose this operation plan.

- LPN-based consolidation in consolidation locator within deliveries: This consolidates material based on LPNs within a consolidation locator for the same delivery before you move it to a staging lane. You cannot mingle material for different deliveries if you choose this operation plan.

- Direct consolidation within delivery: This operation plan enables you to consolidate loose material for the same delivery within the staging lane. If you choose this operation plan, you cannot place material for a different delivery in the staging lane.

- LPN based consolidation in staging lane across deliveries: This operation plan enables you to consolidate material in an LPN across multiple deliveries.

- Direct consolidation in staging lane across deliveries: This operation plan enables you to consolidate loose material for multiple deliveries in a staging lane.

- LPN based consolidation in consolidation locator across deliveries: This operation plan enables you to consolidate material in LPNs in a consolidation locator across deliveries.

- Locator based consolidation in consolidation locator across deliveries: This operation plan enables you to consolidate material based on the consolidation locator across deliveries.

Operation Plan Selection Rules

You can use multiple operations plans in a warehouse. However you can only use one operation plan for execution purposes when material is received. You can configure operation plan selection rules to select an appropriate operation plan based on business requirements. Operation plan selection rules are similar to label format rules. The return value is the operation plan assigned to receiving lines when the condition specified in the rule are satisfied.

Advanced Task Framework Setup Considerations

You must consider the following when you set up Advanced Task Framework

- Operation Plan Assignment
- Default Operation Plan.
- Handling Non-deterministic Destination Locations
- Handling Exceptions

Operation Plan Assignment

An Operation plan is always assigned to material residing in receiving. Therefore when you assign an operation to material that has the last operation in receiving, for example, no operation with an in inventory flagged check, the system always uses operation plan selection rules to assign a new operation plan.

Default Operation Plans

If the operation plan selection rules fail to return an operation plan, at any time, the system assigns a default operation plan

Handling Non-deterministic Destination Location

Often the result of an operation on inbound material dictates the final storage location and its subsequent routing. Advanced Task Framework allows you to terminate the operation plan and perform a mid course determination of the final destination location and operation plan.

Packing of Inbound Material

The results of a packing operation may change the final putaway location for material. For example of you palletize material they may need to go to bulk storage and may require different equipment and material routing to the bulk area. If this is likely to happen, you should terminate the operation plan with a drop at or near a packing

station. The actual packing then occurs using the packing workbench, and the material automatically moved to the packing station locator. Once packing is complete Advanced Task Framework determines the putaway location and assigns another operation plan to move the item to the next location.

Inbound Inspection

Inspection results may influence the final storage location of inspection required items. The business requirement is to route accepted material to storage, and rejected material to a rejection area to process for return to the vendor. You can define three operation plans to address this situation. The first operation plan moves material to the inspection station. The second operation plan moves accepted material to the storage area. The third operation plan moves the rejected material to the vendor return area. You can define an operation plan selection rule to determine the appropriate operation plan based on inspection results.

Handling Exceptions

An exception occurs when you perform a drop operation in a locator other than the suggested locator. Advanced Task Framework handles exceptions in the following ways:

- Excusable Exceptions: This exception occurs when the actual drop locator belongs to the same zone of subinventory as the suggested locator. In this case Advanced Task Framework retains the original plan and further material movement follows the original plan.

- Inexcusable Exceptions: This exception occurs when the actual drop locator belongs neither toe the same zone or the same subinventory as the suggested locator. In this case, Advanced Task Framework aborts the original plan and determines a new operation plan using operation plan selection rules. Further material movement follows the new operation plan.

Execution

An Advanced Task Framework load operation completes successfully when the following transactions occur.

- Manual Load: The load can be carried out using any combination of load transactions such as item based, transfer contents, load full LPN etc.

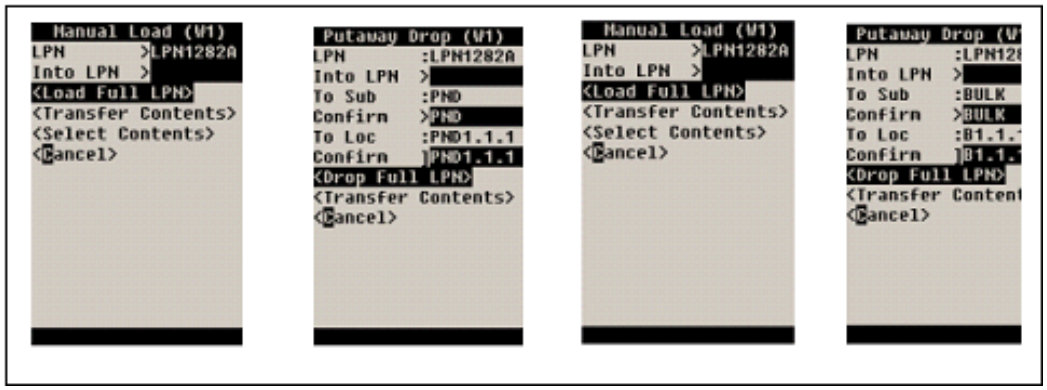
- Move any LPN: This transaction initiates a one-setup load and drop transaction.

When you load material in a receiving locator, the system should suggest the drop location based on the operation plan. You can use any of the following inbound drop transactions to perform the inbound drop.

- Manual Drop: You manually specify the locator.
- Drop Loaded LPNs: This is a directed drop transaction, you can perform this transaction using any of the drop transaction methods such as item drop, transfer contents, drop full LPNs etc.
- Drop All: Allows you to drop all loaded LPNs. The system directs you to drop the LPNs in the most optimal sequence of drop locations.
- Move any LPN: This transaction initiates a one-setup load and drop transaction.

Example

The following operation plan describes a two step inbound material movement. The material is loaded from a receiving area and dropped into a P&D locator. The material is then moved to the final location using another set of load and drop operations.



You can use the Oracle Warehouse Management control board to monitor in progress, and completed operation plans. You can use Advanced Task Framework to view tasks as independent, or as part of an operation plan. You can collapse and expand an operation plan record and monitor the progress of operations within the operation plan.

> **Note:** Load and drop operations appear as one task within the warehouse control board.

Common Problems

1. Drop locator and / or LPN are not suggested as per the operation plan.

   Usually this occurs because the operation plan is not assigned. Verify the correct operation plan is assigned in the warehouse control board. If an incorrect operation plan or default operation plan is assigned, make the correction. If the proper plan is assigned, verify the locator or LPN determination parameters within the operation plan.

2. The system assigns the same operation plan.

   Verify you defined the operation plan assignment rule properly. If you define the assignment rule improperly, then infinite looping occurs.

3. Load and drop operations do not complete successfully.

   Usually the reason for this is available in the PL / SQL log file. To generate the log file set the profile options as follows:

   - INV: Debug Trace : Yes
   - INV: Debug Level: 9
   - INV: Debug file: (Include filename complete path where the file path must exist in the following query result)`from v$parameter where name = 'utl_file_dir';`

6

Inbound Process

This chapter covers the following topics:

- System Inbound Process Overview
- Functional Business Flow Description
- Implementation
- Common Problems
- Debugging Notes
- Frequently Asked Questions

System Inbound Process Overview

Oracle Warehouse Management provides a full-suite of highly automated RF hand held computer based transactions that enable a warehouse to receive incoming material. Incoming material enters the warehouse from the following sources: suppliers, distribution centers, or returned material from suppliers or customers. Oracle Warehouse Management uses Radio Frequency (RF) technology, material handling rules, Advanced Task Framework (ATF) container management and storage constraints. Oracle Warehouse Management supports the following inbound processing features:

- System suggested putaway locations
- Opportunistic crossdocking
- Lot and serial based inspection capabilities
- Express receipts for material from trusted suppliers
- User configured discrepancy actions
- Capability to print highly configurable labels

Functional Business Flow Description

Oracle Warehouse Management supports the following: receipt, inspection, and put away for material from a supplier purchase order, material sent from an internal warehouse against a Shipment Number or Internal Requisition, or material returned from a customer against a Return Materials Authorization (RMA) number. You can use express receipts if you receive an Advanced Shipment Notice from a trusted supplier or material from an internal warehouse.

Oracle Warehouse Management enables you to configure receipt inspection if you must inspect received material before you receive the material into inventory through the receipt routing. When you receive material, Oracle Warehouse Management uses rules in the Rules Engine to determine the cost group, accounts, and the optimal inventory storage location for a put away. This enables you to focus on the execution of material handling.

Oracle Warehouse Management supports a variety of business flows and practices that enable you to model your business requirements. You can receive material through different routings depending if the material require inspection, and if the material needs to be counted as on-hand immediately after receipt checkin. You can use substitute items to receive items against a blanket purchase order releases and the supplier item code. The system gives you real-time responses about tolerance violations. Opportunistic crossdocking allows material to be put away immediately to an outbound staging lane or staged to manufacturing shop floor if backordered sales order lines or WIP component demand exist for the material. You can receive material directly into an inventory storage location in a single step or receive it into a receiving area for later inspection and/or put away.

You can use Advanced Task Framework (ATF) to plan the flow of material from the receiving area to the final putaway location. You can use ATF to model complex inbound material movement within the warehouse. Complex material movement may include, multiple drop-offs to intermediate pick and drop locators, and movement to inspection and packing stations before the eventual movement to the final putaway location. ATF also provides opportunities for material consolidation and deconsolidation that helps you to optimize material handling.

Functional Area

When material reaches the warehouse, you receive the check-in against the matching document number. The document number can be the purchase order number, internal requisition number, Inter-org shipment number, or RMA number. Along with the document information, you scan the information of the material you receive. This information includes the part number, revision, lot numbers, and serial numbers. The revision, lot number, and serial number are required based on the configuration of the part in the system. For example, if the part number is revision and lot controlled, the system prompts you to enter the revision and lot number. However, if the part number is not revision controlled, lot controlled or serial controlled, the system does not require

the information. The inbound process directly correlates to part setup controls, and the document type you use for receiving and the inbound process setup. The window dynamically generates based on the details of the received material, the inbound process, and the type of document you use for receipt of material. This allows you to focus on entering the fields that appear on the window.

Receipts

Oracle Warehouse Management allows you to receive material against multiple document types such as PO, ASN requisition, shipment number for inter-org material transfers, RMA, etc. It also allows you to receive material against material against a blanket PO. You can use existing desktop windows in purchasing to perform receipts in an Oracle Warehouse Management enabled organization. However if you use the desktop windows to receiving material, you must use one of the following methods to finish processing the material.

- Perform inspection and deliver in the desktop windows.
- Use the desktop packing workbench to pack loose items into LPNs. You can perform subsequent inbound activities such as inspection and delivery on the Mobile windows if you use the packing workbench.

Document Receipt

Use a document initiated receipt when you know the document number at the time of receipt. Oracle Warehouse Management utilizes an interface that enables you to receive material against some or all of the document types. If you use multiple document types to receive material, you do not have to change windows to receive material that use different document types. You control which document types to allow for receiving material for a particular receiving menu option.

Item Receipt

Use item initiated receipt when you do not know the document number for the incoming material. Enter the item in the receipt screen to initiate the receipt process. This populates the list of values in the document number field from where you can pick the document number to receive against.

Mobile Receipt Process

In a an Oracle Warehouse Management organization, receipt an also be carried out using the mobile pages. In the mobile pages, you can initiate material receipt by document or item.

Document Initiated Receipt

Use item initiated receipt when you do not know the document number for the incoming material. Enter the item in the receipt page to initiated the receipt process. This populates the list of values in the document number field. You can pick the desired document to receive against from this list of values.

Locators in Receipt Process

Depending on the routing of the receiving document, material is receiving in a receiving area or inventory. If the receiving document has direct routing, material is receiving directly into inventory, and must be receiving in an inventory locator.

If the receiving document has standard or inspection routing, material is receiving in a receiving area. You can receiving this material in a receiving locator. It is possible to pinpoint the physical locator where the material resides before it is putaway to storage. The physical locators in the receiving are can be pack stations, inspection stations, consolidation locations, or staging lanes. You can model all of the as receiving locators in a receiving subinventory. The following validations control the usage of receiving locators:

- You can only use receiving locators if you use the mobile pages or the receiving open interface to complete the receipt transaction.
- You can not receive material in to receiving locators if they are not defined in the system.
- Use of receiving locators is not mandatory if they exist in the system, or if the receiving document has standard or inspection routing.

LPNs in the Receipt Process

You can use LPNs to receive material within Oracle Warehouse Management. You can use LPNs in the receiving process only if you use the mobile pages, or the receiving open interface to process the receipt transaction. An LPNs is mandatory in the mobile receipt pages except in the following circumstances:

- Receiving Item is an expense item
- PO has direct receipt routing.

You can use a pregenerated LPN, generate an LPN during receipt, or receive material into an existing LPN to perform receipts using the mobile pages. You can use LPNs to track the material (part, revision, lots and serials) throughout the warehouse. you must use LPNs for receipts in the inbound process involves receipt of materials into a receiving area prior to inspection and putaway. LPNs can be containers other than a carton or pallet. For instance, if you do not use LPNs throughout the warehouse, you can use a cart as an LPN. you can receive material into the LPN, and putaway the LPN into your storage areas. If you designate all subinventories as non LPN controlled, Oracle Warehouse Management forces material to be putaway loose and the cart (modeled as an LPN) is available to receive more material. You can also model an area on the receiving dock as an LPN and receive material and putaway to inventory storage.

If the item is lot and / or serial controlled, you must enter lot and serial information when you receive items. If necessary, you can configure the system to prompt you to enter lot and serial information during item receipt. you can use this information to build putaway logic. For example if you receive two different lots of an item number in

two shipments, you can set up rules that determine the putaway location based on the lot number.

Oracle Warehouse Management mobile receipt allows you to receive material using the internal item number, the Global Trade Item Number (GTIN) or the supplier part number. You can scan either the GTIN or the supplier part number instead of the item part number to receive material in to the warehouse. In order to facilitate future receipts, you can also dynamically create a relationship between the vendor part number and the internal item number the first time you receive the item. You can also receive a different item number as a substitute.

Express Receipt Versus Standard Receipt

You can perform an express receipts within Oracle Warehouse Management. You can perform express receipts against material for which there is previous knowledge, i.e. a PO shipment with an ASN, or a shipment from another warehouse. To perform an express receipt use a mobile device to complete the following steps:

1. Enter the ASN Number, or Internal Shipment Number
2. Enter the LPN if necessary
3. Enter the PO if necessary.
4. Enter the Subinventory if necessary
5. Enter the Locator if necessary.
6. Select Done.

You do not have to use express receipts to receive material against an ASN or Internal shipment. You can use the standard receipt menu to perform a confirmed receipt. If you choose to use a standard receipt, enter the information at receipt time regardless of prior knowledge. This enables you to confirm the exact details of the received material.

Express Receipt of Nested LPNs

It is possible to receive nested LPNs using express receipts against an ASN, Requisition, or In-transit Shipment. You can receive any LPN within the nested structure. When you scan a nested LPN to receive and express receipt, the system retains the nesting hierarchy of the LPN and receives all of the inner LPNs automatically. If you scan one of the inner LPNs from within the nested structure, the system receives only the inner LPN and its contents. In this case, the inner LPN is unnested from the parent LPN.

Related Topics

Describing Receiving Processes, *Oracle Warehouse Management User's Guide*

Inspection

If the material requires inspection, Oracle Warehouse Management requires you inspect

the LPN before it allows you to putaway the material. You scan the LPN to initiate inspection and then inspect the contents. If the material is under lot or serial control, enter the lot and/or serial numbers as you inspect the items.

Receiving Inspection Modes

Oracle Warehouse Management supports two modes of receiving inspection - Oracle Purchasing Inspection, and Oracle Quality Inspection. If you use Oracle Purchasing Inspection, Oracle Warehouse Management requires you to enter the accepted and rejected quantities and quality codes and reasons for each. If you use Oracle Quality Inspection, Oracle Warehouse Management requires you to enter data according to a collection plan set up in Oracle Quality. See Collection Plans, *Oracle Quailty User's Guide* for more information on setting up a collection plan to be used with Oracle Warehouse Management.

LPN Storage of Inspected Material

Oracle Warehouse Management requires you pack accepted and rejected material in to separate LPNs at inspection time. This facilitates the putaway process and allows for easier processing of rejected material. The logic of the inspection page assumes that accepted material remains in the original LPN while rejected material is moved to a separate LPN. This logic controls the field defaults but you can override it at inspection time.

Inspecting Items under Serial Control

Oracle Warehouse Management supports two modes of inspection for serial controlled items: individual and range. This is controlled via a form function parameter. If you choose to inspect items using serial individuals, you must scan each serial before inspection. Enter 1 or 0 to accept or reject the serial numbered item. If you choose to inspect serial controlled items using serial ranges, enter a range of serial numbers, and accept, or reject the entire range.

Putaway

Putaway is the process of moving material from a receiving area into a storage area when material is received and putaway is initiated for the received material, the rules engine suggests an optimal putaway location for he material. If you are using advanced task framework, the system also determines an operation plan to move the material to the final putaway location. Each time you putaway the material, it progresses further along the operation plan and comes closer the final putaway location. Putaway consists of the following two operations:

- Putaway Load: Material is retrieved from a source location.
- Putaway Drop: Material is deposited into a destination location.

you have multiple options to perform putaway load and drop. These options facilitate pack, unpack and split of material from the LPN during putaway. The following table displays the putaway load and drop options.

Putaway Load Options

Inbound Operation	Operation Mode	Details
Putaway Load	Transfer Contents into an LPN	The contents of he LPN are transferred to an Into LPN during putaway load. This is useful when you need tor transfer material from one container to another for putaway.
Putaway Load	Select Contents into an LPN	This option allows selective transfer of contents from an LPN to an Into LPN during putaway. This is useful when multiple case LPNs are loaded into a pallet LPN and palletized during the putaway process
Putaway Load	Load full LPN into an LPN	The entire LPN is selected for putaway.
Putaway Load	Load full LPN for putaway	

You can use the form function parameters to enable one or more of these options. You can create a user defined menu option which allows or restricts some of these putaway modes. There are also multiple options available for the putaway drop transaction.

Inbound Operation	Operation Mode	Details
Putaway Drop	Transfer contents into an LPN	The contents of the LPN are transferred to an Into LPN during putaway drop. This is useful when material from one container needs to be transferred to another container when material is deposited at the putaway location.

Inbound Operation	Operation Mode	Details
Putaway Drop	Select Contents into an LPN	This options allows selective transfer of LPN contents to an Into LPN during putaway. This is useful when material from a mixed LPN is putaway. This is also referred to as Item Based Putaway.
Putaway Drop	Drop full LPN into LPN	This options allows nesting of an LPN to an Into LPN during putaway drop. This is useful when multiple case LPNs are dropped into a pallet LPN and palletized during the putaway drop process.
Putaway Drop	Drop full LPN	The entire LPN is dropped at the putaway location.

In addition, you can configure the putaway drop transaction to allows system directed drop or manual drop. Consequently, the destination location during putaway can be directed by the system or you.

Directed Drop

In a system directed putaway Oracle Warehouse Management suggests an optimal putaway location for the material. During the putaway process you confirm material attributes such as quantity, UOM, putaway location, and lot as applicable. System directed putaway may stop split LPNs if the items are mixed or if the locators have capacity constraints. However if the system suggests you putaway an entire LPN in the same place, it does not prompt you to enter the item or quantity.

Manual Drop

Use directed putaway allows you to put away an entire LPN in a single scan. Select `User Drop`on the putaway window to initiate user directed putaway. Optionally, the rules engine validate the locator you select to ensure the restrictions are met even if the locator is not optimal. You can also setup rules to suggest the initial locator, as long as you can put away the entire LPN. In addition, you can disable `User Drop`if it is not required

Crossdocking

If you enable crossdocking during putaway, Oracle Warehouse Management suggests you putaway the material directly to the staging area for immediate outbound shipment or WIP issue. Opportunistic crossdocking is available only during a putaway after a standard or inspection routing receipt. If you perform a putaway after you perform a direct routing receipt, you cannot crossdock the material. You also cannot crossdock rejected material. Oracle Warehouse Management uses the rules engine to putaway this material.

Putaway of Nested LPNs

The following reasons list why nested LPNs are possible.

- Vendor sends an ASN with nested LPN structure. i.e. case LPNs packed within a pallet LPN.
- You can use the packing working to generate nested LPNs i.e. possible to palletize floor loaded Case LPNs into a pallet LPN.

Oracle Warehouse Management supports putaway of nested LPNs. You can putaway any LPN with the nested structure. However depending on the putaway rules, capacity constraints, and the number of items residing in the LPN, the system may not retain the nested structure if you use directed putaway. In such cases, the system suggests that you drop the contents of the nested LPNs in different locators. The system retains the LPN nested hierarchy under the following circumstances.

- All the inner LPNs have the same item and are bound for the same putaway location.
- Manual drop is used to drop the entire LPN.

If you scan one of the inner LPNs from within a nested structure, the system, puts away only the inner LPN and its contents. The system either unpacks or unnests the inner LPN.

Note: The system does not support pick load of nested LPNs.

Related Topics

Describing the Crossdocking Putaway Process, *Oracle Warehouse Management User's Guide*

Returns and Corrections

You can perform returns on material received through the mobile user interface. Oracle Warehouse Management supports two modes of returns: a two-step return process, and

a one-step return process. You can configure the return process as a one-step express return or a two-step return using a profile option.

Return to Supplier (Vendor) Integration with Shipping

The return to supplier (vendor) with shipping integration process supports WMS-enabled organizations and Inventory organizations. This feature enables you to:

- Split an LPN to allow partial returns using the mobile device for the return order.
- Process return orders across organizations.
- Do partial returns through Shipping Transactions window (after LPN split).
- Do returns for lot/serial/revision/dual-uom controlled items across organizations.

One-step Returns

For one-step returns, you use the return window from Oracle Purchasing to create the return. Additional Oracle Warehouse Management functionality allows you to query returnable lines by receiving LPN. In addition, the fields, To LPN and From LPN allow return of material that resides in an LPN. The material being returned to the vendor comes from the From LPN. The physical container that is used to return material to the vendor is the To LPN. You can use any LPN that is Defined but not used or Resides in Receiving as the To LPN. Material can be either returned directly to the supplier or to an intermediate receiving area before being returned to the supplier.

> **Note:** You must associate all material that resides in receiving with an LPN. Therefore if you return material from Inventory to Receiving, you must specify a "To LPN" for the material. You do not have to specify a " To LPN" if you return the material directly from inventory to the supplier.

Two-step Returns

You initiate two step returns through Oracle Purchasing as well. However, when the record is saved, the return transaction does not complete. You must verify the return through the mobile return screen before the return transaction is saved. You must scan the LPN that contains the material return and confirm the return of the material inside the LPN. After the confirmation, the return transaction posts.

Corrections

Corrections to material received in Oracle Warehouse Management process through the Corrections window in Oracle Purchasing. You can correct a Receipt, Inspection, or Delivery transaction. Additional Oracle Warehouse Management functionality allows you to query receipt lines by LPN, and correct LPN information for received material. Similar to returns, corrections are also recorded using 'From LPN' and 'To LPN'. However the meaning associated with 'From LPN' and 'To LPN' is different in correction context. A 'To LPN' is the LPN where the received material currently resides and needs to be corrected. A 'From LPN' is the LPN that will hold the corrected material

after correction has been posted. Corrections post immediately when after you save the record from the desktop. Unlike returns, there is no two-step correction process.

Related Topics

Explaining LPN Based Returns, *Oracle Warehouse Management User's Guide*

Crossdocking

If you enabled planned crossdocking prior to material being received, Oracle Warehouse Management suggests that you put away material away directly to the staging area for immediate outbound shipment or WIP issue. The crossdock to outbound shipment or manufacturing job occurs based on the planned crossdock decision.

Opportunistic crossdocking is available only during a putaway after a standard or inspection routing receipt. If you perform a putaway after you perform a direct routing receipt, you cannot cross dock the material. You also cannot crossdock rejected material. Oracle Warehouse Management uses the rules engine to putaway this material.

Implementation

Inbound Form Function Parameters

Form function parameters are name-values lists in Oracle Warehouse Management inbound transactions to control window appearance, layout and functionality. Form function parameters are configured by navigating to Application->Function option in the system administrator responsibility. A standard Oracle Warehouse Management install comes with seeded menu options with pre-configured form function parameters. However, you can create own mobile menu options by creating a custom function and specifying different values for the form function parameters. You can do this by creating a user-defined function and assigning it a unique function name. The user-defined function must also be associated with an HTML call that relates it to the underlying inbound function. A list of the HTML call and the standard inbound function is specified in the following table:

Inbound Function	HTML Calls
Mobile Receipt	oracle.apps.inv.rcv.server.RcptGenFunction
Express Receipt	oracle.apps.inv.rcv.server.RcptASNFunction
Load and Drop	oracle.apps.wms.td.server.PutawayFunction

A list of form function parameters and their values can be entered under the parameters column. Only certain form function parameters are valid for specific inbound function. A list of form function parameters and allowed values for each parameter is shown for each inbound function.

You can specify the following parameters for mobile receipt functions:

Parameter Name	Allowed Values	Comments
SERIAL_TYPE	RANGE, INDIVIDUAL	If this parameter is set it to RANGE then the form accepts a range of serial numbers. The form will show two serial number fields - From SN and To SN on the mobile page. The serial numbers within that range are assumed to be continuous and not missing. If the form function parameter was set to " INDIVIDUAL" then in that case only one serial number field is displayed and the user needs to enter all the serial numbers one at a time.
ATTACHMENT_DISPLAY_MODE	NEVER, ALWAYS, REQUEST	Controls if document attachment should be displayed on receipt. If this parameter is set to Request, then the receipt page shows a button for `<Attachments>`
SHOW_COO	YES, NO	This form function parameter controls the display of Country of Origin field
DOCTYPE	ALL, PO, INTSHIP, RMA, REQ, ASN	This form function parameter controls the document type used for receipt e.g. if the parameter value is set to `PO`, only Purchase Orders can be used to receive items from the form.

ITEM_CONTROLLED	YES, NO	If this form function parameter is set to`YES`, the receipt page is configured for item-initiated receipt. In such a case, user enters the item and then selects the document number to receive the item. If the value is set to`NO`, document initiated receipt is assumed.
TRANSACTION	ALL, PO, INTSHIP, RMA, REQ, ASN	Control allowed transaction types in for Inspection in MSCA inspection menu. No relevance for WMS. Default to ALL

You can specify the following parameters for the mobile express receipt function:

Parameter Name	Allowed Values	Comments
SERIAL_TYPE	RANGE, INDIVIDUAL	If this parameter is set it to RANGE then the form accepts a range of serial numbers. The form will show two serial number fields - From SN and To SN on the mobile page. The serial numbers within that range are assumed to be continuous and not missing. If the form function parameter was set to " INDIVIDUAL" then in that case only one serial number field is displayed and the user needs to enter all the serial numbers one at a time.
TRANSACTION	REQEXP, ASNEXP, SHIPMENTEXP, SHIPMENTCONFM	Controls the documents that can be used to perform an express receipt.

You can specify the following parameters for the mobile putaway load and drop functions:

Parameter Name	Allowed Values	Comments
SUGGESTION	RULES, USER, BOTH	RULES<Load> and <Drop> buttons. The <User Drop> button is not displayed. This Automatically consolidates one location suggested for the entire LPN. USER: Displays only the <User Drop>button. This is used for user directed putaway. This automatically consolidates one location suggested for the entire LPN. BOTH: Displays the <Load>, <Drop>, and <User Drop> buttons. This allows you to perform system directed or user directed putaway. It automatically consolidates one location suggested for the entire LPN. LINES: Displays the <Load> and <Drop>buttons. This is used for system-directed putaway. This options forces you to confirm each line individually even if all items within the LPN are destined for the same locator.
VALIDATE	YES, NO	This parameter is applicable only if User Dropbutton is activated and therefore it is applicable only if SUGGESTION is set to either BOTH orUSER. If this parameter is set toYES , user entered sub-inventory and locator is validated to see if violate a constraint defined in putaway rules. No rules engine validation is performed if this parameter is set to NO.

Parameter Name	Allowed Values	Comments
LOAD_INTO_LPN	YES, NO	Controls the display of the `Into LPN`field in the Manual Load Page.
LOAD_FULL_LPN	YES, NO	Controls the display of the `<Load Entire LPN>`button in the Manual Load page.
LOAD_CONTENTS	YES, NO	Controls display of `<Select Contents>`button in the Manual Load Page
LOAD_TRANSFER_CONTENTS	YES, NO	Controls the display of the `<Transfer All Contents>` button in the Manual Load Page
SERIALLY_COUNTED	YES, NO	If set to `YES`, each entry of serial number increments the qty in item based putaway. If `NO` user enters the qty and then serial
PAGE_TYPE	MANUAL_DROP, ANUAL_LOAD, DROP_ALL, SYSTEM_DROP, PUTAWAY_LOAD	Controls if the page being configured will be of type manual load, manual drop, drop all or system directed drop
DROP_INTO_LPN	YES, NO	Controls the display of `Into LPN` field in Drop Pages.
DROP_FULL_LPN	YES, NO	Controls the display of the `<Drop Entire LPN>`button in the drop pages.
DROP_TRANSFER_CONTENTS	YES, NO	Controls the display of the `<Transfer all Contents>`button in the drop pages.

Example

Example

The following form setup creates a user defined Mobile Receipt menu option that

allows receipt only for Purchase Orders. The mobile receipt form has the Country of Origin field enabled for entry.

Function	Function Description	HTML Call	Parameters
TEST	PO Receipt with COO Field enabled	oracle.apps.inv.rcv.server.RcptGenFunction	TRANSACTION=PO SERIAL_TYPE=RANGE ATTACHMENT_DISPLAY_MODE=NEVER ITEM_CONTROLLED=NO DOCTYPE=PO SHOW_COO=YES

Receipt Routings

The following receiving types are available in Oracle Warehouse Management: Standard, Direct, and Inspection. When implementing Oracle Warehouse Management, you decide which routing type to use based on the receiving item and the available document information. This section discusses how Oracle Warehouse Management picks the routing when the document types differ for received material.

For purchase orders, the routing used for receipts is stored on the PO Line Shipment. The shipment routing defaults based on the default routing for the Item, Supplier, and Organization of the PO. However you may change the default routing when you create the PO.

Mixed Receiving Types

However if there are multiple shipments for the same Purchase Order / Item / Organization combination, and each have different routings, Oracle Warehouse Management uses the most restrictive routing of an Approved, Open for Receiving shipment at time of receipt. If any of the shipments require inspection, when you attempt to receive the shipments against the purchase order, Oracle Warehouse Management requires you to inspect the shipments. If none of the shipments require Inspection, but some are marked as Standard and some are marked as Direct, Oracle Warehouse Management receives the material using standard routing. Oracle Warehouse Management uses Direct routing only if all shipment lines for the PO / Item / Organization combination use a Direct routing.

Return Receipts

For RMA receipts, if the RMA Inspection Required flag is checked for the returned item, you must inspect the item. You set the Inspection Required flag at the item level. If you do not set the Inspection Required flag, Oracle Warehouse Management uses the default routing for the item. If a default routing for the item does not exist, Oracle

Warehouse Management uses the default organization level routing.

In-transit Shipments

For in-transit shipments Oracle Warehouse Management first determines if a default routing for the item exists. If there is no default routing for the item, it determines if a routing exists at the Shipping Network, and routes the item accordingly. If neither exist, Oracle Warehouse Management uses the default routing for the receiving organization.

Advanced Shipping Notice Express Receipts

For ASN express receipts, the routing is determined based on the information entered on the purchase order. Material is received from the ASN according to the receipt routing of the PO Line Shipment associated with the ASN line. If part of the material requires inspection, you must inspect those LPNs before you can putaway the shipment. If an LPN is specified at time of express receipt, then the shipments on that LPN are used for making the decision.

If you receive the ASN through an express receipt, the required lot and serial attributes defaulted based on the default set for the required attributes. If the attributes are different from the defaults, you can chooses not do an express receipt or change the attributes after you perform the receipts. Oracle Warehouse Management requires default values for required attribute segments in order to use Express Receipts. If default values are not defined the transaction does not process.

Since the routing is determined after you enter the item and the LPN was entered previously, it is possible that the receiving LPN is deemed invalid after you scan the item. For example, you cannot perform a direct receipt into an LPN that has a status of Resides in Receiving. You can perform direct receipts in new LPNs or LPNs that contain space with the status Resides In Inventory. If the item is restricted to a set of locations within inventory, the putaway LPN must also reside within the set of locations.

The LPN must also be in a location that allows the delivery transaction. If the delivery transaction is not allowed for the location, you receive an invalid LPN message when you exit the item field. If you entered an LPN with an invalid state for the receiving transaction, you receive an error message that indicates the LPN has an invalid state for this transaction. You must enter a different LPN before you can continue.

Oracle Warehouse Management does not support the Oracle Purchasing Profile, Allow Routing Override when you perform receipts on the mobile device. You must perform receipts according to the proper routing when you use the mobile device.

Labeling

The entire inbound process integrates with label printing. The following business flows for label printing are associated with the inbound flow:

- Receipt for receipts against all document types: Warehouse management creates label requests when you select Done from the Receipt Lines page.
- Inspection for the completion of the inspection transaction.
- Put Away for the completion of the put away transaction.

- Cross-Dock for the crossdocking put away transaction.

Receiving Other Items

Oracle Warehouse Management enables you to receive all types of items - Supplier items, substitute items and expense items. You must define Expense Items to receive with an Item Master. Expense Items are items that are not designated as Inventory Items and are not transactable in Inventory, but can be received into the warehouse.

At the time of receipt, Oracle Warehouse Management enables you to scan the Vendor Items or Substitute Items in the Item field on the mobile device. The receiving process is very similar to receiving normal items, except when you deliver the substitute item after receiving, it is the substitute item that is received in inventory and transacted throughout the warehouse. When delivering material received using the Vendor Item Number, it is the internal item number that is transacted. When receiving the supplier item or the substitute item, the Oracle Warehouse Management honors the tolerances of the original item. See: Defining Receiving Options, *Oracle Purchasing User's Guide* for more details on how to setup substitute items and supplier items.

For receiving a substitute item when you create a shipment for the item in your purchase order, verify the Allow substitute item check box is checked in the receiving controls window. This field defaults from the setting on the item and organization. You must define the substitute item in the Item Relationship form. See Defining Item Relationship, *Oracle Inventory User's Guide.*

When you receive a supplier item, you can specify the substitute item number on the purchase order line. This defaults from the System Item/Vendor Item relationship. But, you can specify the supplier item number without specifying that relationship and receive it using the supplier item number. See: Defining the Supplier Item Attributes, *Oracle Purchasing User's Guide*

Direct Receiving and Put Away Issues

While performing a direct receipt, the subinventory and locator fields default if possible. If you are doing a direct receipt into an existing LPN in Inventory then the subinventory and locator default with the LPN. If the receiving LPN is new, the subinventory defaults from the purchase order distributions from the PO receipt and the shipment lines for an intransit shipment receipt. For the subinventory and locator to automatically default, the distributions and shipment lines must have the same subinventory and locator. Finally, the subinventory and locator can default from the transaction default values if no other information exists. You can override the default values if no default information is available. See:Defining Subinventories, *Oracle Inventory User's Guide*.

When you perform a putaway following a direct receipt, you cannot use a rule which requires any PO, RMA or Internal Requisition references. Since you received the material into Inventory, the reference information is no longer available. A put away after a Direct Receipt is considered a move order subinventory transfer transaction.

Because of this, in order for the putaway to be successfully allocated, there must be a Picking Rule that successfully allocates in order for the putaway to allocate. Make sure to have a Picking Rule for the material in the receiving staging area if you plan to put away from that inventory location into final storage.

Locator Capacity

If a discrepancy exists in reported locator capacity, and actual locator capacity, you can run the concurrent report Update Locator Capacity to verify the locator capacities against the on-hand table and correct any errors. During initial implementation it is suggested that you run this at least once a week.

QA Inspection

If you purchased Oracle Quality, set the profile QA: PO Inspection to Oracle Quality and have a collection plan defined, during item inspection you use the Oracle Quality inspection flows. If the material requires inspection and, you do not have a collection plan, the profile option QA: PO Inspection to Oracle Quality, is not set or you do not have Oracle Quality installed you use the default Oracle Purchasing Inspection flow.

Related Topics

Collection Plans, *Oracle Quality User's Guide*

Shortages and Opportunistic Crossdocking

At the time of receipt, Oracle Warehouse Management enables you to check for material shortages. If you want to view material shortage messages for an item, verify the Check for Material Shortage check box is selected in the Item Master window. In addition, you must set the PO Receipt transaction to allow shortage notifications on the Transaction Type setup window. Finally, you must set the Shortage Parameters to indicate the types of shortages to check.

When you perform a putaway, the system checks to see whether an opportunistic crossdocking opportunity exists. If an opportunistic crossdocking opportunity exists, then it suggests a crossdock. The system checks for opportunistic crossdocking if you enable crossdocking on the Organization Parameters window. It uses crossdock criteria to determine the demand for crossdock. This includes backordered and scheduled sales order lines. If the demand quantity exceeds the putaway quantity, then the system creates a new delivery detail for the unfulfilled quantity, and updates the status on the original delivery detail line to Released to Warehouse.

If the putaway quantity exceeds the demand quantity, then the system creates two tasks; an opportunistic crossdock task, and a putaway task. When you perform an opportunistic crossdock, you drop the material into a staging lane subinventory and locator based on rules, or to the job or supply subinventory defined for the job. After you drop the material, the system creates a new reservation and updates the delivery

detail line with the LPN ID. The status on the delivery detail is also updated to Staged.

Related Topics

Warehouse Organization Setup, page 1-4

Crossdocking Overview, page 7-1

Inventory Attribute Group, *Oracle Inventory User's Guide*

Material Shortage Alerts and Shortage Notifications, *Oracle Inventory User's Guide*

Special Rule Considerations

There are a few rule parameters that use constants to refer to different conditions, the following section addresses those constraints.

To set up a Put Away or Cost Group Assignment rule based on inspection result, you can use the Object 'Actual Transaction' and the parameter 'Inspection Status' and compare it to a constant character. A value of '1' indicates that the material is not inspected. A value of '2' indicates you accepted the material after inspection. A value of '3' indicates you rejected the material after inspection.

Use reference parameters for receiving rules based on document type. The reference parameter has the following values: - PO_LINE_LOCATION_ID for a PO receipt, ORDER_LINE_ID for a RMA receipt, SHIPMENT_LINE_ID for an internal requisition receipt. These objects pertain specifically to putaway rules.

Lot and Serial Numbers

Oracle Warehouse Management allows you to generate a lot number or a serial number with a configurable key. You can generate lot and serial numbers only if the transaction enables you to generate a new lot number or a new serial number. For example, if you receive a PO of a lot or serial controlled material you can always generate a new lot or new serial number for that material. However if you receive an RMA receipt for an item with serial number control of pre-defined, you cannot generate a serial number, and must use the serial number issued out of stores.

Receiving Tolerances

While perform a receipt, it is possible the received material exceeds the receiving tolerances. If you set the Over Receipt Quantity Action to warn, you receive a message that indicates you exceeded the tolerance, and the system asks you if you want to continue. If you set the Action to reject, you receive a message that indicates you cannot proceed because of a tolerance violation. If a single tolerance is exceeded by a receipt, you receive a message that indicates you exceeded the tolerance. If multiple tolerances are exceeded, you receive multiple messages.

However, it is possible that different parts of a single receipt line can violate different tolerances because you can match the receipt against multiple shipments. For example if

you receive a quantity of 25 items against two shipments with a quantity of 10 each and the first shipment has a tolerance of warning set for location tolerance and second shipment has a warning set for quantity tolerance, when you receive the 25 items, you receive 10 items against the first shipment and receive a location tolerance warning and 15 against the second shipment and receive a quantity tolerance warning. If you use a mobile device you receive a general warning message that indicates the tolerances were exceeded. However, if you set the tolerances as error, then an error message displays and you cannot process the receipts.

Matching Algorithm

When you perform a PO receipt, you have the PO Number and the item. When you perform an in-transit shipment receipt, you have the shipment number and the item and for an RMA receipt you have the RMA number and the item. In the case of a PO, you receive quantity against one of the shipments, in the case of an RMA receipt you receive the material against one of the order lines and similarly for the in-transit shipments. This requires the system to match against the appropriate shipment when you perform the receipt.

The system matches a shipment for a purchase order against the first promised shipment. The system then queries all the open approved shipments. The shipments are ordered based on the promise date and quantity. The system also takes the tolerance receiving tolerances in to account. If a shipment does not satisfy either the location tolerance or the quantity tolerance then the quantity is not consumed. If it satisfies the tolerances, then the quantity is consumed against the shipment if the quantity is less than or equal to the tolerance. If there is extra quantity, if tolerance allows it, the extra quantity received is adjusted against the last shipment and not consumed across all the valid shipments even though other shipments may exist that would allow you to consume the quantity. Similar logic applies for in-transit shipments and RMA.

Transaction Processing

Oracle Warehouse Management uses the RCV: Processing Mode profile to determine the processing mode of the transaction. If the profile is set to Immediate or Batch, the transaction processes by spawning a concurrent request in the background and immediately returns control to you. If the profile is set to Online, the transaction processes on-line on the mobile device and you cannot do anything until the transaction completes.

Common Problems

1. I cannot generate a LPN for the Express receipts and confirmed receipts after giving the shipment number or the ASN but I can generate in all other LPN fields. Why?

   Express receipts / Confirm Receipts - On the first page you cannot generate a LPN as that is the field in which you can select the LPN which was shipped as part of the

shipment/ASN. You can only do a Ctrl + L.

2. I am unable to perform an express receipt of a lot/serial controlled item. Why?

   If you are not able to express receive a lot controlled or a serial controlled item from mobile for an in-transit shipment then please verify the attributes. It is possible that the attribute definitions are different in the two organizations. In such cases if you have a required attribute, it should always have a default value associated with it. If the default does not exist for a required attribute, you will encounter an error while doing an express receipt of an in-transit shipment. To successfully perform an express receipt, there must not be any required attributes without defaults in the receiving organization that aren't also in the sending organization.

   Express in-transit shipments can also error out if the item is revision controlled and the revision you are receiving is not defined in the receiving organization in which case you will get an error saying invalid item revision.

3. I am trying to perform an inspection and I receive the message No result found when I scan the LPN. Why?

   If on inspection you get the message No result found when you enter the LPN, verify that the receipt you performed did happen. Perform the inquiry on the LPN and verify if the LPN exists in receiving. You cannot perform an LPN inspection if the LPN is not In Receiving or it does not require inspection. To verify this, re-query your purchase order and select the item you are attempting to receive. Then click Shipments, then Receiving Control. The receiving control should be set to Inspection.

   > **Note:** Receiving control is set on per shipment. A purchase order can not only have different lines being received with different routings but within the same lines you can have different shipments being received with different routings.

4. While performing a receipt I receive the message Online transaction failed. Press any key to continue. What should I do?

   If while performing the receipt you receive the following message Online transaction failed. Press any key to continue, you should do the following:

   Verify whether the transaction managers are running. Log on as system administrator, query the managers. You should see two entries - Receiving Transaction Manager and RCVTM. Against each of these there should be a non zero value for the actual processes. If it is not, please consult your system administrator to look into the problem. If that is all right then you should log on to the desktop and there are a couple of things you could do. You can try and perform the same receipt on the desktop. On the desktop it will not ask you for the LPNs so you will be doing a loose receipt so should go ahead and complete that receipt from the desktop. You will not be able to put away. If you still get an error, please log a bug

with the error message against Oracle Purchasing. If that goes through fine the problem could be more involved and needs to be debugged. Please see the debugging section on what all you can do for debugging. If this message is followed with the following message - The item was not found at the specified location, then that is just a warning message.

5. I get the following message stating - INV_ALL_SQL_ERROR. What is the problem?

   If you get a message like -INV_ALL_SQL_ERROR , most likely there is an invalid PL/SQL package. If you are unable to find it then please file a bug with the entire message.

6. I am unable to see the purchase order in the purchase order LOV. Why?

   If you are not able to see your purchase order in the LOV while trying to perform a receipt, check the shipment record when the purchase order was created. The shipment record for each of the lines has a ship to organization field and it should be set to the organization you want to receive the purchase order in. The purchase order must also be approved and have shipment lines that are Open for Receiving for the current organization.

7. I am unable to find my blanket purchase order when I am trying to perform a receipt. Why?

   If you are not able to see your blanket purchase order on the mobile when you try to receive against it, please make sure that you have created a release for the same before you are ready to receive it.

8. For a RMA receipt I receive a No result found message when I scan the RMA. What could be the reason?

   If you receive a No result found for a RMA receipt then please verify that the RMA has the shipping organization set to the receiving organization. For this you will have to look at the shipping tab on the sales order pad. Also verify that the RMA is booked and that it hasn't already been received against.

9. I am performing an RMA return and it is not stamping the right cost group and I have a cost group based on the return reason. What could be the problem?

   For RMA returns if there exist a cost group rule based on the return reason then make sure that it is marked on the sales order that was created for the return. There is a return reason on each line - make sure that the reason for the line you are receiving against is what you are expecting.

10. I cannot press the down arrow or the tab key on the Lot number field. Is this a bug?

    The down arrow or the tab key does not work on the lot number field or the serial number field. Only the enter key works. Generally the users should only be using the enter key. It is a technological limitation since there can be attributes associated to these which may require going to a new page. This is only possible with an enter

key so the other keys to leave the field have been disabled except the up arrow.

11. I am trying to perform a transaction but I am losing the connection to the server. What could be the reason?

    If anytime you loose the connection to the host while performing a transaction, it may be because the class file was not recompiled when one of the base classes was recompiled and changed. So you need to recompile the class file and start the server again.

12. I am unable to perform any receipts. Why?

    Make sure that the purchasing and the inventory periods are open before performing any receipts. You can open the purchasing periods from Purchasing Super User responsibility, Setup, Accounting and the inventory periods from Inventory responsibility in Accounting, accounting periods.

    Also make sure that the receiving parameters are set for the organization you are receiving the material in. For this please log on as Purchasing Super User and then navigate to Setup, Organization, Receiving Options. Please make sure that you have at least set up the receiving inventory account and there are other default receiving parameters which are required and should be setup prior to receiving.

13. My location is not defaulted in the location field when doing a receipt. What am I missing?

    When defining the organization please make sure you have given a location on the Organization form otherwise the location will not be defaulted when you are receiving the material.

14. I am trying to putaway after performing a direct receipt but it is failing. I have the putaway rules defined. What could the reason be?

    If you are trying to perform a put away after a direct receipt, it might fail if you have not defined a default picking rule that can be fulfilled. This is because, after you perform a direct receipt, the material is already on hand and you will need to have a picking rule and a put away rule for the allocation to be successful.

15. I receive an error message when I scan the LPN for putaway. Why?

    While trying to perform a putaway after a receipt if you get LPN not inspected after scanning your LPN, make sure that you first go and inspect the LPN you are trying to putaway. You cannot perform a put away until you have inspected your receipts that require inspection. You cannot over ride routing during the receiving process.

16. I am unable to generate a LPN/Lot or a Serial Number.

    The LPN, lot or serial generation may fail because there may not be a sequence assigned to Organization and Item. You need to assign the starting sequence for these. These are again available when you are defining the Inventory Parameters for

your organization. The serial number has to be padded when giving the starting serial number with the number of zeroes equal to the number of digits you want to keep for your serial numbers.

17. I just performed a receipt but I am not able to see the transaction on the desktop. What could be the reason?

    If you don't see the just completed transaction in the view transactions form, please make sure that the processing mode for receiving transaction is online. Please refer to the purchasing manual to see how to set this. It is possible that even though the transaction has been completed, it is still in the interface table waiting to be processed if it has not errored out already.

    It could be that the transaction failed in the background if the processing mode is set to a background mode. Check the Receiving Transaction Summary form to see if there are any transactions that have errors.

18. I am trying to perform a direct receipt but I am getting the error message Invalid LPN. Why is my LPN invalid?

    If while trying to perform a direct receipt, after scanning the item you get the message saying Invalid LPN then it might be because you are trying to receive the material into a LPN that has a status of Resides in Receiving. To perform a direct receipt, you must use either a new LPN or an LPN that has a state of Resides in Inventory.

19. I am unable to receive a substitute item. Is there a setup I am missing?

    Make sure that you have a substitute item relationship defined for that item in the receiving organization. Also ensure that the Allow Substitute Receipts is checked on the Shipment line for the receipt you are performing.

20. What should I do if I am not receiving the shortage messages when performing a receipt?

    If you are not receiving material shortage messages, please make sure that the Check Material Shortage check box is checked in the Item Master form. Also ensure that the transaction type you are performing, PO Receipt into Inventory is marked to enable online shortage messages. Lastly, check that the Shortage Parameters are set up to check for the shortages you would like - either WIP shortages or Order Management shortages.

21. I do not see any of my receipt transactions after I pressed <F2>. What could have gone wrong?

    The transation is commited only when you select <Done> on the receipt header or receipt information page. Until you do that, you will not see any transactions. Selecting <F2> rolls back all the data you entered after you entered the transaction from the menu and before going back to the menu.

22. I am unable to see my ASN in the ASN LOV on the mobile device.

    It is possible the ASN import process failed. Check the progress of the ASN using Oracle Purchasing to determine if there were errors in the ASN processing.

23. I'm unable to see any LPN information for my ASN.

    If the LPN, lot, or serial information from the ASN could not be processed because it violated uniqueness constraints, you must receive the ASN using an ASN confirmed receipt. If the LPN, lot, or serial already existed in the system at the time of import, that part of the import ASN process would have failed. The rest of the ASN import process would succeed, but if any of that information is missing from the ASN information, you cannot perform an Express Receipt on that ASN - the confirmed Receipt must be used so that all the information can be properly collected.

24. The LPN is not cross-docked when putaway is performed. What could be the reason?

    For an LPN to be cross-docked, the following conditions must be met:

    - Cross-docking is enabled for the organization
    - LPN context must be 'Resides in Receiving' or 'Resides in WIP'
    - Backordered sales order lines exist for the item
    - LPN is not reserved to a sales order, or the LPN is reserved to a sales order with backordered delivery lines
    - All backordered delivery lines are reserved to other sources of supply
    - Putaway rule does not restrict putaway drop to outbound staging lane. The staging lane is always determined based on the default staging locator for the organization.

Debugging Notes

You should set the debug profiles to ON for the mobile users. To set the profiles log on as System Administrator, and query the profiles for the mobile user having the problem. The profiles for debugging should be set to - INV: Debug Trace set to Yes, INV:Debug Level set to 9, and INV: Debug File set to a database writable file. After setting these up, perform the transaction again and you should see the log messages in your log directory (from the Debug File profile) in the file INVMWA.log. Go to the end and you may see the reason why the transaction was failing. It may be a set-up issue in which case you will see a detailed message as to why it was failing. If it still does not make sense, please provide the last 100 lines of the log file. These log message would be prefixed with INV_RCV.

If you can only process the transaction from the desktop, and not a mobile devices compare the values of the two rows in RCV_TRANSACTIONS_INTERFACE. The values for the columns in RCV_TRANSACTION_INTERFACE both for the desktop and the mobile should be the same. When debugging please make sure that the receiving transaction processing mode is set to online as it gives you more information on why the error is occurring.

Frequently Asked Questions

1. Why did my put away fail with the message Could not allocate space or materials?

   There could be many reasons for this:

   - heck to make sure that there are valid Put Away Rules defined for the current situation and that they are assigned properly. If the rules have been changed recently, log off the mobile UI and re-logon and try the put away again.

   - If you are trying to put away material from Inventory (i.e. after a direct receipt), make sure there is a Pick Rule that will allocate successfully against the material being put away.

2. How can I query material that has been received under a Standard or Inspection routing but not yet Put Away?

   You can query such material through the Material Workbench by using the View By LPN setting and querying for LPNs that have a state of Resides in Receiving.

3. Why hasn't my on-hand inventory increased after doing a receipt transaction?

   The on-hand inventory doesn't increase until the put away has been completed, if the receipt routing is Standard or Inspection Required. If the receipt routing is Direct then the on-hand inventory should be incremented immediately after the receipt has been completed.

4. When should I use Standard or Direct receipt routings?

   If it is essential that your inventory on-hand balance be incremented immediately after the receipt transaction has been completed, you should use Direct receipt routing.

   However, if some material requires inspection, you should use Standard routing for material that doesn't require inspection and Inspection Required routing for material that does require inspection. Additionally, if you plan to make use of the opportunistic crossdocking functionality, you should use Standard receipt routings, as that functionality is not available using the Direct receipt routing. Also, if it is necessary to have put away rules based on the supplier or information stored on the purchasing document, you should use Standard routing.

7

Crossdocking

This chapter covers the following topics:

- Overview of Crossdocking
- Crossdock Criteria
- Crossdocking and Advanced Task Framework
- Crossdocking and Consolidation
- Implementation
- Crossdocking Setup
- Frequently Asked Questions

Overview of Crossdocking

Crossdocking of inbound receipts to outbound shipments is widely used in warehouses to achieve faster flow-through times and optimize warehouse resources. You can match scheduled receipts to inbound shipments minutes, hours, or days in advance to reduce material handling costs and decrease flow-through times. Oracle Warehouse Management supports two types of crossdocking: planned crossdocking and opportunistic crossdocking:

- Planned Crossdocking: In planned crossdocking, the system identifies a suitable supply source for a given demand source. Planned crossdocking is typically used in the following environments:
    - Engineer to order, procure to order, or make to order environments, where you create a supply source to satisfy a particular demand. In this situation, a one-to-one relationship exists between the supply source and the demand source.
    - High-volume retail distribution center environments where you receive items from vendors with pre-allocation to a demand source. Sometimes the containers

the vendors send have the store marking and identification label. This functionality applies to retail and 3PL industry verticals.

- Opportunistic Crossdocking: Opportunistic Crossdocking involves dynamic allocation of an incoming supply source to a demand source on receipt. The system postpones the crossdock assignment until you receive the material into the warehouse. In opportunistic crossdocking, the system identifies a suitable demand source for a given supply source. Oracle Warehouse Management uses business rules, time fences, and priorities to choose the demand source for the incoming material. It considers all demand sources with a demand date that is within the time fence for crossdocking. Opportunistic crossdocking is used in the following environments:
  - Just in Time (JIT) manufacturing environment, where material received from vendors through inbound trailers is Crossdocked directly to manufacturing.
  - Flow-through shipping environments, where material from inbound trailers is crossdocked directly to waiting outbound trailers. This process works well when a small number of incoming orders are used to fulfill a small number of outbound orders.

Crossdocking Feasibility

You can perform crossdocking only if a reasonable time interval separates supply and demand. To perform crossdocking, you must receive the supply prior to the scheduled demand shipment date. A sufficient time between the receipt and the shipment must exist so that you can process, unload, and load the material as well as print the required documents such as the bill of lading and labels.

You should not crossdock material that you receive too far in advance of the shipment because the material could occupy dock space for an undesired length of time.

Important: Crossdocking is not supported for orders with fulfillment base set to Secondary.

Crossdock Criteria

Crossdock Criteria determines the eligible supply and demand sources for crossdocking. You use crossdock criteria for both planned and opportunistic crossdocking. Crossdock criteria represent the business rules on which the system makes crossdocking decisions. Crossdock criteria include which supply and demand documents are eligible for crossdocking, and the relative priority of these documents. You can also use crossdock criteria to define a crossdock window. The crossdock window identifies the supply or demand sources as crossdock candidates based on their expected ship date or receipt date.

Related Topics

Crossdock Criteria, *Oracle Warehouse Management User's Guide*

Crossdocking and Advanced Task Framework

You can use crossdocking with advanced task framework to assign an operation plan to crossdock material to a staging lane. The system links a crossdock operation plan to an outbound operation plan. This link determines the outbound operation plan the material needs to follow through the warehouse. You can link the crossdock activity in the inbound operation plan to one of the four outbound operation plan types: LPN-based consolidation, locator-based consolidation, locator and LPN-based consolidation and staging locator-based consolidation.

Related Topics

Consolidation, *Oracle Warehouse Management User's Guide*

Set up Operation Plans, *Oracle Warehouse Management User's Guide*

Crossdocking and Consolidation

Advanced task framework enables you to consolidate on-hand material with crossdock material. For example, if you fulfill a delivery line with crossdock material, and another through on-hand material, you can consolidate the material in a consolidation locator and pack it prior to shipping. Consolidation ensures the innermost LPN contains items that belong to a single delivery in the consolidation locator. Once you stage LPNs in staging lanes, or are in the process of staging LPNs, you can further consolidate material into an outer LPN. This outer LPN can contain LPNs that belong to various deliveries.

The crossdock method dictates whether you can consolidate material across deliveries and when consolidation occurs in the operation plan.

Related Topics

Consolidation, *Oracle Warehouse Management User's Guide*

Implementation

Planned Crossdocking

The system invokes planned crossdocking during pick release for sales order lines. During pick release, you can choose the crossdock criteria from the pick release

window, or the system uses the rules workbench to determine the proper crossdock criteria.

To perform planned crossdocking, you must establish the crossdocking time fences for each order line. Crossdock time fences are different for each order line, and the order line scheduled shipment date determines the crossdock time fence.

The crossdock time fences determine the earliest and the latest time within which you must receive an order to consider it for crossdocking. The system uses the scheduled shipment date of the order line to determine the crossdock time window. It uses the order processing time, buffer time, and crossdock window to perform backward scheduling. In other words, the scheduled shipment date is offset backwards by order processing time, buffer time, and finally the crossdock window. The system considers only the eligible supply sources that occur within the Crossdock Window as candidates for crossdocking. Once the system identifies the crossdocking candidates, it uses the crossdocking goals to select a supply source.

Opportunistic Crossdocking

Oracle Warehouse Management invokes opportunistic crossdocking when it generates putaway suggestions. During putaway, if you enable opportunistic crossdocking, the system uses the rules workbench to determine the crossdock criteria. If the system does not find crossdock criteria, then it uses the organization default crossdock criteria.

To identify a crossdock demand, you must establish the crossdocking time fences. The system uses the current date to establish crossdock time fence. Crossdock time fences determine the earliest and the latest time within which you can consider a demand for crossdock. The system uses the current date and time, the order processing time, the buffer time, and the crossdock window to perform forward scheduling. In other words, the current date and time is offset forward by order processing time, buffer time, and the crossdock window. The system considers only the eligible demand sources that occur within the crossdock window for crossdocking. Once the system identifies the crossdocking candidates, it uses the appropriate crossdocking goal to select a demand source.

Crossdocking Decision

When pick release identifies a planned crossdock opportunity, it creates a reservation that links supply and demand.

Crossdocking Setup

To enable crossdocking, you must perform the following setups:

- Create crossdock criteria.
- Assign crossdocking criteria in the rules workbench.

- Determine crossdock priority at pick release.

Create Crossdock Criteria

When you create crossdock criteria you must determine the criterion type. The criterion type indicates whether the crossdock plan is for planned crossdocking or opportunistic crossdocking. A planned crossdocking criterion identifies a supply from amongst a pool of eligible supply sources for a given demand source. An opportunistic crossdocking criterion identifies a demand from amongst a pool of eligible demand sources for a given supply source.

Scheduling with Dock Door Appointments

When supply or a demand has a dock appointment, the system derives the scheduled receipt date or the scheduled shipment date from the dock schedule. The receipt date or shipment date could be:

- Earliest Appointment Time: This implies that if an appointment is scheduled between 2:00 p.m. and 4:00 p.m., then the system uses the earliest appointment for the scheduled receipt or shipment time for crossdocking. In this example, the system uses 2:00 p.m. as the scheduled appointment time.

- Latest Appointment Time: This implies that if an appointment is scheduled between 2:00 p.m. and 4:00 p.m., then the system uses the latest appointment as the scheduled receipt or shipment time for crossdocking. In this example, the system uses 4:00 p.m. as the scheduled appointment time.

- Mean Appointment Time: This implies that if an appointment is scheduled between 2:00 p.m. and 4:00 p.m., then the system uses an average of the from and to appointment time as the scheduled receipt or shipment time for crossdocking. In this example, the system uses 3:00 p.m. as the scheduled appointment time.

Scheduling Without Dock Door Appointments

If a dock appointment does not exist for either the supply or the demand, you can still crossdock the supply or the demand. Usually, schedule receipt date or the shipment date is firm, but the time of arrival or departure is flexible and can be controlled if a suitable crossdock opportunity exists. Planned and opportunistic crossdocking criteria allow you to schedule crossdocking without appointments as follows:

- Schedule demand anytime on shipment date: This implies that crossdock criteria allow scheduling flexibility during a one day window for the demand if an outbound dock schedule does not exist. The system assumes that a sales order can be scheduled any time during the day. You can use crossdock planning to create a dock schedule for outbound deliveries based on the crossdock planning outcome.

- Schedule supply anytime on promise date: This implies that crossdock criteria

allow scheduling flexibility during a one day window for the supply if an inbound dock schedule does not exist. The system assumes that a purchase order can be scheduled any time during the day. You can use crossdock planning to create dock schedule for inbound deliveries based on the crossdock planning outcome. The supply reschedule allowed parameter is irrelevant for opportunistic crossdocking.

Rules Workbench Setup

Unlike allocation rules, crossdocking criteria are relatively simple. You can specify crossdock criteria to an item, item category, customer, customer, category, vendor, or vendor category. The rules workbench enables you to define a search sequence for crossdock criteria. This is similar to how pick and putaway strategies are allocated to objects.

> **Important:** Vendor and vendor category restrictions cannot be applied to planned crossdocking.

Planned Crossdocking and Pick Release

You can specify an allocation method during pick release to indicate whether you need to use crossdocking to fulfill an order, and if crossdocking has priority over fulfillment from on- hand stock. This indicates whether the system uses crossdocking or on-hand stock to fulfill an order. You can specify one of the following allocation methods:

- Inventory Only: Indicates that allocation is performed against on-hand stock.
- Crossdock Only: Indicates that orders are fulfilled using crossdocking.
- Prioritize Inventory: Indicates that orders are fulfilled first using on-hand inventory, and crossdocking is used to fulfill residual demand.
- Prioritize Crossdock: Indicates that orders are fulfilled first using crossdock, and on-hand inventory is used to fulfill residual demand.

The Crossdock Criteria field is enabled when the fulfillment strategy involves crossdocking. This field is optional. If you enter a crossdock criteria in this field, then the system uses the crossdock criteria for all delivery lines in the pick batch.

Frequently Asked Questions

1. Can you auto-create a delivery for material that is identified for planned crossdocking?

   You can auto-create a delivery for planned crossdock material if you set auto-create delivery during pick release.

2. Will the crossdocked material always be staged to a default staging lane and subinventory?

   No. You can use advanced task framework and putaway rules to identify the staging lane and subinventory.

3. What happens if crossdocking is implemented in a project manufacturing organization?

   If you set the organization parameter Allow Across project and Task Fulfillment, crossdock planning ignores the project and task information. Crossdock execution ensures that a project transfer occurs in the crossdock operation of the operation plan. If you do not enable the organization parameter Allow Across Project and Task Fulfillment, then crossdock planning ensures that demand and supply belong to the same project and task.

   If a reservation exists between supply and demand that belong to a different project and task, then the system disregards the reservation for crossdocking.

4. Can I change the supply and demands sources after crossdock decision is made?

   You can make changes prior to material receipt; however, existing crossdocking decisions remain. If quantity of a demand or supply is reduced, then the crossdock reservation quantity is reduced. If supply sources are linked to multiple reservations, then the first system consumes the reservation against the latest supply. If a supply or demand is cancelled then the system deletes the crossdock decision. If a supply quantity for a supply document that is planned for crossdock is reduced, then the demand balance quantity needs to be replanned for crossdocking, or fulfilled using inventory. After you receive material, you must cancel the crossdock decision before you can make changes to demand.

   Returns, corrections and inspection may reduce the supply quantity. If this occurs, then the reserved quantity is reduced and the demand balance quantity needs to be replanned for crossdocking, or fulfilled using inventory.

5. How can I cancel crossdock decision after crossdock planning?

   If you have not received the material in the warehouse, you can delete the reservation that links the supply and demand. This automatically cancels crossdocking. If you received the material, then you can use the warehouse control board to cancel the task.

Related Topics

Warehouse Organization Parameters, page 1-4

Explaining the Warehouse Control Board, *Oracle Warehouse Management User's Guide*

8

Label Printing Integration Kit

This chapter covers the following topics:

- Label Printing Integration Kit
- Implementing Label Printing
- XML Formatting
- XML DTD
- Sample XML
- Synchronous API Specification
- Troubleshooting Label Printing
- Common Label Printing Problems
- Debugging Notes
- Frequently Asked Questions
- Summary

Label Printing Integration Kit

Oracle Warehouse Management provides an integration kit to third party label printing software packages that enables you to print labels directly from Oracle Warehouse Management. The kit integrates with the leading providers of label printing software, and, in some case, can integrate directly to label printing hardware without intermediary software. It provides multiple modes for printing applications with more complicated requirements. The integration is handled through XML messages that are dropped as a file to a pre-specified folder, through an XML parameter of a PL/SQL API, or through a standard TCP/IP ethernet socket connection. For specific information about integrating to a particular printing software supplier, contact your supplier.

Oracle Warehouse Management provides the ability to print specific label formats for particular circumstances through either a real-time synchronous integration or a asynchronous integration.

Definition of Terms

- Oracle Warehouse Management: The Oracle Warehouse Management system application including windows accessible through the desktop user interface as well as windows accessible through the Mobile Applications user interface on a mobile RF terminal.

- Third Party Printing Software: The label printing software that integrates with Oracle Warehouse Management . This software may provide label designs, acceptance of XML label requests, and label print services. (A single software package may or may not perform these functions.) Some integration strategies may require multiple software packages to address these functions, or components of the software may reside directly on the printer hardware as firmware.

- Label Type: A broad category of labels that specifies the superset of available data elements that may be included on a single label. Multiple label formats may be defined per label type, and Oracle Warehouse Management recognizes the following types of labels:
  - Material
  - Serial
  - License Plate Number (LPN)
  - LPN Contents
  - LPN Summary
  - Location
  - Shipping
  - Shipping Contents
  - Flow Contents
  - WIP Contents
  - Dispense Pallet
  - Process Dispense Material
  - Process Material
  - Process Product

- Process Sample

  For example: The Material Label Type includes information such as Part Number, Description, Unit of Measure, Quantity, Hazard Code, Lot Number, Lot Expiration Date, Lot Attributes, and so on.

- Label Format: A single design of a label that may include fixed data (such as field prompts) and variable data (such as Part Number). A Label Format is associated to a Label Type. It includes a subset of the available data elements from a particular Label Type. A label type can have multiple label formats, however each Label Format belongs to only one label type. Label Formats are registered within Oracle Warehouse Management after you create the label design in the third party software package.

  Example: Two label formats, HAZMAT and Standard have been defined for the Material label type. The HAZMAT Label Format includes the Part Number, Hazard Code, Unit of Measure, and Quantity. It also includes a large Hazardous Material stamped across the label. The Standard Label Format includes the Part Number, Unit of Measure, and Quantity, and does not have additional text stamped on the label.

- Business Flow: An identifiable business process that occurs as part of material handling within Oracle Warehouse Management. Oracle Warehouse Management recognizes a pre-determined list of Business Flows you can set up to include label printing as part of the transaction processing. See: Associating Label Types to Business Flows, *Oracle Warehouse Management User's Guide*.

- PL / SQL Synchronous Mode: A real-time integration mode between Oracle Warehouse Management and the third party software vendor that is handled through a PL/SQL API. When using this mode, the third party supplier is able to return success or failure messages regarding the status of the label print request. Oracle Warehouse Management stores those messages in the label print history so label printing problems can be easily identified and diagnosed.

- TCP/IP Synchronous Mode: A real-time integration mode between Oracle Warehouse Management and the 3rd Party software vendor that is handled through a standard ethernet TCP/IP connection. When using this mode, Oracle ensures that the printer or print server is listening to the IP and port and has successfully received the message, but no knowledge of the detailed status of the print request beyond acceptance of the XML message is known by Oracle Warehouse Management.

- Asynchronous Mode: An integration mode between Oracle Warehouse Management and the third party software supplier that is handled through dropping an XML file into a watched directory. When using this mode, Oracle Warehouse Management has no knowledge of the status of the print request after creation of the XML file.

Functional Process

Oracle Warehouse Management supports three modes of label printing integration.

- Synchronous Mode (also known as generic synchronous mode): Using this mode, Oracle Warehouse Management calls a PL/SQL API that is shipped as an empty stub. It is the responsibility of the integration partner to implement the API to process the print request and return the status to Oracle Warehouse Management.

- TCP / IP Synchronous Mode: Using this mode, Oracle Warehouse Management sends the requests to the IP address and the port specified during setup.

- Asynchronous Mode: Using this mode, Oracle Warehouse Management creates an XML file in a specified directory that contains the print request instructions.

  Important: It is the responsibility of the integration software to monitor the directory for new files, retrieve the XML file that Oracle Warehouse Management creates, and process the label print request.

You can print labels through Oracle Warehouse Management in several ways. You can initiate a manual print request from the mobile device, or print a label automatically as part of a business flow. You can also reprint labels printed in either of these two ways via a mobile window or a desktop window. You can redirect reprint requests to a different printer, or request a different number of label copies. The manual request and reprint functionality is useful if you require a label to be printed for a particular License Plate if the current label is damaged or unreadable.

For any print request, whether it comes through a manual request or an automatic business flow, Oracle Warehouse Management determines the printer and label format to use if these are not already provided as part of the label printing request. The printer is determined by querying the current printer assignments. Printers can be assigned to the entire Site, Responsibility, Subinventory, or individual User.

The Label Format is determined through the Rules Engine. You can model business logic that determines the best label format to print for a given request in the Rules Engine. You can construct individual rules to specify that a certain Label Format be used if certain criteria are met. Those rules are given weights to determine the execute sequence when looking for a Label Format. Each Label Type also has one default Label Format that is used for a label request whenever the Rules Engine fails to pick a Label Format.

Once the system determines the printer and *Label Format* Oracle Warehouse Management constructs the XML print request. According to the integration mode, the XML is passed to third party party software through a*synchronous* API call through a standard ethernet socket, or through a file created in a specific directory.

The third party party software processes the print request and, if running in *synchronous* PL / SQL mode, returns the print status to Oracle Warehouse Management.

Related Topics

Assigning Printers, page 8-8

Label Format Assignment Rules, *Oracle Warehouse Management User's Guide*

Implementing Label Printing

This section discusses the label setup in Oracle Warehouse Management. The setup steps include setting Oracle Warehouse Management profiles, creating and assigning printers, defining label formats, and assigning label types to business flows. For information on designing label formats and managing the XML import process, refer to documentation from the third party software being used as an integration partner.

Configuring API for Label Printing (Optional)

Oracle provides a stub API that enables you to write business specific logic to configure and control the labels to be printed. This feature supports LPN, LPN Summary, and LPN Content label types. This API `custom_restrict_labels` is contained in the package `wms_label_custom_pkg`.

For example, this API may be useful in the following situations:

- For a specific transaction, print a label only for an outer LPN, yet for another transaction, print a label for the outer LPN and first level LPNs as well.
- Print selected labels only when the delivery is completed in staging, and only for the pick drop flow.
- Print labels for selected items only during the LPN split process.
- Print a label once for the highest LPN level and for the lower levels when they are packed.

> **Note:** You cannot add new labels to be printed using this API; however, one exception occurs when the new LPNs generated are either the parent or child of the current LPN for which labels will be printed.

The `custom_restrict_labels` API provides the following parameters (selected parameters shown) that you can use to develop your business logic when determining whether to print a specific label or not:

- Transaction ID
- Organization ID

- Inventory Item ID
- Subinventory code
- Locator ID
- Lot Number
- Revision
- Source Header details like Sales Order ID, Purchase Order ID, etc
- Source Line details like Sales order line ID
- Purchase order line ID etc.
- Move Order details
- Label type
- Business flow code
- Label Format ID
- Label entity details: The following two parameters for are used for label entity details:
  - Entity type like `LPN`.
  - Entity value table: If entity type is `LPN`, then the entity value would be `LPN IDs`.

Oracle public APIs and related information is maintained in the Oracle Integration Repository. For more information, see the Oracle Integration Repository available in the Oracle E-Business Suite.

Label Printing Profile Options

The Oracle Warehouse Management Label Printing integration kit uses the following three profiles. You can set all three profiles at the Site, Application, Responsibility, and User levels.

- WMS Label Print Mode: This profile determines the label print mode for the integration. The choices for this profile are Synchronous Generic, Synchronous - TCP / IP and Asynchronous. Depending on the setting of this profile, the label print request will be processed according to the mode selected.
- WMS Label output directory: This profile is only used if the Label Print Mode is

Asynchronous. It determines the directory the XML files are written to for the 3rd Party software to pick up and process. Both the Oracle database and the 3rd party software must have read / write privileges to the directory. Furthermore, the directory must be in the list returned by the following SQL statement:

```
select value from v$parameter where name = 'utl_file_dir'
```

- WMS Label file prefix: This profile is only used if the Label Print Mode selected is Asynchronous. The profile determines the prefix for the XML files written to the output directory. Label print file names are generated according to the following format: PPPNNN.xml where PPP is the prefix specified in this profile and NNN is a sequential integer generated for each new label print request. Note that it is possible to distinguish the user who generated a particular print request by setting this profile at the user level.

Creating Printers

Printers for label printing are setup in the same way they are normally setup within Oracle Applications except you do not need printer drivers for the label printers since the 3rd Party software processes the actual print request. The printer needs to be setup within Oracle Applications solely for the purpose of choosing the correct printer for a particular print request and then identifying the selected printer by its name in the XML produced by the system.

Use the System Administrator responsibility to create printers. First, a printer type must be created, then individual printers can be created.

Create a type called Label and give it a description. This printer type does need to have associated styles or drivers.

Create a new printer with a unique name of printer type Label. You can now assign the printer to use as a part of the Oracle Warehouse Management Label Print Integration

> **Note:** The name that you give the printer in this setup step must correspond to the name of the printer as recognized by the 3rd Party printing software. The XML that contains the label request will refer to this printer using the name setup here and the printing software must be able to recognize this printer name to successfully process the print request. However, for the direct-to-printer solution whereby the XML is sent directly to the printer, the printer name is not relevant to the printer as this alias is used to route the request and find the correct IP address, but the printers generally assume that all XML messages reaching it should be printed by it.

Assigning Printers

The system searches for a printer assignment in the following sequence: User, Subinventory, Responsibility, Application and Site level. When you make a label request, Oracle Warehouse Management looks for printer assignments for the requested Label Type and uses the printer assigned to the Label Type at the most specific level. If you do not assign printers, to Label Types, you cannot print labels.

Related Topics

Choosing Printers for Shipping Documents and Labels, *Oracle Shipping Execution User's Guide*

Defining Label Formats

Some 3rd party packages do not recognize special characters or spaces in variable names. For instance, instead of using ITEM NUMBER or S/N use ITEM or SN. In general avoid using all special characters unless directed by the 3rd party documentation.

> **Note:** Not all label fields for a given label type are available during all business flows. In some situations, the data is only available at certain times and cannot be obtained during other business flows. In other situations, the data is located in different places depending on the business flow and not all locations of the data have been implemented yet. Please refer to the Common Problems section for additional details.

> **Note:** The variable names that you give to the fields in this setup step must correspond to the names of the variable names that the 3rd party printing software expects. If these names do not match exactly, Oracle will identify the XML data with one variable name, but the 3rd party printing software will be expecting a different name that is not defined in the data. Thus, the label will be printed with null values for this data.

Related Topics

Compliance Labeling Setup, *Oracle Warehouse Management User's Guide*

Defining Label Formats with Multiple Records

The LPN Summary and Shipping Contents label formats support designs that include more than one row of data on a single label. This enables you to print a single label that may contain multiple lines of content information for an LPN or outbound shipment.

You can enter multiple lines for the same data element to print multiple record labels on

the fields window for defining label formats. For instance, if there is space on one label for 2 rows of information for a LPN Summary label, the following data fields may be defined in the Fields section of the Label Format form:

Data Field and Variables

Data Field	Variable
LPN	LPN
Item	ITEM1
Quantity	QTY1
Item	ITEM2
Quantity	QTY2

In this example if you make a print request for an LPN Summary that contains three rows of record information, the print request API recognizes that two records can fit on one label based on the label format design. Because the data elements Item and Quantity each have two variables associated to them, the first two rows returned for the current LPN pass into those variables. Therefore, two labels are printed. The first label contains the LPN information and the first two rows returned for the LPN Content information. The second label contains the LPN information repeated and the third row returned for the LPN Content information.

> **Note:** Printing multi-record Shipping Contents labels does not working during the Pick Drop business event. You can print multiple record Shipping Contents labels after pick confirmation through a manual print request, or during the Ship Confirm business flow.

Custom Label Fields

You can create custom label fields and associate them with label formats. This enables you to have additional control over the values that are listed on a label. You can write a custom SQL statement to create the custom label field. The following restrictions apply to custom SQL statements:

- You must include the WMS_LABEL_REQUESTS table in the from clause of your SQL statement and use the alias WLR to refer to this table. The system automatically appends the condition "wlr.label_request_id = :id" to your SQL statement. See subsequent examples for proper inclusion of

WMS_LABEL_REQUESTS table.

- The SQL returns one value.
- The system cannot verify the SQL statement will execute properly because it does not know the transaction values until run-time when the SQL is executed. The system does, however, check the SQL for the following conditions:
  - Custom label field definition contains only a SELECT statement. The system does not accept any other type of SQL.
  - The SELECT statement syntax is correct.
  - The custom label field name is unique within the label types.

If a violation occurs during SQL execution, then the system records the violation in the WMS_LABEL_REQUESTS_HIST table.

Example

The following is an example of a correct SQL statement for the field name Supplier Type for the LPN Contents label type:

```
select ap.vendor_type_lookup_code from ap_suppliers ap,
wms_label_requests wlr where wlr.supplier_id = ap.vendor_id
```

Example

The following is an example of a correct SQL statement for the field name PRO_NUM for the Shipping label type:

```
select wc.attribute1 from wsh_carriers wc, wsh_delivery_details
wdd wms_label_requests wlr where wc.carrier_id = wdd.carrier_id
and wlr.delivery_detail_id = wdd.delivery_detail_id
```

Related Topics

Troubleshooting Label Printing, page 8-13

Defining Custom Label Fields, *Oracle Warehouse Management User's Guide*

Assigning Label Types to Business Flows

Multiple Label Types can be assigned to a single Business Flow if it is necessary for multiple labels to be printed. However, multiple label types print only if there are multiple assignments for the business flow at the same level.

For instance, if both the LPN and LPN Content Label Types are assigned to print during a Miscellaneous Receipt for a particular user, both label types print. However, if the LPN Label Type is assigned to a responsibility and the LPN Content Label Type is assigned to a user, even if the user logs in under that responsibility, only the LPN Content Label Type prints. The following table lists the available business flow label type assignments.

Related Topics

Associating Label Types to Business Flows, *Oracle Warehouse Management User's Guide*

Creating Label Format Rules

Creating label format rules is an optional step. Some implementations may require only a single label format for each label type. If this is the case, the system picks the default label format for each type. The system also picks the default if there are no applicable rules. If the implementation requires more than one label format for a label type label format rules are necessary.

Related Topics

Label Format Assignment, page 3-3

Setting Up Label Format Assignment Rules, *Oracle Warehouse Management User's Guide*

Completion of Setup

Before you can print labels, the third party software may require additional setup. The third party software must recognize the Printers registered within Oracle Warehouse Management, the defined Label Format names, and the Field Data Variables. It must be able to read the XML format Oracle Warehouse Management generates. If the integration mode is Synchronous, you must load the implemented PL/SQL API into the Oracle database. If the integration mode is Synchronous - TCP / IP the printer or print server must be able to receive TCP / IP messages and there must not be any firewall blocking messages from the environment to the printer or printer server of the specified port. If the integration mode is Asynchronous, the 3rd Party software must be set to scan the appropriate directory for XML files to process them as print requests

XML Formatting

Oracle and the third party supplier need to agree on the XML format so that the XML contents are understood, parsed and printed as a label. An XML Document Type Definition (DTD) defines the XML tags used in the XML file. Oracle Warehouse Management generates XML files according to this DTD and the 3rd party software translates the XML according to this DTD.

XML DTD

The following is the XML DTD the system uses to create the XML. It defines the elements used in the XML file. The following is a list of their attributes and the next level elements:

```
<!ELEMENT labels (label)*>
<!ATTLIST labels _FORMAT CDATA #IMPLIED>
<!ATTLIST labels _JOBNAME CDATA #IMPLIED>
<!ATTLIST labels _QUANTITY CDATA #IMPLIED>
<!ATTLIST labels _DUPLICATES CDATA #IMPLIED>
<!ATTLIST labels _PAGES CDATA #IMPLIED>
<!ATTLIST labels _PRINTERNUMBER CDATA #IMPLIED>
<!ATTLIST labels _PRINTERNAME CDATA #IMPLIED>
<!ELEMENT label (variable)*>
<!ATTLIST label _FORMAT CDATA #IMPLIED>
<!ATTLIST label _JOBNAME CDATA #IMPLIED>
<!ATTLIST label _QUANTITY CDATA #IMPLIED>
<!ATTLIST label _DUPLICATES CDATA #IMPLIED>
<!ATTLIST label _PAGES CDATA #IMPLIED>
<!ATTLIST label _PRINTERNUMBER CDATA #IMPLIED>
<!ATTLIST label _PRINTERNAME CDATA #IMPLIED>
<!ELEMENT variable (#PCDATA)>
<!ATTLIST variable name CDATA #IMPLIED>
```

Sample XML

The following is an example of XML file that is generated according to the above DTD. The content of the XML files lies between <labels> and </labels>, which correspond to a group of labels. The content between <label> and </label> has the information to print one piece of label. Each <variable> and </variable> pair gives the value of one variable on the label. The printer name and label format are given in the <labels> tag initially, different printer name and/or label format can be set at the level of each label, which is given in the <label> tag. Unless new values are given the <Label> tag, the attributes (such as printer name, label format, and quantity) at the <Labels>

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE labels SYSTEM "label.dtd">
<!DOCTYPE labels SYSTEM "label.dtd">
<label>
<variable name= "ITEM">AS54888</variable>
<variable name= "ITEMDESC">Desktop</variable>
<variable name= "LOT">10292</variable>
<variable name= "QTY">2</variable>
<variable name= "UOM">Ea</variable>
</label>
<label>
<variable name= "ITEM">AS12345</variable>
<variable name= "ITEMDESC">Mouse</variable>
<variable name= "LOT">10200</variable>
<variable name= "QTY">10</variable>
<variable name= "UOM">Ea</variable>
</label>
</labels>
```

Synchronous API Specification

When you set the print mode to Synchronous - General, the XML content passes directly to the third party software to be processed and printed. Oracle Warehouse Management provides the stub of the API and third party company implements the necessary code to process the XML string and print it out. The following is the

specification of the synchronous printing API:

```
--
--  Copyright (c) 1999 Oracle, ------  Redwood Shores, CA, USA
--  All rights reserved.
--  FILENAME
--      INVSPRQS.pls
--  DESCRIPTION
--      Spec of package INV_SYNC_PRINT_REQUEST
--
SET VERIFY OFF
WHENEVER SQLERROR EXIT FAILURE ROLLBACK;
CREATE OR REPLACE PACKAGE INV_SYNC_PRINT_REQUEST AS
PROCEDURE SYNC_PRINT_REQUEST
(
p_xml_content IN LONG
,x_job_status OUT VARCHAR2
,x_printer_statusOUT VARCHAR2
,x_status_typeOUT NUMBER
);
END INV_SYNC_PRINT_REQUEST;
/
--show errors;
COMMIT;
EXIT;
```

The API takes XML content as input parameter and returns the job status, printer status, and status type. The job status has meanings such as success, pending, error. The status type has meanings such as online, out of stock, heads up, etc. The status type shows whether it is an error, warning, log, or success status message. You can control the type of printing messages to display on the mobile device.

Troubleshooting Label Printing

Oracle Warehouse Management and mobile supply chain applications support label printing but must partner with a third party to provide a complete solution. The label format (field layout, fonts, barcode sizes, images, etc.) is designed in the third party software. The third party is also responsible for processing the actual print request. Oracle provides the data to the 3rd party in the form of a well-defined XML string. Because of this transfer of data between two software systems, there has been confusion about which support organization (Oracle or third party) is responsible for various printing problems.

In short, Oracle is responsible to deliver the XML in one of three modes, as determined by a profile option called "WMS: Label Print Mode". Note that the profile option can be set at any of the four levels: site, application, responsibility, and user. The print-mode that the system determined at run-time for a label-request is listed in the "Request Mode " column in the Label Request History form.

In all cases where a label is produced, the XML content should be accessible in the Label Request History form. The XML displayed in this form is exactly the XML that would be passed to the third party. However, there may be problems delivering the XML to the third party, which depend on the label print mode, and there may be problems

generating the XML in the first place.

Troubleshooting Custom Label Fields

You use the Label Requests History to troubleshoot custom SQL errors. The Label Requests History window displays the following SQL error messages:

- Zero values returned by the SQL: Two possible reason this message appears are:
  1. SQL returned a NULL value
  2. SQL could not find any matching record and returned the value No Records Found. The system stops only when the SQL returns the value No Records Found.
- Multiple values returned by the SQL: Sometimes the SQL returns multiple records. If this occurs, then the system stops the printing process.

Common Label Printing Problems

The following sections outline common trouble shooting problems.

No XML Data is Generated

After a label print request is made, either through manual label request or in the course of a business flow, there is no label request in the 'Label Requests History' form (accessed via the 'View Label Requests' menu entry). There are two causes for this problem. Either there are no label types assigned to a business flow, or there is no default format for the label type. If there are no label type assigned to a business flow you receive the following message in the log file.

```
[22-OCT-03 11:02:30] LABEL_MAIN:  In
Get_type_to_print,busFlow,lableTypeID,Manualformat,ManualPrinter= 13,,,
[22-OCT-03 11:02:30] LABEL_MAIN:  Check setup for types to print, start
from user level
[22-OCT-03 11:02:30] LABEL_MAIN:  No types found to print
[22-OCT-03 11:02:30] LABEL_MAIN:        Got label types, count = 0
```

If there is no default label format for a label type you receive the following message in the log file:

```
[22-OCT-03 11:08:40] RULE_ENGINE: No rule match retrieve the default
format
[22-OCT-03 11:08:40] RULE_ENGINE: Update Label Request with label ID
:.(1)
[22-OCT-03 11:08:40] LABEL_MAIN:   Applyed rules engine,
label_format:format_id= [22-OCT-03 11:08:40] LABEL_LPN: did apply label
,,req_id 386
[22-OCT-03 11:08:40] LABEL_LPN: No format exists for this label, goto
nextlabel
```

The solution for both of these problems is to ensure that a default label format exists in

the Define Label Formats window.

No Label Is Printed

After a label print request is made, either through manual label request or in the course of a business flow, there exists an entry in the 'Label Requests History' Form (accessed via the 'View Label Requests' menu entry) and the corresponding XML file or API call was handled successfully. However, no label was printed by the 3rd party printing software. If no label is printed it could have the following possible causes and solutions.

Cause: No printer assigned to business flow

Message in Log File: `[22-OCT-03 10:50:34] LABEL_MAIN: Error in getting the default printer: Default printer not defined.`

Solution: Assign Printers to Documents. Ensure that the label type that you are trying to print has a valid printer assigned to it. Ensure that the "Enabled" and "Default" flags are both checked.

Cause: Printer does not have default or enabled checked.

Message in Log File: `[22-OCT-03 10:50:34] LABEL_MAIN: Error in getting the default printer: Default printer not defined.`

Solution:-> Assign Printers to Documents. Ensure that the label type that you are trying to print has a valid printer assigned to it. Ensure that both the "Enabled" and "Default" flags are checked.

Cause: Printer name mismatched in Oracle applications and 3rdparty software

Solution: Ensure that the printer you are trying to use is defined with the same text identifier that it is referred to by the 3rd party label printing software.

Cause: XML Variable names mismatched in Oracle and 3rd party printing software

Solution: Ensure that the variable names for the label format you are trying to use are defined with the same variable names used by the 3rd party label printing software.

Label Missing Data

The correct format is selected, as can be seen by the fixed / "boiler-plate" format that is printed. However, several fields that you expect to be included in the format are inexplicably missing.

Cause: Information not available to print

Solution: Verify the appropriate information is available. For example, if an item is not serial controlled, the serial label is not available; at time of Receipt and Inspection in an Inventory organization, serial number is not available. Verify the appropriate information is available. For example, if an item is not serial controlled, the serial label is not available; at time of Receipt and Inspection in an Inventory organization, serial number is not available.

Cause: Field not included in XML

Solution: If you see a variable on the label is not replaced by any data, check Define Label Format setup window and verify you add all the variables on the label to the label format and their variable names match. If a variable is printed on the label but not listed in the label format, the XML content does not have information for that variable, then it is missing on the label.

Cause: Mismatch in variable names between Oracle and 3rd party.

Solution: The variable names that are included in the Oracle XML message must match, character for character, and usually in the same case (depending on 3rd party software), the variable names defined on the label format.

Asynchronous Mode- No XML File is Generated

After a label print request is made, either through manual label request or in the course of a business flow, there does exist an entry in the 'Label Requests History' Form (accessed via the 'View Label Requests' menu entry), but no corresponding XML file was created in the appropriate directory.

Cause: Profiles are not set up correctly.

Solution: Setup the following profiles

- WMS: Label Print Mode = Asynchronous
- WMS: label file prefix = any short text string
- WMS: label output directory = read / write directory

Cause: Label output directory does not have the appropriate file permissions.

Solution: Ensure that the database user (usually 'oracle') has read/write permissions on the directory specified in the "WMS: Label output directory" profile. This can be done by executing the following command on the directory,`where "dir/" is the directory: chmod 777 dir/.`

Cause: Label output directory does not have the appropriate database access

Solution: Ensure that the database has the appropriate access set up to write to the file directory. The file should be listed when the following SQL query is performed: `select value from v$parameter where name = 'utl_file_dir'.`

Cause: The WMS: Label Output Directory is full.

Solution: Executing a command like 'df -k {directory}' should point out to this problem. The 3rd party software should be configured to delete the XML files after they are processed. Get more space for the file system or delete unnecessary files.

Synchronous Mode - Synchronous API is not Called

After a label print request is made, either through manual label request or in the course of a business flow, there does exist an entry in the 'Label Requests History' Form

(accessed via the 'View Label Requests' menu entry), but the synchronous API (or custom replacement API) did not seem to be called.

Cause: Profiles not set up correctly

Solution: Setup the following profiles

- WMS: Label Print Mode = Synchronous - Generic
- WMS: label file prefix = not relevant
- WMS: label output directory = not relevant

As long as the first of the following log message appears in the Label Printing log file, the problem lies with the 3rd party integration, not with Oracle and is not the responsibility of Oracle to debug. The log message is:

```
[22-OCT-03 11:46:50] LABEL_MAIN: before call sync_print_req
[22-OCT-03 11:46:50] LABEL_MAIN: Status type returned from the
sync_print_req
```

> **Important:** The following causes of this problem are provided as a convenience in debugging, but the issues they describe are not the responsibility of Oracle support to debug and/or alleviate.

Cause: Custom API not created in proper schema

Solution: Make sure that the custom API has been loaded into the package for " INV_SYNC_PRINT_REQUEST" under the "APPS" schema. A good strategy that many integrations have used is to have the APPS.INV_SYNC_PRINT_REQUEST simply call the same procedure in a custom schema where the custom code is located. In this case, APPS.INV_SYNC_PRINT_REQUEST would just contain a function call to CUSTOM.INV_SYNC_PRINT_REQUEST.

Cause: Appropriate Grant permission not granted for custom schema

Solution: If the strategy described above is taken, APPS must be granted EXECUTE permission on the custom schema in order that the custom API call can be executed from within the APPS schema. A DBA should grant the appropriate persmissions to the APPS user on the custom schema.

Synchronous Mode - TCP/IP Socket is not Opened

After a label print request is made, either through manual label request or in the course of a business flow, there does exist an entry in the 'Label Requests History' Form (accessed via the 'View Label Requests' menu entry), but no message is sent to the label printer.

Cause: Incorrect IP address or port number

Solution: Verify the address and port number on which the print server or printer is listening. Refer to 3rd party documentation for details on how to check the IP address

and port. You can use the Test button on the setup form to verify that the IP address and port are correct.

Cause: Incorrect print mode

Solution: Verify that the print mode is set to Synchronous - TCP/IP for the user.

- WMS: Label Print Mode = Synchronous - TCP/IP
- WMS: Label file prefix" not relevant
- WMS: Label output directory not relevant

> **Important:** The following causes of this problem are provided as a convenience in debugging, but the issues they describe are not the responsibility of Oracle support to debug and/or alleviate.

Cause: Network topology or fire wall prevents messages from getting from database to print server

Solution: The printer may not be accessible from the database, which is the place from which the TCP/IP socket is actually being opened. That is, even though you may be able to ping and/or connect to the printer from the computer at which you are testing, you may be unable to do so from the machine that is running the database. The solution is to ensure that change the fire wall settings to allow messages to the specific port or having a certain content matching a label request to pass through.

Debugging Notes

This section provides some hints and tips to aid in debugging problems in the label print integration setup and execution.

There are two log files that will be able to help debugging problems in label printing setup and execution, they are located in the Inventory log directory as specified by the INV: Debug File profile.

MWA Log Files: Inventory Log

This log file provides information about each step of the label printing execution to help you determine whether each step is executed successfully and the errors that occur. This helps you identify setup or code problems. For example, the log files list the label types printed for the business flow or manual request, if the number of label types is zero, then probably you did not assign label type to business flow properly. The log file also notes the printer for the label, the label format for the label type, and how many variables it finds for the label format. This information helps you find whether there are problems in the setup of printer, label format, and variables for each label format. It also has log messages within each label type. You can find out whether there is error occur when it is retrieving the actually data to print in each label type.

Frequently Asked Questions

1. What is the difference between the LPN Content and LPN Summary Label Types?

   The LPN Content label type lists all the content information for the contents of a particular LPN. If there are multiple contents within an LPN (such as more than one Item, lot, revision or nested LPNs), then separate LPN Content labels will be printed for each of the contents of that LPN.

   The LPN Summary label type allows content information to be summarized for a particular label format. Multiple rows of content information can be included on a single label format. If there are multiple contents within an LPN, they will be printed on as many labels as need to be used, depending on how the labels have been set up for multi-record printing. If there are nested contents within an LPN, the nested contents will be summed up and displayed in summary form as a content line for the outermost LPN. For more information on printing multiple records using an LPN Summary label type, refer to the discussion in the Implementation section.

   > **Note:** The LPN Summary and LPN Content label formats support more than one row of data on a single label. So if you have defined multiple records for the same field, the record will be populated with the same data.

2. Is it possible to add additional Label Types in my implementation?

   It is not possible to add Label Types in an implementation without code customization. Each Label Type is designed using a single PL/SQL package to collect the appropriate information from the references passed to it.

   If there are data elements missing from a Label Type for your business needs, or if there are Label Types missing, please contact Oracle Support or Oracle Warehouse Management development to inquire about adding the required functionality into the label printing integration kit.

3. What are the advantages and disadvantages of using the Synchronous or Asynchronous integration mode?

   The advantages of using the Synchronous print mode are in the direct interaction with the third party printing software. When the functionality to provide feedback through the mobile device is included in a future release of Oracle Warehouse Management, the users will have the ability to receive instant feedback regarding the print job they submitted.

   The disadvantages of the Synchronous print mode is that it may have performance issues because the mobile user must wait for the print job to be processed before continuing to work.

The disadvantages of the Asynchronous print mode are the loss of visibility to any feedback that the print job may have generated. Oracle Warehouse Management cannot have any visibility to the status of the printer or print job since the implementation is achieved through the creation of a flat file.

4. What is the average size of the XML file created by Oracle Warehouse Management?

   The XML files generated by Oracle XML range in size from about 300 bytes up to 1 Kilobyte. The size depends on the number of data filed on each label.

5. Who are the certified integration partners with Oracle Warehouse Management for label printing?

   For a current list of partners that are certified for label print integration, navigate to `www.oracle.com`, find the Oracle partners link, then browse the partner solutions catalog. Search by keywords such as label printing to find the current third party vendors. Refer to the respective partners for additional information.

6. What must be done to ensure that XML files can be written by Oracle Applications and read by the 3rd party label printing software?

   The directory for the XML files must be specified in the appropriate profile for Oracle Warehouse Management label printing. That directory must be able to be written to from the database. That is, the directory must be on a file system that is accessible to the database and the directory must be included in the `v$parameter` list for `utl_file_dir` on the database.

   In addition, many 3rd party label printing packages need the ability to delete the XML file after processing it. Therefore, the permissions on the file directory must be set such that the software has access both to read the XML file and delete the file after processing.

7. When does the system record the label history?

   The system records the label history whenever a label is printed. A record is populated in the label history table even if no XML file was produced in the output directory. This makes the history a useful debugging tool, because if the label and XML are visible here, that can narrow a problem to writing the XML to the file system, rather than generating the xml in the first place. Reprint requests include a link to identify the label printing request that produced the original label.

Summary

Oracle Warehouse Management provides label printing that enables specialized printing, compliance labeling, and automatic label generation. The integration is a standard, generic integration that can be implemented by any integration partner.

9

System Task Management

This chapter covers the following topics:

- Overview
- Functional Flow
- Defining Pick Methodologies
- Labeling
- Operation Plans
- Task Planning
- Warehouse Control Board
- Task Management Setup
- Implementation
- Transaction Reasons
- Transaction Reason Functional Business Flow Description
- Testing the Transaction Reason Workflow
- Operation
- Common Problems
- Frequently Asked Questions
- Debugging Tools
- Debugging Notes
- Task Type Rules

Overview

This chapter contains a detailed discussion of the complete Task Management process, which consists of task creation, splitting, merging, assignment, dispatching, and

execution. It provides the basic fundamentals of tasks as well as highlights decisions that may impact the implementation. It also discusses key setup areas, and helps to troubleshoot some basic problems that may be encountered during implementation or warehouse operation.

Functional Flow

Task management is used in many processes in Oracle Warehouse Management. It is used for material transfers required for sales order picking, replenishment, picking for manufacturing, and requisition move orders. It is also used for cycle count tasks.

The following table outlines which of the task management features are applicable for each of these different types of tasks, and how the features differ for different task types.

Task Management Features

Task Type	Sales Order	Internal Order	Replen.	Move Order Issue	Move Order Transfer	WIP Picking	Cycle Count	Putaway
Task Create Process	Pick Release Cycle Count Workflow	Pick Release Cycle Count Workflow	Move Order Pick Slip Report N Step putaway workflow	Move Order Pick Slip Report	Move Order Pick Slip Report	Comp. Pick Release	Cycle Count Schdl. Cycle Count Workflow	LPN Scan or Pregen. Putaway
System Task Type	Pick	Pick	Replen.	Move Order Issue	Move Order Transfer	Pick	Cycle Count	Putaway
Allocate	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA
Pick Method	Yes	Yes	No	No	No	Yes	NA	NA
Paper Assist Pick	Yes	Yes	Yes	Yes	Yes	Yes	No	NA

Task Type	Sales Order	Internal Order	Replen.	Move Order Issue	Move Order Transfer	WIP Picking	Cycle Count	Putaway
Task Type Assn.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Task Split	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Task Dispatch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Putaway Drop All
Task Load	Yes	Yes	Yes	No	Yes	Yes	NA	Yes
Task Drop	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes
Label Printing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Op. Plan	Yes	Yes	No	No	No	No	No	Yes
Task Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Whse. control board	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Task Creation Process

Each of the different business flows has different processes to create tasks. For instance, sales order tasks are created by using the Pick Release program to select specific sales orders to include in release. It is only after these respective processes run that tasks are visible to Oracle Warehouse Management as Unreleased or pending work.

All these processes require you to set up data. For instance, prior to running Component Pick Release to create tasks for manufacturing components, you must define the job or schedule. Prior to creating Move Order Issue tasks, you must create

and approve the Requisition Move Order.

Pick Release

The pick release process releases internal and external sales orders to the warehouse floor. The Pick Release window has many options to control which lines to select for pick release and how to restrict the material the system considers available for pick release, as well as several other options.

Selection criteria for the release lines to include are as follows:

> **Important:** For advanced catch weight, picking tasks are created in the UOM identified by the fulfillment base.

- Order number
- Order type
- Order status
- Customer address
- Ship to address
- Dates of scheduled shipment
- Customer request dates.

You can also select lines based on delivery or trip, if these have been created in advance, or via ship method or order priority.

Pick release establishes the sales order allocation sequence in case of short supply, optionally specifies the staging lanes, and controls if deliveries are automatically created as part of the pick release process using the Delivery Grouping Rules defined on the Shipping Parameters window. Other options control if pick release is restricted to lines for which prior reservations were made, and can be further restricted to consider only material from a particular subinventory or locator.

A pick release option controls if the move orders are automatically allocated, or if allocation happens later by a manually triggered process. Set this option to automatically allocate the move order, except when you want to troubleshoot with the Rules Engine Simulator.

Another pick release option controls whether the allocated move orders are automatically transacted, which bypasses much of the rest of the task management process. In an Oracle Warehouse Management enabled organization, automatic confirmation is typically disabled except in certain situations. A serialized item cannot be transacted by auto pick confirmation if serial allocation is disabled. In the absence of customizations , if auto-pick confirmation is enabled, then the only mobile shipping

method available for use is the Quick Ship method. Another pick release option controls if the system should create a task with an unreleased or pending status You can also set task priority at pick release. If necessary you can use the warehouse control board to change the task status, and priority.

In addition, the cycle count workflow can create sales order tasks by automatically re-allocating new material when a sales order task is underpicked

Replenishment

The system creates replenishment tasks (and allocations) when the Move Order Pick Slip report runs. You must also run the Min-max planning report prior to running the Move Order Pick Slip report.

The Min-max Planning Report creates the move orders based on selection criteria, such as item category, and planner and buyer, and also controls which sources of demand and supply are included. This creates the move orders, but the Move Order Pick Slip report actually allocates these move orders and creates the tasks to perform. Alternatively, you can choose Allocate in the Transact Move Order window to manually allocate the move orders the Min-max Planning Report creates.

In addition, the n-step putaway workflow can create replenishment tasks when an LPN is dropped to an intermediate staging location that differs from the initial putaway suggestion provided by the system. The replenishment task directs the operator to move the material from this intermediate location to its final destination.

Move Order Issue and Transfer

The system creates Move Order Issue & Transfer Requisition move order tasks (and allocations) when the Move Order Pick Slip report is run for approved move orders. Similar to replenishment, a two step process is used to create the move order, and then allocate the move order. Alternatively, you can choose Allocate in the Transact Move Order window to manually allocate the move orders the Min-max Planning Report creates.

Picking for Manufacturing

The system creates tasks to pick components required for manufacturing jobs when Component Pick Release is run. Component pick release allocates and creates the tasks. Different user-interfaces are used based on manufacturing mode: discrete jobs, repetitive jobs, lot-based jobs, and flow schedules each have separate component pick release processes with different selection criteria. See: Manufacturing Picking, page 14-2.

Cycle Counting

Tasks for cycle counting are automatically created when the counts are scheduled. This is triggered via the Cycle Count Scheduler, accessible from the cycle counts window. You must create the cycle count header prior to scheduling cycle counts.

In addition, the cycle count workflow can create cycle count tasks by automatically generating a task to count the material that the operator was unable to find when executing a picking task. In creating this cycle count task, the system also automatically places a reservation on the missing quantity so that it is not allocated for other tasks until the discrepancy is resolved

System Task Type

Each of the different business flows for which tasks are created has a System Task Type. The system defines System Task Types, and groups them by similar sets of features. The System Task Type is automatically assigned to every task when it is created and cannot be edited. Tasks within the same System Task Type can be further classified by User Task Types, which are assigned at a later point by the Rules Engine.

Allocation

All material movement tasks require a source and a destination for the material. Only cycle count tasks do not require material movement, and are not allocated. All other tasks use the Rules Engine to allocate material and, if necessary, a destination locator.

Sales Order

Allocation is performed during pick release, if auto-allocate is enabled. If the move order is not automatically allocated during pick release, you can use the Allocate button on the Transact Move Order window to allocate it at later point.

The Rules Engine allocates material based on defined picking rules. If the sales order was reserved, the reservation is viewed as an additional constraint on the rule. If you entered a subinventory or locator in the Pick Release window, these also act as additional rule constraints. The system applies these constraints together to find available material to allocated for the sales order. If no material is found, the system backorders the delivery.

The Rules Engine is also used to select the staging lane if none was specified on the pick release window or selected by previously defined dock door appointments. Otherwise, the Rules Engine is used to validate the staging lane.

Replenishment

The Move Order Pick Slip report performs allocation. The Min-max Planning reports specifies the destination subinventory but may not specify the source subinventory. The system uses the Rules Engine picking rules to select the source subinventory, if not already specified, and the source locator. The Rules Engine putaway rules are used to select which locator of the destination subinventory the replenishment should be directed to.

Move Order Issue & Transfer

You can specify different levels of detail on the move order during creation. For instance, a subinventory transfer move order requires only the destination subinventory be specified, but you can optionally indicate the destination locator, source subinventory and locator, or lot or serial details. The Rules Engine fills in any missing details when allocating, with the details already specified acting as additional constraints on the rules.

Move order issues do not have an inventory destination. The rules engine can specify the subinventory or locator, or optionally you can specify the subinventory or locator.

Move order transfers require both a source and a destination.

Picking for Manufacturing

Manufacturing picking tasks are allocated at the same time the task is created. Unlike the other types of tasks, you cannot separate the move order creation and the allocation into two separate processes.

The move order is allocated using the Rules Engine to determine the source of the material. The destination of the material is controlled by attributes on the material requirement. If the supply type is push, (and the supply subinventory is null) then the destination of the move order is a job or schedule, and thus no destination subinventory or locator is determined by the system. If the supply type is pull, the destination of the move order is the supply subinventory / locator defined on the bill. The Rules Engine is used to validate the supply subinventory and locator.

If a supply subinventory is specified, the destination of the move order is the supply subinventory, even if the supply type is push. The supply subinventory must be non-LPN controlled and non-reservable.

Pick Methodology

Various picking methodologies are available to control the way tasks are dispatched. These methodologies are supported for sales order and manufacturing picking tasks. Two ways are available to use pick methodologies. You can set up Pick Slip Grouping Rules that preassign pick methodologies, or you can choose the pick methodologies from the mobile Task Menu.

Pick Slip Grouping Rules

Immediately after allocation, the system groups all lines that are released together according to a pick slip grouping rule. The system assigns the same pick slip number to all lines with the same criteria that are defined in the pick slip grouping rule, and assigns different pick slip numbers to lines that do no have the same criteria. The system dispatches all lines with the same pick slip number in a group, and assigns a single operator assigned to the group.

Some commonly used pick methodologies for sales orders are as follows:

- Wave picking: The system does not group lines by any criteria. The system dispatches an operator one task at a time. The operator must complete the task before the system dispatches the next task.

- Order picking: The system groups all lines for a particular sales order, job, or schedule together, so an operator receives all the tasks required to pick a single sales order, job, or schedule. An operator must complete all the tasks in the group before the system dispatches any other tasks to the operator.

- Zone picking: The system groups all lines for a particular sales order, job, or schedule, and within a particular subinventory together so an operator receives all the tasks required to pick a sales order, job or schedule from a single subinventory.

Because one group per source document per subinventory exists, potentially multiple groupings for the sales order, job or schedule could exist. An operator must complete all the tasks in the group before the system dispatches any other tasks.

- Bulk picking: The system groups all lines that allocate the same item from the same locator into a single larger task, so an operator can pick for multiple sales order or manufacturing requirements in a single operation. Note that these items must then be de-consolidated after the picking process.

A manager can also create pick methodologies based on any number of grouping criteria. Pick slip grouping rule may include criteria that is not applicable to the task for which it is used. For instance, a grouping rule with the job, department, and operation criteria checked may be used during sales order pick release. In this case, the system ignores criteria that is not applicable.

Bulk Picking / Task Merging

Tasks for the same item and revision from the same subinventory and locator are merged together if the item is bulk picked. Bulk picking can be specified either by the pick slip grouping rule / pick methodology on pick release, or the Bulk Picked item attribute on the item definition. In addition there is a concurrent program that allows you to merge picking tasks after task creation. WMS Bulk Task Generation, *Oracle Warehouse Management User's Guide*.

The task merging process, as an extension of the pick slip grouping rules, is supported for manufacturing and sales order tasks. Items that are lot or serial controlled are not eligible to be merged.

Cartonization

The system suggests containers into which the items on the tasks are picked. This allows the picker to pick into the final shipping carton, and is also commonly used for conveyor-based picking where a picker picks a sales order into a tote that is scanned to trigger the next task. Cartonization is grouped by delivery, so lines that are shipped together are grouped together by the system Only sales order and manufacturing picking tasks are cartonized.

Putaway

The system creates putaway tasks in the following two ways. If you turn on pregeneration of putaway the task is created after the receipt transaction is complete. If you do not turn on pregeneration of putaway the task is created after you scan the LPN. The system does not dispatch putaway tasks to you. When you scan the LPN, you receive the putaway task on the device you are signed in to. If you load multiple LPNs for putaway, you can use the `Drop All` option within the Directed Task Menu. If you select `Drop All` the system directs you in the optimal dropping order through the warehouse and enables you to putaway all the loaded LPNs.

Paper Assisted Picking

In some scenarios paper-assisted picking, where the system produces a paper report,

and the operator has the ability to decide which task to perform next, may be useful. Paper assisted picking could be helpful when the operator knows more efficient paths to go from locator to locator that cannot easily be modeled in the system, or if some pick methodology not easily mapped to the methodologies above is required.

Paper-assisted picking is available for all of the material movement tasks, which excludes only cycle counting tasks. You must enter a task number that is provided on the move order report. These reports can be automatically printed as part of the task creation process.

Task Type Assignment

As soon as the tasks are created, the system assigns a task type you define to the task. This task type controls which skill sets are required to perform the task. Equipment may also be required to perform the task, which is captured by the task type. Only operators with the valid skill sets and equipment are dispatched specific tasks.

For all tasks except cycle count tasks, the task type is assigned by the Rules Engine based on any number of criteria you define. You can also define a default task type for each of the System Task Types if more specific rules-based logic is not necessary, or to serve as a fallback task type if the Rules Engine is unable to select a task type.

Cycle count tasks use the first task type you defined in the task types window. Currently, cycle count tasks do not use the Rules Engine to select the task type.

Task type assignment does not assign a task to an operator, but rather assigns a task to a skill set and optionally, equipment item, that is required to perform the task. One or more operators can be qualified to perform this type of task, and the task is not actually assigned to the operator until the operator asks the system to dispatch the next unit of work. Only at this point, or via a manual task assignment from the Warehouse Control Board, is a task associated to a particular operator.

Using Application Program Interfaces for Task Planning

You can also use application program interfaces (APIs) for task planning. You can use APIs to update and delete inbound, outbound, move order and cycle count tasks. You can update the task status, task type, priority, operation plan, and LPN cartonization information. You can also use APIs to split outbound tasks and cancel pending crossdocking tasks.

If you try to update a pending task to queued, you must enter the employee ID of the user to which the task should be queued as an API input parameter. You must verify that the employee ID is valid because the API does not perform any validation checks.

Task Split

The task is split, if necessary, based on the capacity of the equipment required to perform the task. Tasks split in this way receive the same pick slip number, and are grouped together and dispatched to the operator. All material movement tasks are

potentially split based on equipment capacity.

Task Dispatch

All tasks are dispatched when the operator logs into the system and requests a task. The operator receives the highest priority task sequenced by subinventory and locator picking order, based on where the operator is currently located. You can assign task priorities manually via the Warehouse Control Board.

All of the system task types can be interleaved. For example an operator could perform a sales order pick, followed by a move order issue task, followed by a pick for a manufacturing job, and then back to a sales order pick. Essentially, interleaving can be controlled by the task types. If qualified, the operator is dispatched the next task regardless of the task type. However, in cases where the system assigns a groups of tasks to an operator, such as via cluster picking or pick slip grouping rules, the system directs the operator to complete that group of tasks before it assigns additional tasks of potentially different system task types.

Sales Order

Sales orders have an additional feature to control how to interleave sales order tasks across the pick release waves. You can interleave Sales order picking tasks across pick release waves so the highest priority task in any wave is dispatched first. You can also segregate tasks by waves, so an operator is not dispatched any task from a later wave if the operator is qualified to perform any task on an earlier wave, regardless of task priority or subinventory / locator picking sequence. This behavior is controlled by a profile option WMS: Sequence Picks Across Waves.

Task Load

An operator can load or drop a task. Loading a task indicates the material was loaded to equipment or a person. An operator can load additional tasks or drop the loaded tasks when ready.

Cycle count tasks are not material movements, and thus cannot be loaded. Move order issue tasks issue material directly to a destination account in a single operation, and thus loading these tasks is not supported. All other tasks can be optionally loaded.

Task Drop

Task drop confirms the material is moved to the final destination, which may be a staging lane, job or schedule, supply subinventory, account, or normal subinventory or locator. The material transaction is completed only after the task is dropped. All material movement tasks support task dropping.

Defining Pick Methodologies

Pick methodologies refer to the different ways that you fulfill a group of orders. For example, you might select to pick an order by itself, or to pick multiple orders at the same time. The type of picking methodology you use depends on the kinds of operations you run in the warehouse. For example if you have a high volume warehouse that is concerned with picking speed, you may not choose to use bulk picking.

Oracle Warehouse Management supports the following pick methodologies:

- Order picking: The system assigns picks for one order, job, or schedule at a time to a user. When a user accepts a task for the first line of a job, schedule, or sales order, the system assigns the user all other picking tasks associated with that job, schedule, or order to the user as well, regardless of the task type or subinventory.

- Wave picking: The system dispatches one task at a time to the user.

- Zone picking: The system assigns picks for a given sales order, job or schedule in a given subinventory to a user. If a user accepts a task for the first line of a sales order, job, or schedule, the system assigns the user all other lines on that sales order, job, or schedule that are sourced from the same subinventory.

- Bulk picking: The system groups tasks to pick the same items that are sourced from the same locator so you only see one task that might represent picks for several order lines. Deconsolidation of order lines occurs at pick drop. Oracle Warehouse Management automatically splits bulk tasks based on equipment constraints during pick release. You can choose to bulk pick items at pick release via the pick slip grouping rules, or choose to use the concurrent program to bulk pick across pick waves after pick release. You can also bulk pick within a delivery or across deliveries. The following bulk pick exceptions apply:

  - The system does not allow bulk picking for cartonized items

  - The bulk picked item must be the same revision

    Note: You cannot merge tasks with allocated LPNs with any other tasks. If you want to use bulk picking, you must use an allocation mode that does not allocate specific LPNs.

- Paper-based picking: Users pick according to a paper pick slip that is printed at pick release. This enables a user to dispatch tasks to themselves when working in a paper-assisted environment.

- Pick and Pass/Label picking: The system generates LPNs during cartonization and prints the labels prior to picking. In order to pick, the user scans the LPN and the

system dispatches the picking task associated with that LPN. The user can then pass the LPN to the next user or continue picking all material for the LPN. The system does not prompt the user to drop the LPN in the staging lane until the user picks all of the lines.

- Cluster picking: The system dispatches a specified number of clusters to a single user. A cluster is all the tasks related to a sales order delivery, or a manufacturing job or schedule. Clusters are comprised of a group of tasks associated to a delivery or cartonization group for a sales order, manufacturing job, or schedule.

- User-defined pick grouping: See:Defining Pick Slip Grouping Rules, *Oracle Inventory User's Guide*.

  In Oracle Warehouse Management, you set up pick slip grouping rules to specify different ways where a warehouse might choose to fulfill a groups of orders. For example, warehouse operators might choose to pick an order across multiple subinventories, or they might decide to pick by bulk. Pick slip grouping rules enable warehouse managers to specify the type of picking methodology used to pick orders.

Labeling

The entire picking and putaway processes are integrated with label printing. Several business flows are integrated into the picking and putaway processes and are triggered automatically by specific transactions. The business flows are as follows:

- Pick Load: The label request is created when an operator selects Load or Drop in the Pick Load page for sales order tasks.

- Pick Drop: The label request is created when an operator completes the drop transaction for sales order tasks.

- WIP Pick Load: The label request is created when an operator selects Load or Drop in the Pick Load page for all manufacturing picking tasks.

- WIP Pick Drop: The label request is created when an operator completes the drop transaction is for manufacturing picking tasks.

- Cartonization: The label request is created during pick release for tasks that are cartonized.

- Pick Release: The label request is created during pick release to support Pick UOMs per case or pallet if cartonization is not enabled.

- Cycle count: The label request is created when a cycle count entry is posted.

- Replenishment Load: The label request is created when an operator selects Load or

Drop in the Pick Load page for all replenishment tasks.

- Replenishment Drop: The label request is created when an operator completes the drop transaction for replenishment picking tasks
- Putaway Drop: The label request is created after the operator completes the drop transaction for putaway.

Operation Plans

Operation plans control the routing and behavior of individual tasks through the warehouse. Operation plans are automatically assigned to tasks when initially created, using the Rules Engine.

Sales Order

The system assigns one of eight predefined operation plans during pick release to sales order or internal order tasks. You can use the operation plan selection rules via the rules engine, or accept the default from the Warehouse Parameters window to assign the operation plans. The plan controls if and how to default LPNs when the operator drops sales order tasks in the destination locator thereby aiding in delivery consolidation.

Inbound

You can set up inbound operation plans using the Operation Plan Setup Window. See: Advanced Task Framework Concepts, page 5-1.

Task Planning

When the system creates tasks, they can be dispatched immediately, or at a later time. You can hold back tasks to manually prioritize, assign, and group tasks as required, and then release smaller groups of tasks to be performed by certain individuals or groups of operators. In this way, and using some of the summary features of the Warehouse Control Board, you can exert tighter control over the work performed in the warehouse.

Warehouse Control Board

The Warehouse Control Board provides visibility to the following information to all tasks performed in the warehouse.

- Task Details
  - Dispatch information,
  - Load information

    - Completion information

- Operator who performed the task
- Task exceptions

You can use the Control Board to create and save actions to perform on tasks such as manage task priorities, control task assignments, and cancel crossdocking tasks. You can also optionally override the qualifications of an operator to which you assign the task.

Finally, the Control Board also provides summary statistics that allow you to monitor labor productivity and equipment utilization within the distribution center. Additional summary statistics can be reported on groups of tasks, so the total weight or volume required for the tasks, or the total expected time required to complete those tasks can be estimated.

Task Management Setup

Task management setup includes the following tasks:

Set Up Warehouse Employee Resources

For the system to capture the skill set of each user, and then use this information to dispatch tasks to qualified users, each user defined in the system must be associated with an employee defined in Oracle Human Resources.

> **Note:** Only one person can be logged onto the mobile user interface, with one user name at a time. Therefore, users that will be using the system concurrently cannot share a user name.

Oracle Warehouse Management enables you to define the types of employees who work in the warehouse. The BOM resources entity is used to capture the skill sets of employees required to perform a specific task. For each task that requires a unique set of skills, define a new resource. However, if the same set of skills can be used to perform a variety of tasks, you do not need to define individual resource types. In this case, a single resource type will suffice. See: Defining a Resource, *Oracle Bills of Material User's Guide*

Set up or Verify Equipment Items

Equipment, such as forklifts, pallet jacks, and so on are used to perform tasks in a warehouse. In WMS, you set up equipment as a serialized item and a BOM resource, see, Defining Items, *Oracle Inventory User's Guide* and Defining a Resource, *Oracle Bills of Material User's Guide*. Users sign on to the serial number of the equipment and are then dispatched tasks appropriate to that equipment.

To set up equipment for use with WMS, you must do the following:

- Define the equipment as an item
- Define the item as an equipment type
- Specify the equipment as serial controlled (predefined)
- Enter the equipment's capacity (optional)
- Generate serial numbers for the individual pieces of equipment

Setup Equipment Resources

After you set up equipment items, you must set up the equipment types as resources. You use the BOM resources window to setup equipment resources see: Defining a Resource, *Oracle Bills of Material User's Guide*. Equipment resources represent types of equipment. For example, you might have several items that all perform the same function and can be used interchangeably. In this case, you could create one resource and then associate each similar piece of equipment under that resource.

Set Up Warehouse Task Types

Each task generated by the system for dispatch to a user must have a task type. Task types are user-definable through the BOM Standard Operations window see: Creating a Standard Operation, *Oracle Bills of Material User's Guide*. For each task that requires a unique combination of human and equipment type resources, a new task type should be created. You must enter a task type in the task type field.

> **Note:** Available system task types are Pick, Putaway, Cycle Count, Replenish, MOXfer (Move Order Transfer), MOIssue (Move Order Issue), Inspection, and Staging Move.

> **Note:** WMS requires that, at a minimum, you set up at least one pick and one replenishment task type. In addition, one cycle count task type can be defined if cycle counts should be dispatched as tasks. Do not define more than one cycle count task type for the organization.

You must also assign operation resources to the task type, enter one human resource per task type and at most, one equipment resource. Every task requires exactly on human resource, but the equipment resource is optional. See: Defining a Resource, *Oracle Bills of Material User's Guide*

Set Up Departments

A department represents a grouping of similar resources within a warehouse. For example, all of the employees and equipment that perform picking tasks might be grouped together in the Picking department.

To use the task management system, you must set up at least one department. To use a human and equipment resource to perform the same task, each must be defined to the same department. Therefore, you should not implement separate departments for equipment and human resources. For information on defining departments See: Defining a Department, *Oracle Bills of Material User's Guide*

Set Up Task Type Attributes

The User Task Type Attributes window enables you to specify a task type, pick load page type, and if you should honor the pick UOM you specified on the Subinventory window. If you choose to honor the pick UOM, then you can print shipping contents labels by case or pallet for the pick release business flow if you do not enable cartonization.

Related Topics

Overview of Task Planning, *Oracle Warehouse Management User's Guide*

Defining Resources, *Oracle Bills of Material User's Guide*

Physical Attribute Group, *Oracle Inventory User's Guide*

Defining Resources, *Oracle Bills of Material User's Guide*

Creating a Standard Operation, *Oracle Bills of Material User's Guide*

Implementation

In order to use the task management features, you must define several different entities. Some of these steps are optional, while others are required for some of the system task types. However, you must define at least one task type must for each of the system task types (Pick, Replenishment, MO Issue, MO Transfer, Cycle Count) in order to automatically have those tasks dispatched. Some of these steps, such as defining employees and defining users, are performed as part of the common installation steps.

The following table lists the steps for setting up task types:

Task Type Setup

Step	Required
Define Employees	Yes
Associate Employees to Users	Yes
Define Equipment Items	No
Define Equipment Instances	No
Define Resources	Yes
Define Department	Yes
Define Task Type	Yes
Define Task Type Rules	No
Define Default Task Types	No

Though defining task type rules and defining default task types are optional, you must perform at least one of the steps.

Prior to defining entities, you must identify the task types to be used in the warehouse. Use the following questions to help define task types:

- Beyond the five system-defined task types that differentiate the tasks by the type of document that originated the task, what criteria are used to differentiate who is qualified or what equipment is required to perform a task? This helps determine what task types should be defined.

- Do operators typically work with one or two pieces of material handling equipment all day, such as a dedicated fork truck driver? If so, then equipment resources should be defined. Or do they typically switch equipment frequently, grabbing whatever equipment they need to do the task? If so, then it may not even be necessary to define equipment resources because operators are already deciding which equipment to get based on the task attributes.

- Are there different classes of material handling equipment in the warehouse, such as a pallet jack, fork truck, or cart? Are these classes broken down even further, perhaps by weight capacity, or by material handling properties? Can only some equipment be used for refrigerated or hazardous items? Is some equipment

required to reach certain areas, such as high racks, in the warehouse? This helps determine what equipment items should be defined and how they should be associated to task types.

- Are different operators trained to operate different pieces of equipment, or move different classes of items, or are all operators qualified to move all material? This helps determine what manual resources should be defined and how they should be associated to task types.

Though task types are set up to model skill sets and equipment required to perform tasks, they can also be used to selectively restrict tasks to operators. Operators can elect to perform tasks in the refrigerated cooler in the morning, and tasks in the freezer in the afternoon, as directed by you the manager, and controlled by the equipment the operator signs on to.

In addition to defining task types, you must define Transaction Reasons if exceptions to tasks, such as picking less than the allocated quantity or picking from a different locator than suggested, are allowed. See: Overview of Transaction Reasons, page 9-21 for implementation details on defining Transaction Reasons and the associated workflows.

Define Employees

In setting up skill sets, you assign a particular employee to resources, which effectively means the employee has the skill sets to perform specific tasks. You must define this employee to set up resources.

Employee information is maintained by Oracle Human Resources. If Oracle Human Resources is installed, an employee can be defined and maintained from the Enter and Maintain People window in HRMS Manager responsibility. If Oracle Human Resources is not installed, you can access the same window via the Warehouse Manager responsibility. See Entering a New Person, *Managing Your Workforce Using Oracle HRMS (US)*.

Associate Employees to Users

When signing on to the mobile devices, an operator indicates a user name and password. The user name is associated to a specific employee, and in turn, to the skill sets the operator has, by means of this step.

After creating a mobile user and providing it with the appropriate responsibilities, associate the employee defined in the previous step to this user.

There can be more than one employee with the same employee name and number, but belong to different Operating Units. Verify the employee selected belongs to the correct Operating Unit for the responsibilities.

Define Equipment Items

Equipment items are a specific type of equipment required to perform a task type. They

are used to restrict the tasks dispatched to a particular operator based on the equipment with which the operator has logged on. Equipment capacity is also used to split tasks, if the weight or volume of the task exceeds the weight capacity or volume capacity of the equipment that is required to perform it. Typically, equipment items are the model numbers of the equipment used in the warehouse. Examples of equipment items include Komatsu K4300 forklift 2-ton fork, Yale Y4000 2-ton lift, or Caterpillar C3600 high-reach fork truck.

Equipment items are optional resources on a task type. This step is only required if the operator should be required to sign on to particular equipment to get specific tasks.

Equipment items are defined from the Master Items window, as equipment items are simply serialized inventory items with several additional attributes. Ensure the Vehicle check box is enabled, and that the item is defined as serial at receipt, or serial predefined. You must assign the item to the organization in which it is used. Additional optional attributes include the equipment capacity, specified by entering a maximum load weight and internal volume. Ensure the units-of-measure that are specified for these two attributes are in the same unit-of-measure class that is used to specify the weight and volume of the items.

Define Equipment Instances

The specific pieces of equipment in each warehouse are modeled as serialized instances of equipment items. For instance, there may be 15 2-ton forklifts in a particular warehouse. Because these forklifts have the same make and model and are therefore interchangeable on the warehouse floor, they have been defined using just one equipment item. Serial numbers must then be generated for the 15 different instances. It is these serial numbers, associated with a particular equipment item, which the operator is logging on to. This step is only required if equipment items have been defined.

Serial numbers can be generated either via the desktop concurrent request to generate serial numbers, or via miscellaneous receipts of the equipment items. Equipment items can be on-hand, but that the task management processes do not require that it be on-hand, nor do they perform or require any material movements of the equipment item.

Define Resources

Resources are used to model the equipment and employee skill sets. Two different types of resources are used to model task types: manual and machine, or rather, operator and equipment. Resources group the employees or equipment items into sets where every instance on that set is considered equivalent.

To define manual resources create a resource name and indicate the type as Manual. You can assign the employees defined earlier to that resource. All the employees assigned to a resource are considered interchangeable, so any one of the employees on a resource can perform a particular task. Different manual resources might be a 2-ton forklift operator, forward picker, hazmat handler, or cycle counter.

To define equipment resources create a resource name and indicate the type as

Machine. You can assign the equipment items defined earlier to that resource. Equipment items assigned to a resource are considered interchangeable, so any serial instance tied to an equipment item on a resource can perform a particular task. Different machine resources might be a 2-ton forklift, small cart, or hazmat forklift.

Define Departments

Departments break resources into logical groups. One department may be defined for hazardous material handling, while a second department may be defined for miscellaneous material. Or one department may be defined for picking, and another for replenishment. You can assign resources to one or many departments, and departments include both manual and machine resources.

Define Task Types

User-defined tasks types set the skill sets and optionally, equipment, required to perform a task. Each task type you define is associated with exactly one manual resource and either one or zero machine resources. The task dispatching engine dispatches tasks to operators qualified to perform that particular task. You must associate the task type with a department and with a system-defined task type. You must define at least one user task type for each system task type in order to use task dispatching for that system task type.

Define Task Type Rules

Task type assignment rules determine the user-defined task types to assign to each task. You use the Rules Definition window to create Task type assignment rules. However, unlike picking and put away rules, task type assignment rules do not have strategies, or strategy assignments.

Each task type assignment rule has both restrictions and a return value. The return value is the user-defined task type that should be returned when the restrictions are met. The restrictions indicate the requirements that must be met, such as the quantity of the task or the source location of the task The rules also are given a weight, which determine the sequence in which the rules are evaluated; higher weighted rules are evaluated first. The task type on the rule with the highest weight for which all the restrictions are met is stamped on the task.

You do not have to define Task Type Assignment Rules if default task types are defined at the organization level. You can use rules and organization defaults to ensure a task type is always assigned.

Define Default Task Types

If no task type is assigned after evaluating all the task type assignment rules, or if no task type rules exist, the system checks for the default task types assigned to each system task type on the Organization Parameters window. You do not have to define

default task types if task type rules exist. Both rules and organization defaults can be used to ensure that a task type is always assigned.

Transaction Reasons

Transaction Reason Actions provide you with an alternate customizable flow to handle exceptions. For example, you may try to pick from a location that differs from the system suggested locations because you are unable to reach the suggested locator. The system prompts you for a reason. You can associate this reason with a workflow process, which automatically executes.

Transaction Reason Functional Business Flow Description

Transaction Reasons enable you to record and monitor exceptions to tasks. You must enter exceptions when you perform something unexpected during a task. You can optionally associate a Transaction Reason with a workflow process or Transaction Reason Action, which supports customized alternative process flows to automatically handle these exceptions.

The following is an example of a Transaction Reason Action:

- *Transaction Scenario*: You are asked to pick a quantity of three of a particular item from a locator, but when you go to the locator, there is only one item in the locator.
- *Reason for the Exception*: Inadequate quantity in suggested locator.
- *Action:* Execute a Workflow to request a cycle count on the locator.

Transaction Reason Setup

You setup transaction reasons in the Oracle Inventory Transaction Reasons window. See Defining Transaction Reasons, *Oracle Inventory User's Guide*. You can view reasons with an attached corrective action workflow. The workflow initiates upon completion of the task or transaction.

Cycle Count Workflow

The Cycle Count workflow process is seeded with the application. The workflow performs the following steps:

- Cycle Count Reservations: The cycle count workflow creates a cycle count reservation for the discrepant quantity when you initiate the workflow from the pick load page. The discrepant quantity is the difference between suggested task quantity and the actual quantity picked from the location. The reservation prevents the discrepant quantity to be re-allocated to other tasks until you perform a cycle count, and the inventory on-hand balance is correct. The reservation includes the item, subinventory, locator, and as applicable, revision and lot number.

- Generate Cycle Count Entries and Cycle Count Tasks: The workflow schedules a cycle count for the discrepant item and locator, and a concurrent request for generating cycle count entries and cycle count tasks is submitted.

- Alternate Task Generation: The workflow generates an alternate task for the remaining quantity you can not pick due to a pick exception. The system creates an alternate task provided sufficient on-hand quantity exists and can be allocated elsewhere. If sufficient quantity does not exist at an alternate location, the system backorders the remaining quantity.

n-Step Putaway

The application also comes with a second seeded workflow to enable n-Step Putaway. Suppose you have a task to put away or replenish material from location A to location D. You are responsible for picking material from location A, but location D is at the other end of the warehouse and rather than travel the distance, you can drop the material destined for D at an intermediate staging location, called B, and another operator completes the movement from B to D.

In this case, you override the suggested drop location of D by indicating a drop location of B instead. When the system requests an exception reason, you indicate a reason associated with the workflow process of n-Step Putaway. The system automatically generates a task (of type replenishment) to move the material from B to D and automatically dispatches the task to a qualified operator. However, that operator may be able to move the material to location D, or may only be able to transfer the material from location B to location C, which generates another movement task.

Customized Workflows

In addition to the two seeded workflows, you can build your own custom workflows to automatically process any notifications or other exception handling you deem necessary.

Setup Example

Oracle Warehouse Management contains the workflow: *MTL Transaction Reasons Workflow*. This workflow contains over sixty input and output parameters you can use to create a custom workflow process using the Oracle Workflow Builder. Alternatively, you can select either of the two seeded workflow processes attached to this workflow name, *Cycle Count*, or *WMS N Step Putaway*.

To create a reason that automatically triggers a cycle count process when an operator selects the reason from a picking task, create a new record in the Transaction Reasons window. Enter a name such as "Missing Quantity", keep in mind that the display is a mobile handheld device and so the name should be as succinct as possible. The system also displays the description field. This is an optional field during setup.

The workflow type must be set to *MTL Transaction Reasons Workflow*, and the workflow process to *Cycle Count*. Other processes you associate with this workflow name are also

be available here. Be sure to indicate a Reason Type of *Picking*. Only picking, putaway, and replenishment tasks support automatically initiating workflows on exceptions. The Reason Type is used to restrict which reasons you see in each type of transaction or task. Other transactions, such as a material status update, can use and record transaction reasons, but do not initiate any associated workflow.

Testing the Transaction Reason Workflow

Use the following procedure to test the Transaction Reasons workflow:

1. Create and release a sales order for a quantity of three of an item.
2. Use the mobile device to sign on and navigate to the Pick Load Page.
3. In the pick load page there is a task to pick three items. When you reach the field confirm quantity, enter the quantity as one.
4. Select the Drop button instead of the Pick More button, to indicate that you wish to pick only one instead of the original requested quantity of three.
5. The audit page opens. Select the reason associated with the workflow process Cycle Count and select Done to continue.
6. Complete the task, including confirming the suggested drop location and select Done. Verify that the task is completed for the reduced quantity via the Warehouse Control board or the View Material Transactions window.
7. Verify the cycle count for the requested location. Navigate to the cycle manual requests window and enter the default cycle count header name associated with the organization where the quantity discrepancy exists. You should see a request for a cycle count in the Schedule Requests field.
8. Verify the workflow notification was sent.
9. Navigate to the Warehouse Control Board window and verify the creation of the cycle count task and alternate picking task if additional quantity was on-hand and available.

Operation

The following section provides details about how the system dispatches tasks operators and the different processes available to manage the tasks in the warehouse.

Picking Process

Mobile Sign On

In order to receive tasks, an operator must sign on to the mobile device, select the Whse Mgmt responsibility, and navigate to the Tasks menu. After entering the current organization, an operator can optionally enter the equipment serial currently in use, or the subinventory from which tasks should be restricted.

If the operator does not enter any value for the equipment, the system assumes the operator has the necessary equipment to perform the next task. The operator can also enter a value of NONE, which restricts the system to dispatch only tasks that do not require any equipment. For any other value entered, the system dispatches tasks that require a resource equipment type the operator indicates. Although the operator scans or enters the specific equipment item serial number, the serial number is tied to an equipment item, which is in turn linked to a resource, and a task type.

If the operator enters a subinventory, only tasks originating in that subinventory are dispatched to the operator.

Task Menu

There are several ways you can perform tasks in the warehouse. Tasks are divided into two categories, directed tasks and manual tasks. The following section describes all the options available in the tasks menu.

Directed Tasks

The directed tasks option enables you to perform system directed tasks. You can use the warehouse control board to assign a task priority, or optionally set a default task priority at pick release, see Navigating the Warehouse Control Board, *Oracle Warehouse Management User's Guide* and Releasing Sales Orders for Picking, *Oracle Shipping Execution User's Guide*. Directed tasks are grouped under the following categories.

- Interleaved Tasks: Enables you to perform any kind of task.
- Outbound: Enables you to perform sales order and internal order tasks.
- Manufacturing: Enables you to perform work order tasks.
- Warehousing: Enables you to perform replenishment, cycle counting, slotting (move order transfer), and move order issues.
- Directed Move: Allows you to move LPNs.

You can reconfigure the menu structure to group directed tasks to suit your needs.

Accept Any Task

The Accept Any Task option calls the task dispatching engine to retrieve the next optimal task among all the pending tasks that the operator is qualified for. If any tasks are already dispatched or queued to the operator, the next task based on subinventory / locator picking order is then presented to the operator.

If no tasks are currently dispatched or queued to the operator, the following process gets the next task or group of tasks. Tasks are first filtered out based on the manual resources required for the task, the equipment the operator has signed on to, and the subinventory the operator signed in to. The tasks that pass these restrictions are then sequenced based first on the task priority, where higher priority numbers take precedence. The tasks of the highest priority are then sequenced based on subinventory and locator picking order, and the task closest to the operator's last known position based on ascending subinventory / locator picking sequence is dispatched to the operator and presented on the mobile device. Sales order tasks can also be optionally interleaved across pick release batches, or dispatched batch by batch, depending on the setting of the profile option WMS: Sequence Picks Across Waves.

All tasks with the same pick slip number are also assigned to the same operator at this time. When performing tasks with the same pick slip number, the operator is automatically brought to the next task in that group as soon as the previous task is dropped. When the operator completes the tasks in the group, the mobile device displays a message, and returns the operator to the task menu.

From the Accept Any Task option, the operator can completely perform the task, and elect to drop the material directly to the destination for material movement tasks, or if applicable, load the task.

Express Pick

Express Pick is similar to Express Load, except both the pick load and the pick drop are performed in a single operation. The complete task is transacted in a single operation.

Express Load

Tasks dispatched via Accept Any Task require the operator to confirm several details about the task, including the revision, item, source subinventory and locator, and quantity, as well as the lot and / or serial details, as applicable. If the material is packed and comes from an LPN that can be entirely consumed by the task, the confirmation process is simplified. The operator only has to scan the LPN.

The Express Load page is a configuration which requires minimum confirmation of fields. It bypasses all of the confirmation fields, allowing a task load to be confirmed with a single keystroke after confirming the pick to LPN..

Express Load uses the same task dispatching algorithm as Accept Any Task to select the next task to load for an operator.

Cluster Picking

Cluster picking allows a pre-specified number of "clusters" to be dispatched to an operator, to handle scenarios where the operator may be traveling through the picking area with a cart and be able to pick for several sales orders or jobs at once by consolidating the material into a tote specific to the source document.

Clusters are defined by the tasks within a single delivery for sales order picking, or all the tasks related to a single job or schedule for manufacturing. As soon as the operator accepts a task via the cluster picking option, all other tasks for that cluster as well as the tasks from a pre-specified number of additional clusters are assigned to the operator immediately. The system directs the operator to use new LPNs / totes when picking the first task for a new cluster, but to reuse the already existing / loaded totes when picking additional tasks for that cluster. Clusters for manufacturing and sales orders can be interleaved, based on operator qualifications and task type setup.

Pick by Label

The Pick by Label option is applicable to cartonized tasks only. It is primarily used in conveyor-based picking, where a tote passes down a conveyor belt and different operators load material to the tote. Rather than dispatching tasks based on priority, or by a Pick ID, tasks are dispatched by scanning the license plate. By way of cartonization, the tasks have already been associated to that particular LPN. The LPNs are initially placed on the conveyor based on the labels printed during cartonization at pick release.

When the operator scans an LPN, all eligible tasks that should be picked into the LPN are dispatched one after the other based on the picking sequence. The operator performs these picks one after the other into that LPN. Once all picks are complete the operator has the choice of dropping the LPN, or passing it on to the next operator in the queue.

Discrete Picking

The discrete picking option uses the preassigned pick methodology defined by the pick slip grouping rules. All eligible tasks with the same pick slip ID are dispatched the same operator one after the other.

Order Picking

The order picking option dispatches all eligible tasks from the same sales order or internal order to the same operator.

Wave Picking

The wave picking option does not group tasks prior to dispatch to the operator. The system dispatches to the operator the most optimal eligible task one after the other based on subinventory / locator picking sequence and task priority.

Bulk Picking

The bulk picking option does not group tasks prior to dispatch to the operator. The system dispatches individual bulk picking tasks one after the other based on subinventory / locator picking sequence and task priority

Replenishment

The replenishment picking option does not group tasks prior to dispatch to the operator. The system dispatches individual replenishment tasks one after the other based on subinventory / locator picking sequence and task priority

Counting

The counting option does not group tasks prior to dispatch to the operator. The system dispatches individual cycle counting tasks one after the other based on subinventory / locator picking sequence and task priority

Slotting

The slotting option does not group tasks prior to dispatch to the operator. The system dispatches individual move order transfer tasks one after the other based on subinventory / locator picking sequence and task priority

Move Order Issue

The move order issue option does not group tasks prior to dispatch to the operator. The system dispatches individual move order issue tasks one after the other based on subinventory / locator picking sequence and task priority

Move Any LPN

The move any LPN option is applicable to inbound tasks only. It allows putaway of both loaded LPNs and LPNs that are not currently loaded for putaway. It also allows you to transfer contents from the loaded LPN into another LPN, nest the loaded LPN into another LPN, or drop the loaded LPN as is.

Drop Loaded LPNs

This option allows the operator to drop any loaded LPN. The loaded LPN could be either a pick or putaway transaction. If the operator invokes the list of values the system displays only those LPNs the operator loaded. However, the operator can scan LPNs that were loaded by a different operator, and perform drops.

Drop All LPNs

The Drop All LPNs option is applicable to inbound tasks only. It allows putaway of all loaded LPNs that are currently loaded for putaway. It also allows you to transfer contents from the loaded LPN into another LPN, nest the loaded LPN into another LPN, or drop the loaded LPN as is. The system allows the operator to putaway only those LPNs they loaded. One operator cannot drop LPNs loaded by another operator. The system routes the operator through the warehouse in the most optimal dropping sequence.

Staging Move

The staging move is applicable to outbound tasks only. When a task is picked and dropped into a consolidation locator or packing station, an operator can scan these LPNs and the system directs the operator to the appropriate staging lane.

Manual Pick

The Manual Pick option is primarily used in paper-assisted picking environments where the operator dispatches tasks manually, rather than relying on the task dispatching engine to select the next task to dispatch. The Pick ID triggers the Manual Pick option, available from the Pick List printed by sales order pick release, and also available on the Move Order Pick List report for other move orders.

Once a task has been dispatched to an operator manually via Manual Pick, the other task features behave exactly as if the task were dispatched via Acc Next Task, with the exception of pick slip grouping rules. Specifically, the Manual Pick option does not honor the pick slip grouping rules, so that an operator can perform tasks from multiple different groups if desired. However, because the pick slip report breaks pages with each new pick slip number, this can be avoided by process controls, if desired.

The Pick ID is simply the TRANSACTION_TEMP_ID, from

MTL_MATERIAL_TRANSACTIONS_TEMP, and so in the absence of these reports during testing or demo situations, can be accessed either directly from the tables, or from the Transaction Number column on the Warehouse Control Board. in the case of bulk picked tasks, the individual child tasks that are merged to window the parent task are not eligible to be picked via Manual Pick.

Manual Tasks

The manual tasks option allows you to perform manual tasks. The following is a list of manually performed tasks

- Manual Load
- Manual Drop
- Manual Unload
- Inspect
- Paper Based Pick
- LPN Mass Move
- LPN Mass Consolidate

Manual Load

The manual load option is used to load LPNs for putaway. It allows putaway load of LPNs that are not currently loaded for putaway. It also allows you to transfer contents from the LPN into another LPN, nest the LPN into another LPN, or load the LPN as is.

Manual Drop

The manual drop option is used to drop loaded LPNs. This option is not available for outbound tasks. It allows the operator to drop LPNs into any locator of their choice. The system does not direct the operator to any specific locator. It also allows the operator to transfer contents from the LPN into another LPN, nest the LPN into another LPN, or load the LPN as is.

Manual Unload

The manual unload option can only be used on tasks that were picked for outbound transactions. The operator can scan a loaded LPN and perform an unload transaction, reversing the task load and placing the task back in the queue of pending tasks available for operators. Unload returns the material to the source locator in the same state (packed or loose) in which it was loaded. Finally, information about the task can be viewed. Although the Manual Unload page displays only those LPNs the operator loaded, the operator can access other LPNs via this page if the LPN is scanned directly.

Inspect

The inspect option can be used to inspect LPNs received via inbound, and are not currently putaway.

LPN Mass Move

The LPN mass move option is only applicable to outbound transactions. When LPNs are picked and dropped into a consolidation locator, the operator can perform a mass move of these LPNs to a packing locator or a staging lane. The operator scans the source locator and the destination locator to perform the move.

LPN Mass Consolidate

LPN Mass Consolidate enables you to consolidate all staged LPNs for the same delivery residing in the same locator. You can specify the destination LPN and if the destination LPN is new, you must specify the sub and locator also. This locator can be of any one of the three types: staging, consolidation, or packing. For consolidated LPNs that have LPNs across deliveries, the destination locator must be a staging locator.

Paper Based Picking

In some scenarios paper based picking, where the system produces a paper report, and the operator has the ability to decide which task to perform next, may be useful. Paper based picking could be helpful when the operator knows more efficient paths to go from locator to locator that cannot easily be modeled in the system, or if some pick methodology not easily mapped to the methodologies above is required.

Paper based picking is available for all of the material movement tasks, which excludes only cycle counting tasks. You must enter a task number that is provided on the move order report. These reports can be automatically printed as part of the task creation process.

Task Exceptions

Oftentimes, a locator may be unavailable or specific material may not be found as expected. Different types of task exceptions are supported, each of which can trigger a corrective workflow.

Transaction Reasons

You define transaction reasons during the setup process. Transaction reasons link an exception type, such as a Picking exception or a Putaway exception, with a text description and an optional user-defined workflow that can perform a corrective action. For pick load transactions reasons, you can enter a reason context and attach an associated workflow. Defining Transaction Reasons, *Oracle Inventory User's Guide*.

Common types of corrective actions may be placing locators or subinventories on hold if they are damaged, cycle counting an item in a locator if it is short picked, or reallocating an order line if insufficient material was found.

License Plate Matching

In the Pick Load page, an operator can pick packed material, as well as loose material. Packed material is picked by entering an LPN in the LPN / Loc field; to pick loose material, the LPN field is left blank.

When the operator scans the from LPN, the system calls a LPN matching routine. This compares the selected LPN against the requirements of the task in question. The system calls the routine even if a particular LPN has been allocated, in case additional material was packed into the LPN after the allocation occurred.

The matching routine verifies the selected LPN has the allocated item. If the item is revision controlled, the LPN must include the specific revision on the task. If the item is lot controlled, the LPN must include at least one of the allocated lots. If the item is serial controlled and serial allocation is enabled, the LPN must include at least one of the allocated serials. The material that matches the allocation must also be available. Note that this matching routine allows LPNs from different locators to be entered, even though they are not in the list of values for the LPN. But it performs the additional availability check, for which LPNs displayed in the LPN list may then be invalidated.

The matching routine then checks to see if the LPN can be completely consumed by the task:

- If item lot controlled, all lots in the LPN have been completely allocated
- If item serial controlled, all serials have either been completely allocated, or specific serials have not been allocated
- No other items or revisions in the selected LPN

If the LPN can be entirely consumed by the task, the operator does not need to confirm any of the other task details such as subinventory, locator, item, revision, lot, or serial. However, if the LPN can be only partially consumed, then the operator must confirm all the additional details based on pickload page configuration.

If, after selecting the LPN, regardless of whether it was entirely consumed, the task still has remaining quantity to pick, the operator can either continue to pick more loose or packed material from the same or different locator, or can indicate that there is no more material to pick that thus the task is short picked.

The LPN Fields properties can be configured to behave independently for fully consumable LPNs versus partially consumable LPNs and/or loose material. Three scenarios are supported for fully consumable LPNs and one scenario is supported for partially consumable LPNs and/or loose material. These configurations pertain to behavior at the time of retrieving material from a locator and loading it into an LPN. The tables below depict these scenarios and provides allied setup information.

Fully Consumable LPN

Details	Setup
Background: Locator E1.1.1 contains LPN10. LPN10 is fully consumable. Requirement: Get LPN10 As-Is.	All valid setups for Transfer LPN or Into LPN can achieve this. Basically either Transfer LPN or Into LPN is set up as one of these three properties: • Display only, no confirmation · • Show both fields Confirm second with no LOV • Single line Input with no LOV, value defaulted
Background: Locator E1.1.1 contains LPN10 .LPN10 is fully consumable .Requirement: Transfer All contents of LPN10 to LPN20.	Transfer LPN: • Show both fields Confirm second with no LOV OR • Single line Input with no LOV, value defaulted Into LPN: hide fields
Background: Locator E1.1.1 contains LPN10.LPN10 is fully consumable. Requirement:Get LPN10 As-Is and Nest into LPN777.	Transfer LPN: Hide fields Into LPN:· • Show both fields Confirm second with no LOV OR • Single line Input with no LOV, value defaulted

Partially LPN, or Loose

Details	Setup
Background: Locator E1.1.1 contains LPN10 and/or Loose material. LPN10 is partially consumable. Requirement: Move partial contents of LPN10 to LPN20 and/or move Loose material to LPN20.	Either Transfer LPN or Into LPN is set up as one of these two properties: • Show both fields Confirm second with no LOV • Single line Input with no LOV, value defaulted

Pick to LPN (Transfer / Into LPN)

All material movement tasks must be picked to an LPN. This LPN could be the final LPN that is shipped to the customer, an intermediate LPN that is consolidated into a larger shipping container or pallet, or an intermediate tote that is only used to identify the material while the operator is moving it.

If cartonization, is enabled, the system automatically generates the Pick To LPN, as well as the container item that the task should be picked to. This suggestion is displayed in the Pick Load page. If the operator is picking an entire LPN, then the Pick To LPN defaults as the From LPN, meaning that the entire LPN is loaded as is. However, if the task is not cartonized and the operator picks a partial LPN or loose material, the operator enters or generates the Pick To LPN.

For sales order picking tasks, the only restrictions the system enforces are that different deliveries are not commingled in the same Pick To LPN, and that the Pick To LPN is in the correct context when it is used. The valid contexts are Packing Context, and Defined but not Used. This means the following can be used for the Pick To LPN:

- LPN which is currently loaded to the operators equipment for the same delivery
- LPN which has been pre-generated and not yet used
- LPN generated inline using the hot-key

The LPN Fields properties in the pick load page setup can be configured to behave independently for fully consumable LPNs versus partially consumable LPNs and/or loose material. Three scenarios are supported for fully consumable LPNs and one scenario is supported for partially consumable LPNs and/or loose material. These configurations pertain to behavior at the time of retrieving material from a locator and loading it into an LPN. The table below diagrammatically depicts these scenarios and provides allied setup information.

Drop LPN

Sales order picking tasks allow the operator to consolidate individual picking tasks for larger deliveries as part of the Pick Drop process. If deliveries were automatically created as part of the pick release process, or if they were created manually prior to pick release, the Pick Drop page uses the deliveries to group LPNs that should be dropped together. If any operator has already dropped an LPN for the delivery, that LPN will be defaulted as the Drop LPN.

By leaving the Drop LPN as suggested, the Pick To LPN is automatically nested inside the Drop LPN. The operator can also clear the Drop LPN, so that the Pick To LPN is dropped as is, or a new Drop LPN can be generated. Like the restriction on the Pick To LPN, the only restrictions on the Drop LPN are that it does not result in delivery commingling, and that it is in a valid context of Picked or Defined but not Used.

If the LPNs are not consolidated into larger shipping containers, the Drop To LPN can be used to help identify other LPNs in the staging lane near which the current LPN should be dropped, thereby keeping deliveries near each other. This helps streamline the outbound shipping process because a shipper need not search the entire staging lane for missing LPNs.

LPN Contexts

LPN contexts indicate the current LPN state. For instance, an LPN may be in inventory, or it may be in-transit between two organizations. Other contexts include Resides in WIP and Resides in Receiving. Resides in receiving is used for LPNs that have been created and packed, but not yet put away to inventory. Several contexts are used for LPNs as they proceed through the picking process. Specifically, the contexts Packing Context and Picked come up only in reference to tasks.

The Picked context is used to identify LPNs that have been staged for sales orders. These LPNs can only be issued as part of a shipping transaction. They can also be split into smaller LPNs, or merged so long as only LPNs on the same delivery are combined.

The material movement is not processed until the task is dropped; no transaction is recorded for tasks which have only been loaded, though details about the task such as the time at which it was loaded and the operator who loaded the task are recorded.

When a new LPN is generated for a task that is subsequently loaded, the LPN is not packed and does not yet reside in a particular subinventory and locator. These LPNs are given the context Packing Context. This also applies to Pick To LPNs that previously had the context Defined but not Used. When a task is dropped, the LPN is given one of several contexts as follows:

- If the task is dropped for a sales order staging transfer, the LPN is given the Picked context.
- If the task is dropped for any other task to an LPN controlled subinventory, the

LPN is given the context Resides in Inventory.

- If the task is dropped to a non-LPN controlled subinventory, or the task drop issues the material to WIP, the LPN is given the context Defined but not Used so that it can be reused as a tote.
- If the task is issued on a Move Order Issue, the LPN is given the context of Issued Out of Stores.

Warehouse Control Board

The Warehouse Control Board is a desktop-based management tool that enables you to view the tasks pending progress, currently in progress, or already completed, for a particular operator, task type, job, sales order, date, task status, or any number of additional criteria. Task exceptions are recorded and displayed in the Control Board.

Common Problems

1. You receive a message that indicates no tasks are available.

   This could happen for one of many reasons. There could be no tasks pending, or the task could be pending but no task type assigned, or the task type could be assigned, but the operator is ineligible to perform the task. The following helps determine which those three scenarios is the root cause of the problem, and how to resolve the problem.

   First, query the Warehouse Control Board for tasks created by the particular document (job, sales order, move order, etc.) for which tasks were expected. Clear the date fields, and select all statuses. If no tasks are found for that particular document, then the task creation process failed. For material transfer tasks, the most common cause is that the Rules Engine was unable to allocate any material. Please refer to the Rules Engine chapter of this guide for steps on how to debug this problem. Other possibilities are that no replenishments were required, the Restock option on the Min-max Planning Report was set to No, Cycle Counts have already been scheduled for the period, or the release criteria set during pick release were too restrictive and did not pick up the desired lines.

   If tasks have been created, check the task status. The task status should be Unreleased or Pending for any task that has not yet been begun or assigned to a particular operator. If the task status is Unreleased, either task planning was enabled when the tasks were initially created, or a user manually changed the task status to Unreleased. Unreleased tasks are not eligible to be dispatched.

   If the task status is Completed, check the name of the employee that the system believes completed the task; perhaps someone else is also testing concurrently. If the task status is Completed for a sales order task, verify that Auto Pick Confirm was disabled during the pick release batch. Verify that the item is reservable, as

non-reservable items are automatically pick confirmed during sales order pick release regardless of the setting of the Auto Pick Confirm flag.

If the task status is Queued, that means the task has been manually assigned to a particular operator via the Control Board. Either log on as that operator to complete the task, change the assignment to another operator via the Control Board, or set the task status back to Pending, which automatically clears out the operator assignment and make the task available for any operator. However, tasks in status of Queued should still be available via Acc Next Task to the correct operator.

If the task status is Dispatched, that means the task has been assigned to a particular operator by the system based on either pick slip grouping rules or cluster picking. Tasks in status of Dispatched should still be available via Acc Next Task to the correct operator.

If the task is in status Loaded, an operator has loaded the task to his equipment, but has not yet completed the task. The task should be available to be completed from the Current Tasks option of the user who loaded the task. Or any other operator can complete the task by manually entering or scanning the LPN in their Current Tasks page.

If the task is in status Pending, the task should be available to any qualified operator based on the task type that is assigned to the task. Verify the Task Type for the task; if the task type is null, then the Rules Engine was unable to assign a task type and there were no default task types defined in the Organization Parameters window. Verify that the task type assignment rules are enabled. Also, if patches have been recently applied to the instance and task type rules worked prior to the patches, run the concurrent request Generate All Rules. Define default task types ensure that a task type is always assigned to tasks. To continue with this task, manually assign the task to a particular operator in the Warehouse Control board.

If the task is in status Pending and has a task type, but is still unavailable via Acc Next Task, then likely the employee associated with the mobile user is not qualified to perform the task. Check the Resources required for the Task Type; there should be exactly one manual resource, and either zero or one machine resources assigned. Verify the employee name that is associated to the user, and then verify that employee is on the list of valid employees to perform the manual resource. Also, when signing on to the mobile device, leave the Equipment and From Sub fields blank, so that these do not act to further restrict the tasks available to the operator.

If the task status is Active, the task page is currently open in an operators session and thus the system things an operator is currently working on that task. The operator that has that task open will also be displayed in the Warehouse Control board.

2. Some sales order picking tasks are never dispatched

   So long as some operator is qualified to perform the task, the qualified operator should always be dispatched tasks before being given the "No Tasks Available" message, as long as that operator did not sign on to a specific subinventory or sign

on with specific equipment. However, in an active warehouse, there may always be pending picking tasks as pick release is performed daily for new batches and yet it may seem that some of the picking tasks for waves released in previous days do not get dispatched.

Tasks are dispatched in sequence of priority and subinventory / locator picking sequence, and restricted by the operators skill set. Assuming that an operator is qualified to perform all tasks, priorities are never manually assigned, and the operator does not sign on to a particular piece of equipment or a particular subinventory, tasks are sequenced solely on subinventory / locator picking sequence.

If an operator is in one end of the warehouse, based on that picking sequence, additional picking waves are released before the operator completes the previous wave. It is possible the operator may never get to the opposite end of the warehouse because additional were created for locations within the operator's current area. While this ensures an efficient picking path, this also means tasks may be left pending indefinitely as new batches are released. Instead, you may wish that an operator cannot work on any tasks released in a later pick release wave as long as there are tasks still pending in a previous wave for which the operator is qualified.

This is controlled by a profile option, WMS: Sequence Picks Across Waves. This profile option determines whether sales order picking tasks should be sequenced only on priority and subinventory / locator picking order regardless of pick wave, or whether they should be sequenced by wave number, priority, and then subinventory / locator picking order.

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Tasks are dispatched in sequence of priority and subinventory / locator picking sequence, and restricted by the operators skill set. Assuming that an operator is qualified to perform all tasks, priorities are never manually assigned, and the operator does not sign on to a particular piece of equipment or a particular subinventory, tasks are sequenced solely on subinventory / locator picking sequence.

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there are tasks still pending in a previous wave for which the operator is qualified.

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This profile option only affects how sales order picking tasks are interleaved with other sales order picking tasks; if an operator is qualified to perform, say, replenishment or WIP picking tasks, these may be continually dispatched before other sales order tasks if they are continually being created. Therefore, if this continues to be a problem for sales order picking tasks, the operator qualifications or task types should be modified so that sales order picking tasks are not interleaved with other task types.

3. User dispatched a task not qualified to perform

   There are two possible causes that a task for which an operator is not qualified to perform has nonetheless been dispatched to the operator.

   The task may have been manually assigned to a particular operator via the Warehouse Control Board. Manual assignments take precedence over the user task type assigned to the task. However when manually assigning specific operators to tasks, you have the option to indicate the assignment should only be made if the user is qualified to perform the task type, or the assignment should be made regardless of qualifications or skill sets.

4. User task type populated incorrectly

   The most common cause for an incorrect task type is that the task type assignment rules are incorrectly defined. Task type rules are evaluated in sequence of descending weight; the task type on the highest weighted rule for which all the rule restrictions apply (and which has a return value associated with the same System Task Type required for the task) are assigned to the task.

   Verify that the rules are weighted correctly, and that different task type assignment rules do not have the same weight. Also verify that the rules that should be selected are enabled, and run the Generate All Rules concurrent request if patches have been recently applied to the system. Double-check the rule restrictions to ensure that they are encoding the correct rule logic. Finally, verify that the task type that is expected has the correct System Task Type; for instance, a Replenishment task type will never be assigned to a Picking task, regardless of the rule setup.

5. Tasks not consolidated for bulk picking

   When tasks for the same item created by sales order pick release or manufacturing component pick release are not grouped together, as expected for bulk picking, there are several attributes to verify.

   First if the item is bulk picked, verify that the bulk pick flag is enabled on the

organization item, as depending on the implementation, this flag may be controlled at the organization level rather than the master level. Or, if the batch was released with a bulk picking pick methodology, verify that Bulk Picking is, in fact, indicated as the pick methodology on the rule.

Verify that all other attributes of the task are identical. Specifically, only tasks of the same item and revision, from the same subinventory and locator, and assigned the same task type, can be consolidated for bulk picking.

If the task type assigned to the task requires an equipment item with constrained capacity, verify that the consolidated tasks would not exceed the equipment capacity. Tasks are not consolidated if their combined weight or volume would exceed the equipment capacity.

Tasks for which particular license plates have been allocated are not merged with any other task.

6. Tasks not split as expected

   When a task exceeds the equipment capacity by weight or volume, it will be automatically split. If it is split unexpectedly, there are several attributes to verify.

   Verify the equipment capacity and item attributes are defined at the organization item, as depending on the implementation, this flag may be controlled at the organization level rather than the master level. Also, verify that the units-of-measure for both the equipment item weight and volume, and the picked item weight and volume, have been defined, and that they are in the same unit-of-measure class.

   The system splits tasks based on the smallest capacity equipment item of the required machine resource. For instance, if a resource "Small forklift" is required for a particular task type, and three equipment items are assigned to the machine resource defined on the task type have weight capacities of 2000 pounds, 2200 pounds, and 2500 pounds, the original task is split into smaller tasks of 2000 pounds per task.

7. Exiting from a task makes task unavailable to others

   When you enter a task, the task status is updated from Pending to Active. This prevents other operators from accessing the same task. When you exit from a task using the key assigned to the Menu function (defaulted to F2 with the default key mappings), the task is set back to a Pending status, and available for any operator.

   However, in certain situations, the system is unable to rollback the task. Currently, if the mobile device loses the connection but you elect to start a new session, rather than continuing the old session, when you log in to the system, the task remains Active.

8. From LPN list does not include an expected LPN

   The From LPN list of values in the Pick Load page displays any LPN that contains

some of the allocated material in the allocated locator. That is, any LPN that includes at least one of the allocated item, revision, and lot, and if serial allocation is enabled, serial, and resides in the locator selected by the Rules Engine, will be in the LPN list of values. Verify the allocation details of the task and the contents of the license plate.

You can pick LPNs that reside in different locators than allocated may, as long as they also match the allocation details. However, these other LPNs are not displayed in the From LPN list.

9. Invalid LPN message when a particular From LPN is picked

   After selecting a particular LPN, several additional validations are made as follows.

   - The system checks LPN to verify at least some of its contents are allocated, including verifying the revision, lots, and if serial allocation is enabled, serial numbers contained.
   - Material statuses of the contents are verified to ensure that at least some of the contents may be picked.
   - Availability of the contents are verified to ensure that the contents are available and not allocated or reserved to another requirement.

10. Invalid LPN message when a particular Pick To LPN is specified

    The Pick To LPN must meet several restrictions. It must either be loaded by the operator for the same delivery, or have a context of Defined but not Used. You can generate a new LPN via a hot-key, or the desktop concurrent request. If you do not generate a new LPN the From LPN defaults as a valid Pick To LPN if the LPN entered as the From LPN was entirely consumed by the task. No other LPNs can be used as the Pick To LPN.

11. Invalid LPN message when a particular Drop LPN is specified

    You can specify the Drop LPN for sales order picking tasks. LPNs cannot commingle deliveries at any level of nesting. Only LPNs picked for the same delivery, new LPNs generated via a hot-key or LPNs that reside in the context Defined but not Used, can be used as a Drop LPN.

12. Task type assignment rule cannot be compiled see:System Rules Engine, page 3-1

Frequently Asked Questions

1. What do the different task statuses mean and how are they dispatched?

   The seven task statuses, are:

- *Unreleased:*The system created the task, but it is not yet eligible for dispatch. Tasks are generally created in this status because you want to exert additional control over exactly when tasks are released. You can update tasks in this status to Pending to make them eligible for dispatching, or directly to Queued. The system creates tasks in this status when you check Plan Tasks on the Pick Release window.

- *Pending:*The task was created and can be sent to any available operator. The system dispatches pending tasks based on priority, and sequences tasks based on subinventory picking order and locator picking order in relation to the operator's last-known position. The system then filters tasks by task type, current operator equipment, and subinventory.

- *Queued:*You manually assigned a task to a particular operator in the Warehouse Control Board. The system assigns queued and dispatched tasks to operations based on task priority. The system then sequences the tasks based on subinventory picking order and locator picking order in relation to the operator's last-known position.

- *Dispatched:*The system assigns the task to an operator as part of a group of tasks because of pick slip grouping rules or cluster picking. The system dispatches the tasks based on priority, and sequences the tasks subinventory picking order and locator picking order in relation to the operator's last-known position. You cannot update dispatched tasks on the Warehouse Control board. When an operator cancels an active task in the same cluster, the rest of the tasks revert to status pending.

- *Active:* This is the task on which the user is working. The task is rendered to the user's mobile device, but the user has not selected either the `<Load>` no `<Load & Drop>` button. As soon as the operator either loads or drops the task, the status changes.

- *Loaded:*A particular operator has loaded the task, but the system has not posted a material transaction. To complete the task, the operator must drop the task.

- *Completed:*An operator has transacted the task, and the material transaction has posted.

The task the user is currently working on is in the statuses Dispatched and Queued only. The system groups tasks by pick slip number, clusters order number, and cartonization ID depending on which pick method or menu entry the operator uses.

2. Is task interleaving supported?

   Task interleaving is when tasks of different types are dispatched to an operator to minimize deadheading and take advantage of the current operator location. For instance, if, after loading a picking task, a cycle count needs to be performed in an

adjacent locator, the operator should perform the cycle count first before leaving the area.

Oracle Warehouse Management has full support for task interleaving. Tasks are dispatched to an operator based on skills and equipment required for the task, operator capabilities, and grouping rules. Beyond these restrictions, tasks of any type are dispatched to operators based on priority and subinventory and locator picking order. Cycle count, picking, replenishment, and requisition move order tasks can be interleaved.

3. How is wave planning supported?

   Wave planning refers to the process by which sets of outbound sales order tasks are grouped, released, and executed. For example, if an organization performs primarily parcel shipments, there may be one daily UPS departure in the afternoon, and one daily FedEx departure in the morning. Sales orders that must be shipped via UPS may be released several times throughout the day, while FedEx orders may be released just once, early in the morning.

   You can schedule the pick release process, which creates tasks for the outbound shipments, with certain parameters. You can set several release rules the system automatically performs every day at predefined times.

4. Are tasks assigned to specific operators?

   When tasks are created, they are not assigned to specific operators. Rather, a task type is assigned to operators, which represents the skill set the task requires. The task type has an associated set of operators and optionally, a set of equipment, any instance of which are equally qualified to perform the task. The system dispatches tasks when the operator indicates they are ready for the next task.

   At the point of accepting a task, it is possible for several tasks to be assigned to a single operator, based on the current pick slip grouping rules. All tasks with the same pick slip number are dispatched together as a group. In addition, it is always possible to assign a task directly to an operator via the Warehouse Control Board.

5. Can tasks be automatically pick confirmed?

   Auto pick confirm, an option that can be specified on the pick release batch or controlled for the organization on the shipping parameters window, automatically confirms the move order as allocated without any manual intervention. Auto pick confirmation is supported in a Oracle Warehouse Management organization.

   However, only loose material is picked, and moved to the staging lane loose, unassociated with any license plates. Both cartonization suggestions and LPN allocations are not honored if the task is automatically pick confirmed. Only loose material is selected even if LPN allocation has been used. If auto pick confirmation is enabled, the subinventories from which material is allocated should not be LPN controlled. Otherwise, when attempting to confirm the move order, the system may drive loose on-hand quantities negative or the transaction may error, depending on

the organization parameter for negative balances.

You can complete the ship confirmation process on the desktop Shipping Transactions window or on the mobile Quick Ship page. Note that neither LPN Ship nor Dock Ship will be available for auto pick confirmed lines, because both of these shipping processes are driven by the LPN.

The Oracle Warehouse Management Control board does not include auto pick confirmed move orders. Also, note that as is also the case for inventory organizations, serialized items can only be automatically pick confirmed if serial allocation is enabled; otherwise the system does not know which serials to transact.

6. Can nested license plates be picked?

   Oracle Warehouse Management supports nesting license plates to any number of levels. However, only innermost license plates, that contain only loose items and not other license plates, can be picked. This means an item is stored in cases and pallets, where a case is modeled as an LPN and a pallet is a nested LPN that contains many case LPNs. You can confirm a task for that item by scanning one or several case LPNs, which would automatically unpack the case from the pallet before moving it to the staging lane. But a larger task could not be confirmed by scanning the pallet LPN label, as that license plate is not the innermost level.

7. What attributes must tasks share in order for them to be merged?

   Tasks can be merged for bulk picking if the item is marked as bulk picked, or pick release is performed with a bulk picking pick slip grouping rule. However, several other criteria of the items must also be shared. The tasks must be for the same item and revision, and be allocated from the same subinventory and locator. Also, specific LPNs may not be allocated for the particular task. Tasks with LPN level allocations are not merged. However, tasks for different lots or serials may potentially be merged.

8. I can populate a reason code in tasks and transactions, as well as during material status updates. Will all of these initiate the workflow?

   Only task exceptions initiate the corrective action workflow. Transactions and material status updates do not initiate a workflow process.

9. What changes can I make in a dispatched task?

   You can change the subinventory and locator, and reduce the picked quantity. You cannot change the lot or, if enabled, the serial number.

10. Does Oracle Warehouse Management populate the workflow attribute *serial numbers* for picking and putaway exception handling

    The attribute *serial number* is no populated.

Debugging Tools

The following table shows the Oracle Warehouse Management task type value for each of the system defined task types:

System Task Type	Warehouse Management Task Type Value
Pick	1
Putaway	2
Cycle Count	3
Replenish	4
Move Order Transfer	5
Move Order Issue	6

Debugging Notes

The seeded workflow processes, *Cycle Count* and *WMS N Step Putaway*, should always show up in the Workflow Process field in the Transaction Reasons window after the Workflow Name *MTL Transaction Reasons Workflow* has been selected. However, if a custom workflow process you have developed does not show up in this field, there are several things you can check.

You may not have saved the workflow process properly in the wf_runnable_processes_v table. The LOV query for the workflow process is:

```
SELECT DISPLAY_NAME, PROCESS_NAME, ITEM_TYPE
FROM WF_ RUNNABLE_PROCESSES_V wf, MTL_TRANSACTION_REASONS mtr
WHERE wf.ITEM_TYPE = MTR.WORKFLOW_NAME
```

Also if needed, the LOV query to obtain the workflow name:

```
SELECT DISPLAY_NAME, DESCRIPTION, NAME
FROM WF_ITEM_TYPES_VL
```

If the workflow is visible in this window and you are able to assign it to a transaction reason, but the process did not execute, be sure you associated the reason with both a workflow name and workflow process, and that the user entered the correct reason. The system needs both the workflow name and process to execute the workflow.

When using the seeded *Cycle Count* workflow process, if the system sends a notification

but does not request a cycle count, it is possible you did not define the default cycle count header on the organization parameter window.

Customization

Oracle Warehouse Management supports customization of new workflow processes. Only new workflow processes created under the workflow *MTL Transaction Reasons Workflow* are supported. You can use the Oracle Workflow Builder to view the attributes and descriptions.

Workflow processes execute when the system prompts you for a *Reason* on the mobile device during task execution only. The *Reason* field appears in the following scenarios:

- Pick Load Page: when confirmed quantity is different from suggested quantity.
- Pick Load Page: when confirmed location is different from suggested location.
- Pick Drop Page: when confirmed location is different from suggested location.
- Putaway Drop Page: when confirmed quantity is different from suggested quantity.

> **Note:** Although the Update Status Page requests that the user enter a reason, it does not execute a workflow.

The executed *MTL Transaction Reasons Workflow* workflow processes always have the following attributes:

- Reason Id
- Calling Program Name
- Source Organization Id
- Reason Name

The following paragraphs contain the default attributes for the associated *Reasons*.

Other than those attributes described below, the remainder of the attributes in the workflow may or may not populate depending on the transaction. For example, the *destinationorganization* attribute populates only if a putaway is done for an inter-organization transfer.

Populating the Item Attributes

The following are applicable for both picking and replenishment tasks:

- When the confirmed quantity differs from the suggested quantity. The attribute Transaction Quantity populates with the quantity actually picked.

- When the confirmed location differs from the suggested location. The attributes Destination Subinventory and Destination Locator populate with the new Subinventory and Locator respectively.

The following is applicable for both picking and replenishment tasks:

- When the confirmed location differs from the suggested location. The attributes Destination Subinventory and Destination Locator populate with the new Subinventory and Locator respectively.

The following are applicable for putaway tasks.

- When the confirmed quantity differs from the suggested quantity. The attribute Transaction Quantity populates with the actual putaway quantity.

- When the confirmed location differs from the suggested location. The attributes Destination Subinventory Destination Locator populate with the new Subinventory and Locator respectively.

Task Type Rules

This script identifies the applicable task type assignment rules called for a particular task. The following query displays all enabled task type rules for the selected organization or made common to all organizations. You must enter the numeric value for the system task type and the three-character organization code.

```
select wrb.rule_weight as weight,
wrt.name as name,
wrt.description as description,
operation_code as user_task_type,
ml.meaning as system_task_type
from wms_rules_tl wrt, wms_rules_b wrb, mtl_parameters mp,
bom_standard_operations bso, mfg_lookups ml
where wrt.language = 'US'
and wrt.rule_id = wrb.rule_id
and wrb.type_code = 3
and wrb.organization_id in (mp.organization_id,-1)
and mp.organization_code = &org_code
and wrb.enabled_flag = 'Y'
and bso.standard_operation_id = wrb.type_hdr_id
and bso.wms_task_type = &wms_task_type
and bso.wms_task_type = ml.lookup_code
and ml.lookup_type like 'WMS_TASK_TYPES'
order by wrb.rule_weight
```

10

Counting

This chapter covers the following topics:

- Overview of Cycle Counting
- Cycle Counting Setup
- Setting Up Opportunistic Cycle Counting
- LPN Related Counts
- LPN Discrepancies
- Serial Counts
- Overview of Physical Inventory
- LPN Related Physical Inventory Counts
- Common Problems
- Debugging Notes
- Frequently Asked Questions

Overview of Cycle Counting

Cycle Count functionality has always been a integral part of Oracle Inventory. Cycle counting is the process of periodically counting individual items to ensure accuracy of inventory quantities and value. With Oracle Warehouse Management, this functionality has become more user friendly, less time consuming, and more accurate. The most significant improvement is in the way the actual count is entered and the flexibility in entering the count. In an Oracle Warehouse Management enabled environment the Mobile Radio Frequency (RF) devices essentially provide a new interface for the same cycle count transactions that were formerly performed on the desktop. Counts are recorded immediately in the database. The latency between when the count is recorded on paper and entered in the system has been eliminated. Counts are automatically matched to the cycle count request; if no match is found, an unscheduled count (if allowed) is created. This direct entry eliminates the need for a data entry clerk to type in

the cycle count values, simplifying the process and making it less error-prone. Also, when License Plate Numbers (LPNs) are entered, either the entire contents of the LPN can be verified or the LPN can be recorded as on-hand and all the contents are assumed present.

With Oracle Warehouse Management, cycle counts are dispatched as tasks. This chapter will give you a very high level overview of how to utilize the Cycle Count Task Dispatching functionality to perform cycle counts. The entire process of counting with Oracle Warehouse Management remains the same as in Oracle Inventory except that the scheduled counts are dispatched as tasks. Users who are eligible to perform these tasks will be the only users that will see these tasks. There are some additional Oracle Warehouse Management set up steps that are required so that the task infrastructure can be utilized for this purpose.

Functional Business Flow Description

The business flow of a Cycle Count is outlined below:

1. Set up and schedule a Cycle Count through the desktop forms
2. Dispatch Cycle Count Task (optional)
3. Perform the cycle count and enter the count results through the mobile interface either from the regular Cycle Count menu or in the form of Cycle Count Tasks. (Optionally, counts can be recorded on paper and entered from the desktop)
4. Approve the counts and adjustments through the desktop forms
5. Run reports through the desktop forms

Set up, defining, scheduling, and generating Cycle Counts is done from the desktop forms. While all these desktop forms are available from the Warehouse Manager responsibility, the actual scheduling process has not changed with Oracle Warehouse Management. There are some new fields and options in the Cycle Count Header form. Details can be found in the Functional Area section of this guide.

Once a Cycle Count is scheduled and generated to be counted, the operator can log onto the mobile device and is now ready to perform the count. At this point the user has performed all the task set up required to utilize Cycle Count Task Dispatching. The user navigates to the Task menu to perform the count. If the Task set up is not done the user will have to go the regular Cycle Count menu to perform the count. All other fields, such as item, subinventory, and locator, are scanned using the mobile RF device. If the count does not allow unscheduled entries, all fields will be limited to what has been scheduled. If Cycle Count allows unscheduled entries, for example if no match is found, the system automatically creates an unscheduled entry. Such entries can only be made from regular Cycle Count menu or the Desktop forms.

After the count has been performed, a manager can approve, reject, or send for recount those count entries that fell outside of the tolerances defined on the Cycle Count. These

adjustments are immediately posted to the accounts indicated on the Cycle Count once they are approved.

Related Topics

Overview of Cycle Counting, *Oracle Inventory User's Guide*

Cycle Count Functionality

This section details the Cycle Count functionality.

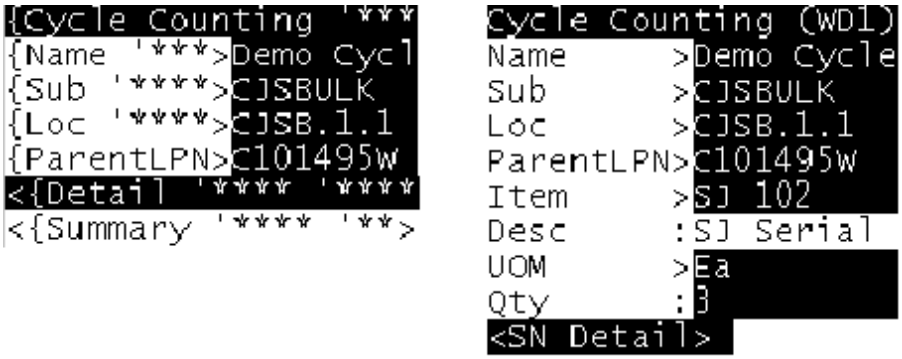
You can define and maintain an unlimited number of Cycle Counts in Oracle Inventory. For example, you can define separate Cycle Counts representing different sets of subinventories in your warehouse.

There are five steps to performing a Cycle Count, though the only steps that have changed in the process are seen when defining the Cycle Count (additional options have been added for counting LPNs, entering the counts performed on the mobile device instead of the desktop, and setup required to utilize task dispatching of the counts). All other steps remain unchanged from Oracle Inventory prior to Oracle Warehouse Management.

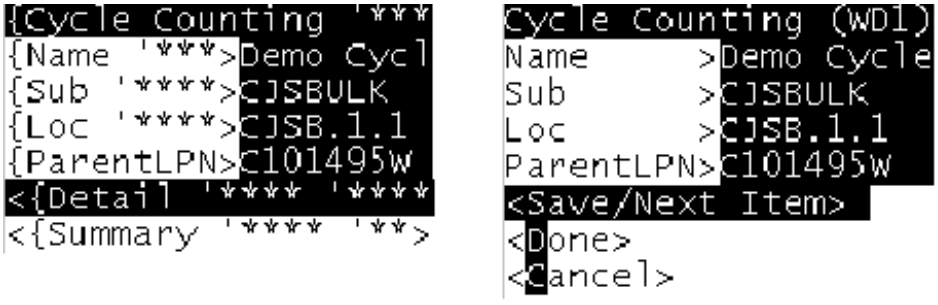
Entering the count: After the count is scheduled and generated successfully, the user can log on to the mobile RF device and navigate to the Cycle Count menu to enter the counts. There are two ways of entering the count regardless whether the user is performing the count from the regular Cycle Count menu or from the Task Dispatching menu:

- Summary count: This option gives the counter the ability to count all the items inside the LPN by scanning the LPN number. If the LPN is sealed the counter is not required to open the LPN and count each item individually. This type of counting helps in counting nested LPNs, which are sealed The system assumes that the contents of the LPN are as expected. Once the counter enters the LPN they are prompted for the next item or LPN in that subinventory and locator. The counter can optionally change the subinventory and locator.

- Detail count: When Details is selected the person entering the count only confirms all the contents of that LPN, including specific lots, serials, and revision numbers. Once you complete the entry of that LPN you are prompted for the next item or LPN in that subinventory and locator. You can optionally change the subinventory and locator.



The graphic above shows the counter is entering count for Cycle Count: Demo Cycle Count. The counter is currently in subinventory CJSBULK and locator CJSB.1.1. This entry is for LPN: C101495W. Once an LPN is entered the counter is given the flexibility of entering a Detail or a Summary count. In this case the user is entering a Detail count. The counter is then prompted to enter the item SJ102 (item description field is defaulted depending on the item selected in the previous field). Counter then enters the UOM and a quantity of 3. Because this is a serial control item, the user is then prompted to enter the Serial Number details.



The graphic above shows the counter is entering count for Cycle Count Demo Cycle Count. The counter is currently in subinventory CJSBULK and locator CJSB.1.1. This entry is for LPN C101495W. Once an LPN is entered the counter is given the flexibility of entering a Detail or a Summary count. In this case the user is entering a Summary count. The user is not prompted to enter the value of items, UOM, and so on after the Summary option is selected. The system assumes that everything that is supposed to be in that LPN is actually there. Thus the counter can proceed to enter the next count.

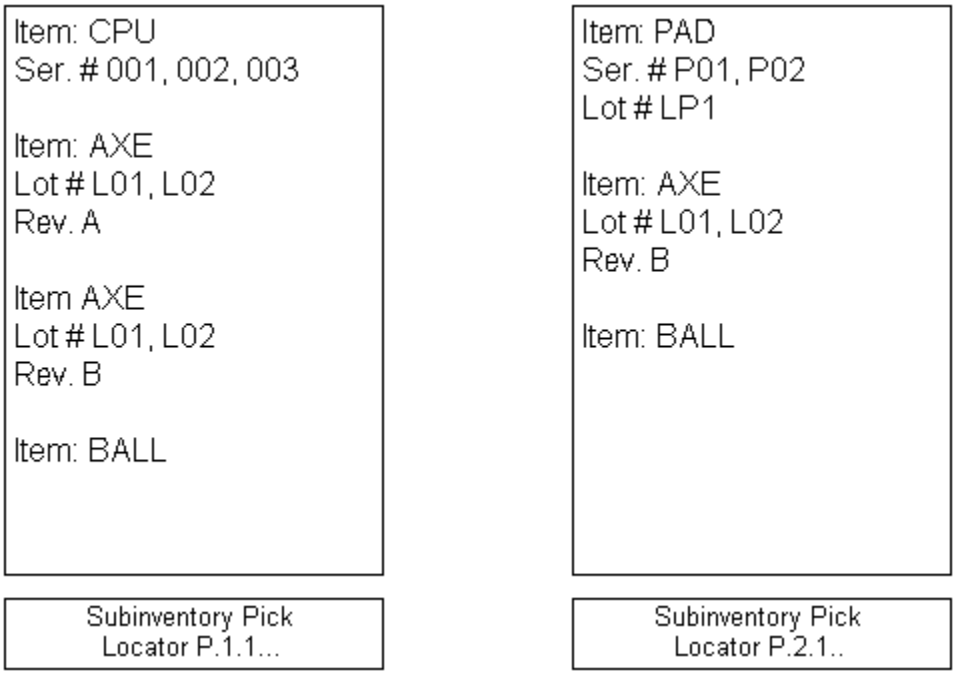
Entering Cycle Counts as Tasks

The counter will be prompted to perform a Cycle Count at a location based on their current location and the equipment that they are signed on to. Moreover, tasks will be

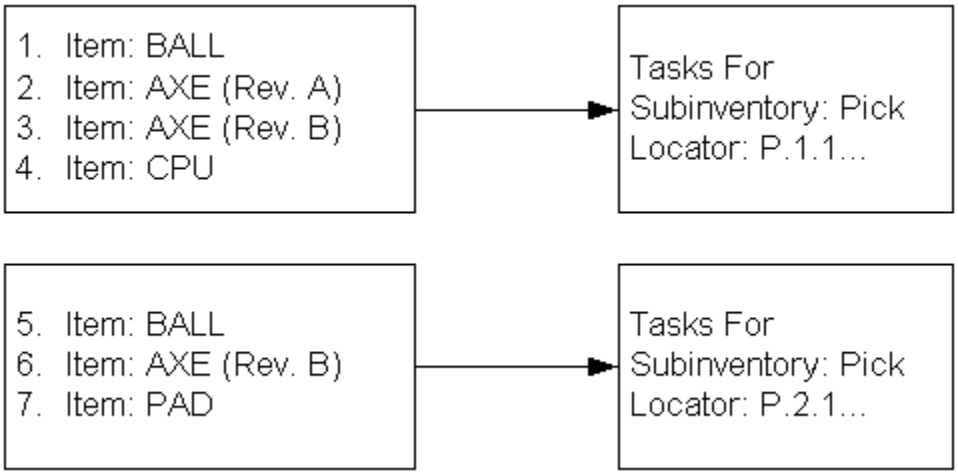
filtered based on the users skill set, only qualified employees will able to perform Cycle Count tasks. Cycle Count tasks can be assigned to a specific user or manually moved up the task queue, or can be re-prioritized, from the Oracle Warehouse Management Control Board by a warehouse manager or user with the correct responsibility. Cycle Counting tasks will be interleaved with picking and replenishment tasks to optimize the movement of the warehouse operator within the warehouse. Oracle Warehouse Management does not support multiple Cycle Count Task Types.

The system sequences cycle count tasks based on priority, subinventory, and locator picking order.

Consider the following scenario:

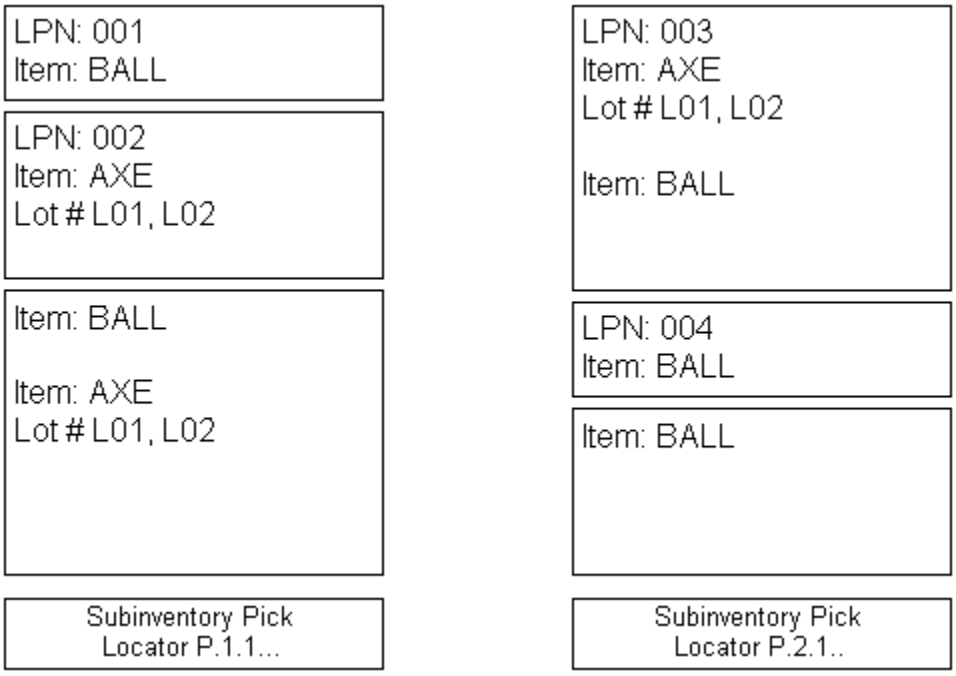


The previous scenario generates the following tasks:

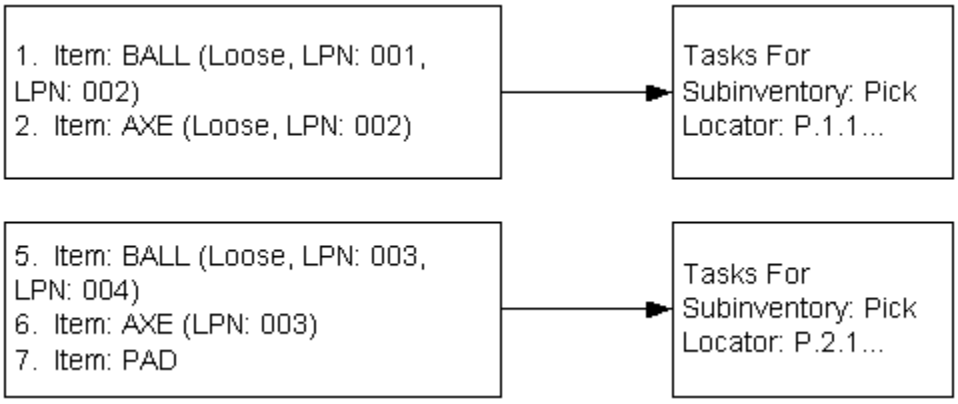


In this case 7 different tasks will be dispatched to the user. If the items are packed inside LPNs, a separate task will be created for counting that LPN. Consider a case in where there are some loose and some packed in an LPN of an item in same subinventory and locator. In this case two tasks will be created for counting the item. One task will be for counting loose quantity of that item and another task will be to count quantity of that item packed in LPN. Like regular cycle counting, the mobile Cycle Count interface user will be able to enter LPN counts in the form of either SUMMARY or DETAIL.

Consider the following Cycle Count scenario involving items contained in LPNs and loose items:



The previous scenario will generate the following tasks:



There are different cases that might happen while completing these tasks. Lets assume that User A accepts the task of counting BALLS & User B accepts the task of counting AXES at the same time. User A will be able to count only item BALL, and user will B will be able to count item AXE only. When user A is counting LPN:002 / LPN:003, he will be able to count only item BALL in that LPN, no matter whether user A performs detail or summary count for these LPNs. The same will apply for User B while counting LPNs LPN:002 and LPN:003. User B will be able to count only item AXE while performing the count on these LPNs.

In the second locator (P.1.2...) if user A accepts the task of counting BALLS then they will be able to count only item BALL from LPN:003 & LPN:004. And if user B accepts the task of counting AXES then User B will be able to count only item AXE from LPN:003.

If an LPN is partially counted then it cannot be approved on the desktop. This is the existing functionality, which remains unchanged.

The user would be able to skip a task after entering partial information while performing the count or in the beginning of the count. This can be done using <ESC-K>, which is one of the preseeded hot keys. This task will be sent to the user after some specific time, which will be defined as one of the organization parameters. At the end of the count the user will receive a message that all the scheduled counts are over. The user will be able to count ONLY SCHDULED entries from the Cycle Count Task menu. Once the counting is complete, the user will be able to view the completed counts on the desktop. There the user will be able to approve, reject, or recount the count. This part of the Cycle Count functionality remains unchanged.

Visibility of Scheduled and Generated Counts

Sr.	Task Status	Task Menu	Mobile Menu	Desktop
1.	Not accepted by any user	Blank	Visible. The user will be able to perform the count entry from this screen.	Visible. The user will be able to perform a count entry from this menu.
2.	Accepted by user	Visible. The user must perform all counts that have been dispatched as tasks from this menu.	Visible, but will give a warning message when trying to perform a count that has been dispatched as task. If unscheduled entries are allowed for the Cycle Count then the user will be able to perform unscheduled entries from here.	Not visible. If unscheduled entries are allowed for the Cycle Count then the user will be able to perform unscheduled entries from here.

Sr.	Task Status	Task Menu	Mobile Menu	Desktop
3.	Skipped	Not visible. Will become visible if the count is not complete after the scheduled skipping time is over.	Visible, but will give a warning message when trying to perform a count that has been AGAIN dispatched as a task after the scheduled skipping time is over. If unscheduled entries are allowed for the Cycle Count then user will be able to perform unscheduled entries from here.	Visible only until the time the count task is in the skipped mode. The user will be able to perform a count entry from the desktop menu as long as the count has not been *AGAIN* dispatched as a task after the scheduled skipping time is over. If unscheduled entries are allowed for the Cycle Count then the user will be able to perform unscheduled entries from here.

The user cannot perform unscheduled multiple serial counts from the mobile interface. This ability is available on the desktop interface. Also, the desktop interface does not have the ability to dynamically generate lot and serial numbers (and their attributes if Oracle Warehouse Management is installed). LPNs cannot be generated from the desktop, so if there is an unscheduled Cycle Count entry, which involves LPNs, then that entry should be made from the mobile interface. 0 (zero) count can be made from the desktop as well as the mobile interfaces. For example if user wants to enter an item and if all of the items are missing then user can enter 0 to report missing quantity.

Cycle Counting Setup

Once the cycle count has been defined on the desktop, and entries have been scheduled and generated to be counted, there is no further setup required for using the regular mobile Cycle Count menu. As stated previously, the mobile portion of Cycle Counting enables you to perform user directed counting of the entries that were generated. You can still enter counts through the desktop just as before. However with the mobile, you

do not have to perform the matching process between counting an item and inputting the values into the appropriate count entry. You print out a Cycle Count report to see what to count, and then proceed to the specified locations and count the items that are on the list.

If Task Dispatching is going to be utilized, there is additional setup required:

- Set up an employee
- Assign that employee to the user that will perform the Cycle Count tasks
- Define a department for Cycle Counting (optional)
- Create a new resource type of Person. Assign the employee that is associated with the user who will perform the Cycle Count tasks
- Define a standard task type for Cycle Counting. Assign the Cycle Counting department to this task type
- Assign task type of Cycle Count
- Assign the resource that was created for Cycle Count in Operational Resource

The user is ready to accept dispatched Cycle Counts once this setup is complete. The process of creating, scheduling, and generating Cycle Counts remains unchanged.

This setup is organizational specific. Each organization must set up Cycle Count tasks if applicable.

One of the major differences between entering cycle counts on the desktop and on the mobile is that with the mobile, the counter directs the counting. In other words, the counter counts items and doesn't have to match that count with the specific count entry that was generated for it. On the desktop, in the cycle count entries window, each record corresponds to an active cycle count entry generated. There is no need to match entry information since this is done explicitly. On the mobile, the information that the user inputs is matched with an entry in the MTL_CYCLE_COUNT_ENTRIES table. It will search for a record for that particular Cycle Count header ID, subinventory, locator ID, inventory item ID, revision, lot number, and serial number for cycle count entries that haven't yet been counted and are still active. This matching is done in the PLSQL backend in the process_entry method. The inputs that the user enters are matched with an existing active cycle count entry and then that record is processed in a manner similar to how it is done on the desktop.

> **Note:** If you enter data that is not found in the cycle count entries table and if unscheduled entries are allowed, a new record is created in this table for the new count.

Related Topics

Defining a Resource, *Oracle Bills of Material User's Guide*

Defining a Department, *Oracle Bills of Material User's Guide*

Assigning Resources to a Department, *Oracle Bills of Material User's Guide*

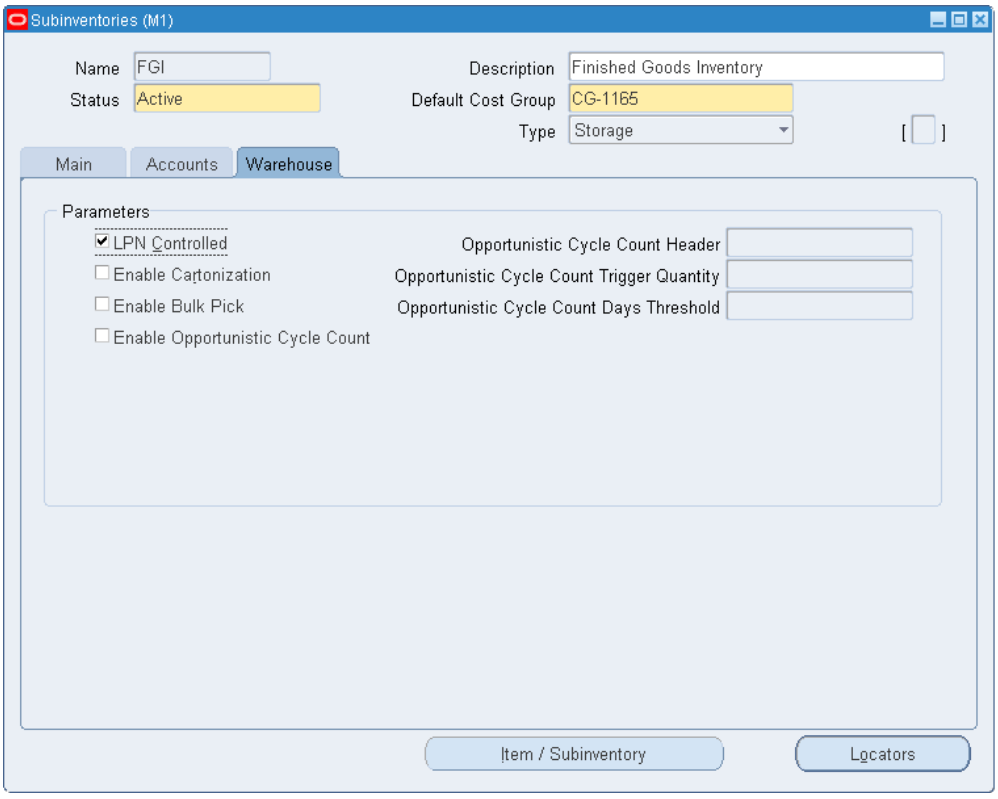
Setting Up Opportunistic Cycle Counting

An *opportunistic* cycle count enables you to perform an unscheduled cycle count in the middle of a picking operation if an item falls below a minimum quantity tolerance for the locator. If the resulting quantity is less than or equal to the specified quantity, then the system asks you whether or not you would like to perform a cycle count for this item at this locator. For instance, if the Opportunistic Cycle Count Trigger Quantity is set to 5, then whenever a pick from a locator leaves 5 or fewer pieces in the locator, the system prompts you to count the item. Opportunistic cycle counting is controlled at the *subinventory* level. This means if you enable opportunistic cycle counting for the subinventory, then all items within the subinventory will be subject to opportunistic cycle counts.

To set up opportunistic cycle counting controls on the Subinventories window:

1. Navigate to the Warehouse tab of the Subinventories window.

   Note: The Warehouse tab on the Subinventories window is available only if Oracle Warehouse Management (WMS) is installed and enabled for your organization. (WMS is enabled when the WMS Enabled check box is selected in the Organization Parameters window.)



2. Enter values for the desired cycle counting controls:

Field	Description
Enable Opportunistic Cycle Count	Select this option to enable opportunistic cycle count for the subinventory.
Opportunistic Cycle Count Header	Select the default cycle count header.
Opportunistic Cycle Count Trigger Quantity	Defines the quantity at which the cycle count is triggered for the locator. (This is a required field when controlled at the subinventory level.) For opportunistic cycle counting at the subinventory level, the pick UOM serves as the quantity trigger. If the pick UOM is not specified, then the primary UOM is used.

Field	Description
Opportunistic Cycle Count Days Threshold	Defines the number of days tolerance that controls whether or not redundant cycle counts are performed. For example, if the Opportunistic Cycle Count Days Threshold is set to 14 days, then the system will only prompt you to count this item locator combination if there has not been a cycle count in this location within the past 14 days. If that item/location combination were counted 10 days prior to the pick (which would otherwise trigger a free cycle count) that trigger would not be invoked because of the days tolerance. (Required field if the Enable Opportunistic Cycle Count check box is selected for the subinventory.)

Important: If an opportunistic cycle count is performed and there is already a scheduled cycle count for that item location combination, then the system deletes the existing cycle count entry. This prevents redundant cycle counts from being performed.

For information about the non-cycle count fields on the Warehouse tab, see Setting Up Subinventory Parameters, page 1-12.

Blind Counts:

When you define the Cycle Count header, you control whether or not the opportunistic cycle count will be blind. If the count is blind, then the system does not specify the system on-hand quantity during the count.

Related Topics

For more information, see *Oracle Warehouse Management User's Guide*, Opportunistic Cycle Counting

LPN Related Counts

If your count contains an LPN, you can perform either a summary count or a detail count. A detail count requires the counter to open up the LPN and count the items stored within it. A summary count requires the counter to enter LPNs only. The LPN contents do not need to be verified. The system will assume that the LPN is intact. This is useful if the LPN is sealed and the user believes that it is highly likely that the LPN quantity matches what the system thinks it should have. Therefore if you perform a summary count, all of the items packed within it will be counted automatically. Only those count entries which were scheduled will be updated. Unscheduled counts will be

performed only if it is allowed and if the item packed within the LPN is defined within the scope of the cycle count.

Understanding the Approval Process for Cycle Count Adjustments in WMS Cycle Counting Mobile Page

Problem

When cycle counting is performed from the cycle counting mobile page, you may find that the adjustments get automatically approved even though the *Approval: Required* parameter is set to Always. (Typically, when this parameter is set to Always, then the approval is required before the adjustments are allowed.) This situation occurs only with LPN counts, but not adjustments related to unpacked (loose) material.

> **Note:** The Approval: Required parameter is set at the cycle count header level on the Adjustments and ABC tab of the Cycle Counts window (INVADCYC).

Solution

The following section explains how to prevent the system from automatically approving cycle count adjustments for LPNs.

You can control the cycle count adjustment approval process by selecting one of the following options in the Approval: Required field on the Adjustments and ABC tab of the Cycle Counts window:

- Never: Not required for adjustments.
- If out of tolerance: Required for adjustments out of tolerance (in this case tolerance settings can be set in the same tab).
- Always: Required for all adjustments.

For WMS organizations:

- For non-LPN counts (unpacked material): The parent LPN field is blank in the cycle counting mobile page. The preceding setting will apply.
- For LPN counts: There is a parent LPN in the Cycle Counting mobile page.

However, you can override the preceding default behavior by setting the following Container Option values on the Serial, LPN and Schedule tab of Cycle Counts window:

- Adjustment: Determines whether or not the tolerances set in the Adjustments and ABC tab apply to LPN counts. Select from the following values:
  - Adjust if Possible (any applicable tolerances will be applied to LPN counts).
  - Review All Adjustments (any applicable tolerances will not be applied to LPN

counts).

- Discrepancy: Overrides the *Approval: Required* parameter in the Adjustments and ABC tab for LPN counts only.
  - Allow: Approves the adjustment automatically.
  - Do Not Allow: Sets the adjustment to Pending Approval.

When the *Approval: Required* field is set to Always, then an LPN count entry will go to Pending Approval status in the following case:

The counter adjusted the quantity and the following Container Option parameters are set:

- Adjustment = Review all Adjustments
- Discrepancy = Do Not Allow

Alternatively, an LPN count will get automatically approved even when:

- Approval Required = Always
- Adjustment = Adjust if Possible

  OR

- Discrepancy = Allow

If your business needs to manually approve any adjustment regardless of whether or not the item is packed into an LPN, then set up the following settings for the Container Option:

- Adjustment = Review all Adjustments
- Discrepancy = Do Not Allow

LPN Discrepancies

LPN discrepancy means that an LPN was found in a location other than expected. On the desktop this works by modifying the subinventory, locator, and LPN of the existing entry rather than creating a new entry. On the mobile this works by automatically determining if there is a discrepancy; the existing entry is similarly modified as in the desktop. If you are performing an LPN count and you allow container discrepancies, the system will automatically issue a subinventory transfer for the entire LPN and all of its contents if it is ever found in a different location. Thus if the user finds a sealed LPN and does not want to open it up and the LPN is found in a new location, the user can still perform the count. Even though the LPN is found in a discrepant location, count entries for items packed within the LPN can still be entered as if the LPN was found in

the original location on the system. So, when the system has to decide whether or not to perform an adjustment for an item packed in an LPN, it doesn't matter where the LPN is found. The packed information for the LPN should still be correct. If it is not, then an adjustment will be made for the item. In any case, a subinventory transfer will be issued for the LPN to ensure system accuracy for the location of the LPN.

> **Note:** LPN settings override the serial settings of the contents of that LPN. For example, if the LPN allows discrepancies, upon finding the LPN in a different locator, all the contents including any serialized contents are moved as well, even though the cycle count may not allow serial discrepancies.

Serial Counts

There are two options for performing serial counts:

- single serials
- multiple serials

> **Note:** Serial counting is available only for organizations that have enabled Oracle Warehouse Management.

When you perform a single serial count, a count entry is generated for each serial number. For multiple serials, a single cycle count entry is created for the given item, revision, and lot. In the single serial case, the counter will scan in the item, revision, lot, and quantity information, then enter the serial number. Depending on the form function parameter, either single or ranged serials will be displayed. For single serial, if the user claims that they have found 10 serials, they will need to scan in each individual serial for a total of 10 scans. However if ranged serials is allowed, they will scan the first and the last serial number. For ranged serials, there will be a From and a To serial field, which will require a total of 2 scans by the counter. However, it is implied that all of the serials in the range exist, no gaps exist, and the total amount equals the quantity that the user had entered in earlier. Once all of the serials have been entered, either one by one or in a range, you can process all of the entries at once.

In the case of multiple serials, once you have entered the item, revision, lot, and quantity information, a Serial Detail button will be displayed. You will then navigate to a multiple serial detail page where you will input in the serials that were found during the count. On this page, there are two fields, the first is the scheduled serial field. This field is a non-editable List of Values (LOV) field that enables you to query up to see which serials were scheduled to be counted for that multiple serial entry. The second field is the serial entry field. Here the counter will scan in the serial that were found. When you first enter the page, there are two buttons available which are All Present and All Missing. If you select All Present, then all of the serials which were scheduled to

be counted for the entry will be marked as present. Likewise if you select All Missing, all of the serials will be marked as missing. You can scan or input in a serial number and either choose Save/Next or Remove/Next. Selecting Save/Next will mark the serial in the serial entry field as present. Selecting Remove/Next will unmark the serial in the serial entry field so that it will be considered missing. Once the counter is satisfied that all of the serials that were found have been entered in correctly, the counter can select Done which will bring them back to the previous page. The counter can then save the count entry and either continue with the count or exit out of the count and navigate back to the menu.

Related Topics

Serialized Cycle Counting, *Oracle Inventory User's Guide*

Overview of Physical Inventory

Physical inventory involves counting of all the items in a subinventory or a organization to ensure accuracy of inventory quantity and value. All the transactions are stopped while the physical inventory is done. Physical inventory functionality has now become more accurate with Oracle Warehouse Management. The most significant change Oracle Warehouse Management introduces in the physical inventory is the way the counts are entered. Oracle Warehouse Management uses mobile radio frequency (RF) devices to enter counts. Because of using RF devices the information can be scanned, and the database is updated instantly. So there is no latency between performing the count and entering the count. Entering the count via RF gives the counter the flexibility of entering the count at two different levels:

1. Summary count - The counter believes all the contents within an LPN are intact, for example sealed LPNs, and scans the outermost LPN only. In such a type of entry the system assumes everything within that LPN is intact and updates the database accordingly.

2. Detail count - The counter counts and enters the counts for each LPN and items within that LPN. Details of the business flow are given in the next section.

Related Topics

Physical Inventory Counts, *Oracle Inventory User's Guide*

Physical Inventory Functional/Business Flow Description

The functional flow of Physical Inventory is as given below:

Functional Flow of Physical Inventory

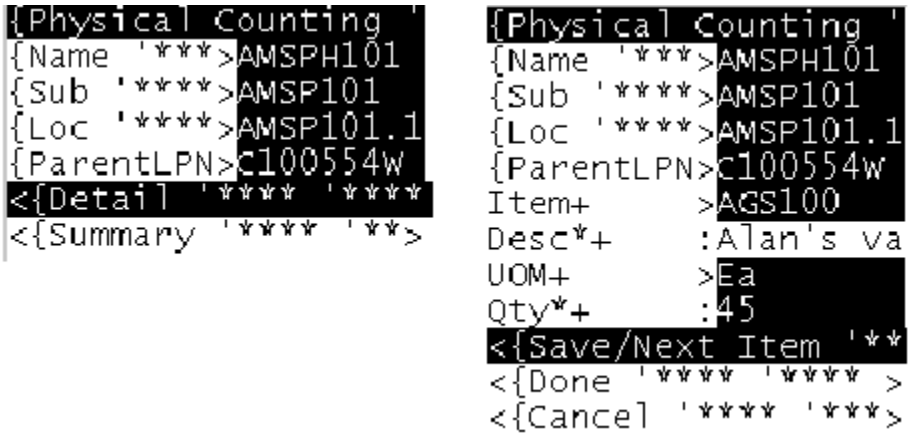
Defining Physical Count	Desktop
Taking snap shot	Desktop
Generating Tags	Desktop
Entering Counts	Mobile
Approving Counts	Desktop
Launching Adjustments	Desktop
Reports	Desktop

The core functionality has not changed for Oracle Warehouse Management. Only the way the count is entered has changed. All the other steps are the same.

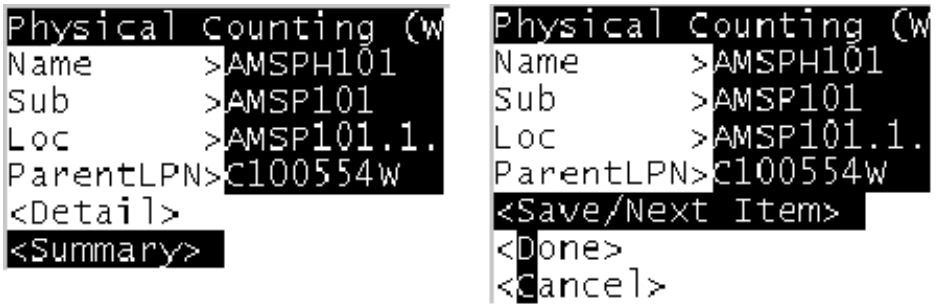
There are no major changes made to the Physical Inventory desktop forms, except for some new fields that have been added to the Physical Inventory Tag Counts form. These new fields are Cost Group, Outer LPN, and so on. There's also a new tab Container Details, which gives the details of the LPNs that have been counted during the Physical Inventory. Similarly in the Physical Inventory Adjustment & Approvals form there's a new tab added for Container Details. All the LPN entries can only be made from mobile RF devices. LPN entries can only be viewed form the desktop forms like Tag Counts and Approval Adjustment forms. LPN options for this functionality can be effective for Oracle Warehouse Management enabled organizations.

LPN Related Physical Inventory Counts

If your count contains an LPN, you can alternatively do a summary count or a detail count. Note that these options might not both be available depending on the user that is set as a form function parameter. A detail count means that the user will open up the LPN and count items stored within it. A summary count means that the user is sure that everything inside the LPN agrees with what the system thinks is inside it. This is useful if the LPN is sealed and the user doesn't want to open the LPN just to count the items if it's highly likely that it matches what the system thinks it should have. Therefore if you do a summary count, all of the items packed within it will be counted automatically.



In the screen shot shown above Physical Inventory counter is entering count for Physical Inventory AMPH101. The counter is currently in subinventory: AMSP101 and locator: AMSP101.1.1. This entry for LPN: C100554W. Once a LPN is entered the counter is given the flexibility of entering a detail or a summary count. In this case the user is entering a detail count. He is then prompted to enter the item: AGS100 (item description field is defaulted depending on the item selected in the previous field). Counter then enters the UOM and the quantity: 45.



In the screen shot shown above, the Physical Inventory counter is entering a count for the Physical Inventory AMPH101. The counter is currently in subinventory: AMSP101 and locator: AMSP101.1.1. This entry is for LPN: C100554W. Once an LPN is entered, the counter is given the flexibility of entering a detail or a summary count. In this case the counter is entering a summary count. After they select the Summary option they are not prompted to enter values of items, UOM, and so on. The system assumes everything that is supposed to be in that LPN is actually there. The counter can then enter the next count.

Common Problems

Many issues result from users scanning in information without realizing that all of the

information is interdependent. That is, when you scan in a particular item, the rest of the fields will be restricted based on that item. Similarly, when you scan in a certain lot number and the item is lot and serial controlled, the serial numbers available are also limited. Each of the fields on the mobile page are restricted based on the cycle count header options first, and by previous information entered in other fields second. If unscheduled entries are allowed, the LOVs will display more values since you are no longer restricted to those entries which have been scheduled. The mobile is supposed to take the place of a user entering in quantity information on the desktop. On the desktop, the user can view all the entries that have been generated and input them appropriately. However, on the mobile the user directs the count and the system will match the count information with the scheduled count entries. Thus you must make sure first that a count you have made matches exactly with that of the scheduled count entry. The subinventory, locator, item, revision, lot, and serial all have to match properly otherwise the matching will be processed incorrectly or you can encounter other problems.

Debugging Notes

If the user has made sure that everything is properly set up but errors still occur, then there are a last few things that the user can do. There are really two stages in performing a mobile cycle count. The first involves the front end data collection side. Verify details such as:

- What the unscheduled entry option is for the cycle count header
- Whether or not those entries exist that the user wants to count
- Whether the serial has a valid status to be counted

Cycle count messages are also printed to the mobile server log that is generated wherever the mobile application server was started. The log will display information about which field it was in, what values were passed in as the LOV statement for a field, what error messages occurred when calling the backend PLSQL procedures, and so on. This log is basically for the front end Java side for collecting the data for the count entry. It will then pass all of the collected count entry information to the backend. This will call the process_entry method. If the user that is trying to debug an issue has access to the database, and can view the files, they can query up the LOV statements and see if there is a reason why the user isn't seeing a particular value on a field. For detailed information, consult the component document for mobile cycle counting. Note that the log file will be of the format <port number>.INV.log.

The process_entry method will first match the count entry information with the particular cycle count entry generated. Once it has found a match, it will update and process that particular cycle count entry. However, if no match is found, it will try to insert a new Cycle Count entry if unscheduled count entries are allowed for that particular Cycle Count. The backend processing will log messages into the filename as specified by a profile value for the user in the log directory. The profile parameter for

this is INV: Debug file (Including the complete path). The log directory is based on the init.ora parameter value. For cycle counting, the lines in the log related to the cycle count will be prefixed with 'INV_CYC_LOVS' to indicate that those debug log lines were entered through the PLSQL package INV_CYC_LOVS which is the mobile cycle counting backend package. Common problems that occur when trying to process a count entry usually involve serial numbers. Serial numbers might not have a valid status for certain transactions or they could be marked so they are not available to be transacted. The log file should indicate where the error occurred.

The final stage to complete a mobile cycle count after the data has been collected on the front end side, the data has been passed into the database server side for processing, is the cycle count adjustment stage. This is the final stage where the transaction manager is invoked to process the cycle count adjustment and actually make the changes in quantity information or perform a subinventory transfer for LPN's and serials. The transaction manager can also error out and it too will produce a log file. The log file can be viewed to see at which stage it generated an error. The file is also stored in the log directory, generally set by a profile and has a name like trx_<user name>.log.

With these three logs, you should be able to figure out at which stage the transaction failed and possibly what error occurred that caused it to fail. Note that logging isn't always on and it does depend on the user and profile values. However if you encounter an error, you should be able to turn logging on and send the logs to the support team.

Frequently Asked Questions

1. Where do I set the profile options and the form function parameters related to cycle counting?

   There are two form function parameters that can be set for Cycle Counting. The first parameter is the type of count. The parameter is called COUNT_OPTION and can have the values: BOTH, DETAIL, or SUMMARY. This specifies the types of LPN counts that the user is allowed to do. The other form function parameter is called SERIAL_TYPE. The possible values are SINGLE or RANGED. This specifies whether the user must enter each serial number individually or by specifying the FROM and the TO serial number in the range. Form function parameters are set on the desktop forms as with other form function parameters. You will need to set this for the mobile cycle counting page which has a name CycleCountFunction. The profile for where log files from the mobile server is located in the init.ora file. There you can set the log directory for where backend PLSQL files write their logs to.

2. What do I do if the scheduled and generated cycle count doesn't appear in the Cycle Count list of values in mobile?

   First, make sure that the concurrent request to generate count requests completed successfully and did not error out. Next, check that some count requests were actually generated. On the application forms, you can navigate to the count entries form and query entries for that Cycle Count that you have defined. If there were no entries created and unscheduled entries are not allowed for your cycle count, then

that cycle count header will not be displayed in the cycle count LOV. If you are using Cycle Count Task Dispatching, check the WMS Control Board to see the status of the tasks created after the Cycle Count is generated. If the count that you are looking for has a status of Dispatched then it will not be available on regular Cycle Count menu or desktop Cycle Count Entries form.

3. I defined late days on the cycle count header to calculate the date after which the count would be considered a late count. Can late count entries (those that are past the count due date) be updated and entered?

   There is no restriction after late days so you can enter or update late count entries that are past the count due date.

4. My cycle Count is scheduled to be counted but it is not generating any counts to be counted.

   Entries will be generated only for items which you have defined within the scope of your cycle count. These are the cycle count items and entries will be generated to count those items only. Scheduled entries will also only be generated if those items are on-hand in the system. Make sure that if a count entry was not generated for a particular item that the item was included in the scope of the cycle count. Also for unscheduled counts, only items that are defined within the scope of your cycle count will be allowed.

5. What happens if I select F2 in the middle of entering a count?

   F2 will bring the user to the previous menu. Thus if you accidentally hit that key in the middle of entering a count, any information you had in that count will not be saved or processed. You have to make sure that you hit F2 only if you really want to quit out of the count entry. A confirmation is required though before you will be brought back to the previous menu. This behavior is the same for counts entered from the regular Cycle Count menu as well as the counts entered as tasks.

6. Can I enter zero quantity for missing items and LPNs?

   Yes. This behavior is the same for counts entered from the regular Cycle Count menu as well as counts entered as tasks.

7. How can I enter nested LPNs during a cycle count from the regular Cycle Count menu?

   There is a parent LPN field which would be the outer LPN and if that LPN contains child nested LPNs, it will display another LPN field on the mobile device. If the parent LPN entered does not contain any nested LPNs, this field will not be displayed. The child LPN field will be for LPNs which are direct children of the parent LPN.

8. Can I approve partial LPNs?

   Yes, you can approve partial LPNs if an LPN contains several items within it and

some of the items need adjustments while others do not. However, if the LPN is found in a discrepant location (for example it is found in a subinventory/locator that doesn't match the system) you cannot perform partial approval of an LPN count entry. Note that count approvals are all currently being performed on the desktop forms since the responsibility and task of approving count adjustments is usually separate and distinct from performing the count itself.

9. Can I enter LPN count on desktop?

   Yes, even with Mobile Supply Chain Applications, you can still perform all of your cycle counts the same way as before. Everything you can do on the desktop, you can do on the mobile and vice versa, except that LPNs cannot entered on the desktop forms. However, items found with in an LPN can be entered on the desktop forms.

10. Can I populate lot and serial attributes for newly found serial and lots during a cycle count?

    Yes, if unscheduled count entries are allowed for your cycle count, you can dynamically count new lots and serials during a cycle count. The lots and serials will be generated automatically and you can populate the lot and serial attributes for these new lots and serials. This is only available from the regular Cycle Count menu on the mobile.

11. What cost group is assigned to newly found items?

    For newly found items, unscheduled count entries will need to be created. However, since they do not exist on-hand in the system, the cost group ID will be assigned using the Cost Group rules engine. For negative adjustments, when a miscellaneous issue is performed or for a subinventory transfer as a result of cycle count adjustment, the Cost Group rules engine will not be called.

12. What will happen if I again schedule a partially completed cycle count?

    If a cycle count entry already exists, is not yet counted, and hasn't past the due date, then the concurrent program to generate count requests will not again generate the same count entry. It will however generate new count requests if those cycle count entries have been completed already.

13. How do I enter serials for "multiple serials per request"?

    On the desktop, when you are counting serialized items with the multiple serials per request option, you first enter the total quantity for that particular item, revision, and lot. You then proceed to the Serial Detail window. There is a similar way of handling this on the mobile device. After entering the quantity information, instead of inputting into the serial number LOV, you will be prompted to choose a serial detail button. This will bring you to a new page for entering multiple serial information where you can query which serials have been scheduled to be counted. You can also mark or unmark those serials that are present and accounted for.

During this counting process, the user can enter the serial entry LOV and perform a query to see which serials are currently marked by the counter as present. Once the counter has completed counting and marking the serials found, they will choose Done and return to the previous page. Note that the quantity counted must match what was entered in the previous page otherwise a mismatch error will occur.

14. How do I enter newly found serials for "multiple serials per request"?

    Currently we do not support unscheduled count entries for multiple serials per request count option. This is a future enhancement, but since it is not a critical functionality, it has not been included. Generally we believe that serialized items are kept track of very closely. If a new serial is found, a new cycle count can be generated to count it, but with the "single serial per request" option instead.

15. How can I enter serial discrepancy of serials packed inside LPN and serial option is "multiple serials per request?"

    For multiple serials per request which are packed within an LPN, discrepancies are allowed only if container discrepancies are allowed. This is the scenario where serials packed within an LPN, and the LPN is found in a discrepant location. The cycle count entries generated will contain subinventory and locator information which does not match where the LPN is actually found. The user can still count the serialized items by just specifying where the LPN was found, and then entering the serials that were found within it. As with all LPN related transactions, items stored within an LPN are done relative to the LPN. The actual location of the LPN does not matter. So in this case, the user can enter the multiple serial detail information as if the LPN was found in the location specified by the system. When the count is processed, a subinventory transfer will be issued for the LPN to move it from where it was before to where it was found. Additionally, all of the items packed within the LPN will also be moved along with it.

16. I am trying to enter a count for a serialized item but I do not see the serial number in the LOV. Why can't I see it?

    If you do not allow unscheduled count entries and an entry was created for that particular serial for single serial per request count option, there are a few reasons why this might be the case. One thing to keep in mind is that the LOVs are intelligent LOVs in that what they display is determined by what the user has entered in previous fields. So for a serial to be displayed in the serial number LOV, the item, revision, and lot must match for that particular serial number. If that does not match, the serial number will not be displayed. Another possibility is that the serial number has been marked by another transaction and is being used by someone else. This serial will not be available to others to transact until it has been unmarked. It is possible that the serial was marked by another transaction and it did not properly unmark the serial after it was done with it. If this is the case, the serial will need to be unmarked first before you can perform a cycle count on it.

17. How do I know that all the scheduled entries have been entered for a cycle count,

on the mobile device?

After you have saved an entry, the system will check to see if there are anymore scheduled entries to be entered. If there are none left, it will display the message " All scheduled entries have been entered" on the status bar. You are made aware if all the entries for that particular cycle count have been counted and completed.

18. Why can't I enter an unscheduled count for an item that I found in a particular subinventory?

    First, verify that, for this particular cycle count, unscheduled count entries are allowed. Second, make sure that this item is included in the scope of the Cycle Count. Finally, make sure that the subinventory in which you found the item also exists within the scope of the cycle count. Only items and subinventories which are defined within the scope of the cycle count are considered.

19. Are reservations created when a subinventory is scheduled for cycle counting?

    No. Reservations are not created during the cycle count scheduling process. Cycle Count reservations are usually created during a picking process when you pick short and report an inventory discrepancy. When a cycle count is processed, it will delete all reservations tied to it, but it does not create actual reservations.

20. I am receiving the error "Error Processing Tasks". What can I do?

    This is one of those errors for which there is nothing much that can be done to resolve it. This error will appear when things are really out of control and there is a major bug. You should view the log and find out what is going wrong. Check to see if other tasks are processed correctly.

21. I am receiving the error "Unexpected Error." What can I do?

    This error is a system error and is most likely not a Cycle Count specific error, nor a Cycle Counting setup error. This error may be caused by several reasons.

22. The scheduled and generated Cycle Count is not being dispatched as tasks. What can I do?

    There may be several reasons for this happening. You should start debugging in the following manner

    - If you are regenerating the same count, verify that there are no open entries for that count. Check to see that the count is complete (counted and approved).

    - Verify that the setup is correct. You should be logged on as the user who is enabled to perform the Cycle Count. You should be in the correct organization. Check to see if there are multiple Cycle Count task types, there should NOT be multiple Cycle Count task types. Check to see if there are multiple users who can perform a Cycle Count. If this is the case then the Cycle Count task may have gone to the other logged-on user who can perform Cycle Counts.

- If none of the above solves the problem, log a bug or TAR.

23. I am receiving the error "Transaction Failed | Failed to Pack/Unpack item | Unpacking update error | WMS_CONT_NEG_ITEM_QTY. Press any key to continue." What can I do?

    Typically, this error should not appear. This error appears when there is an issue with pack and unpacks of LPNs. There is nothing much that you can do about this error. Log a bug or TAR.

24. I am receiving the error "The total number of serial numbers marked, as present does not match the quantity entered for this count request. Press any key to continue."

    This error will appear while entering multiple serials in a Cycle Count. Typically the user will enter a quantity of 5 in the Total Quantity field and when the user is brought to the Entering Serials page on the mobile, the user will enter either more or less than 5 serials. The user should ensure that the quantity entered on the main page and the number of serials entered on the serials page match.

11

Warehouse Management Transactions

This chapter covers the following topics:

- Mobile Inventory Transactions
- Form Function Parameters
- Transaction Processing Mode
- Customizing Hot Keys and Prompts
- Transaction Manager Stub
- Common Problems
- Debugging
- Frequently Asked Questions

Mobile Inventory Transactions

Oracle Warehouse Management provides inventory transactions on a mobile RF device. It provides support for License Plate Numbers (LPNs) in all transactions. All transactions can be for either loose material or LPN triggered. LPN triggered transactions require less data entry because an LPN has its current subinventory, location, and item contents all associated with a single identifier. The benefit of an LPN triggered transaction is greater when it contains serial controlled items because the amount of data entry is greater.

Supported Transactions

Oracle Warehouse Management supports two basic categories of transactions on the mobile device. These two transaction categories are differentiated by whether or not they have document tracking. These two categories deal with material movement: receipts, issues, and transfers. A third category of transactions, LPN transactions, includes miscellaneous pack and unpack transactions but does not receive, issue, or move material to different locators.

Non-Document Based Transactions

Miscellaneous receipts allow you to receive material without a purchase order number. Miscellaneous issues allow you to issue material without a sales order number. You can transfer Inventory organization items without using an Internal Requisition/Internal Sales Order through Direct Organization Transfers or In-transit organization transfers. Subinventory transfers allow you to transfer material to a different subinventory or locator a document number.

Document Based Transactions

Move Orders enable requisitioning and document tracking tool for material transfers within an inventory organization and for material issues. If material needs to be requested from another inventory organization, use internal requisition.

Related Topics

Overview of Inventory Transactions, *Oracle Inventory User's Guide*

Transferring Between Subinventories, *Oracle Inventory User's Guide*

Performing Miscellaneous Transactions, *Oracle Inventory User's Guide*

Inter-Organization Transfers, *Oracle Inventory User's Guide*

Overview of Move Orders, *Oracle Inventory User's Guide*

Generating Move Order Requisitions, *Oracle Inventory User's Guide*

Performing Inventory Transactions with LPNs, *Oracle Warehouse Management User's Guide*

LPN Transactions

LPN transactions allow movement of material in to and out of LPNs and enable you to manually create nested LPNs. The available LPN Transactions are as follows:

- Pack transaction- The Pack transaction enables you to pack loose material into an LPN.
- Consolidate transaction- The Consolidate transaction enables you to nest a child LPN inside a parent LPN.
- Unpack transaction- The Unpack transaction enables you to unpack either material or a nested LPN from a parent LPN.
- Split transaction- The Split transaction is essentially an Unpack and Pack combined together, creating a new LPN with some material from another LPN.
- Update LPN transaction- The Update LPN transaction enables you to update the weight, volume, and container item of an LPN. As in all other transactions, LPN transactions of lot, serial, or revision controlled material requires you to enter the

item controls.

Pack

A pack transaction takes loose material and moves it into an LPN. You can use an existing LPN, or generate a new LPN in the following ways: with a hotkey, via a desktop concurrent request, or enter manually. If you use an existing LPN, the subinventory and locator of the material default from the current LPN location. A pack transaction does not change the on-hand or available quantity of the item. It changes how much of the material is packed in LPNs and how much is loose within the locator.

If the item you are packing is under dual under dual unit of measure control, then the secondary packed quantitymay become out of synch with the secondary lot quantity if you implement deviations for items in the line region. You need to implement synchronization of both fields when this happens.

Consolidate

The consolidate transaction packs one LPN into another LPN, and creates a nested LPN, or parent-child relationship. You can have an unlimited amount of nested LPNs. If you consolidate two existing LPNs, they must both exist in the same locator. However, you can use a new parent LPN (generated with a hotkey, entered manually, or pregenerated on the desktop) for nesting an existing LPN into an empty outer LPN.

Unpack

Use unpack to unpack any of the immediate contents of an LPN, including both items and other nested LPNs. Identify and enter the LPN to be unpacked which can, itself, be an inner LPN in a nested relationship. Like packing, unpacking does not change the on-hand or available quantity of the item, only how much of the item is packed in LPNs and how much is loose within a locator.

If the item is under dual unit of measure control, and the item supports deviation for the secondary quantity, ensure there is no residual left in an LPN when unpacking the secondary quantity will be zeroed when the primary is zero.

Split

A split transaction splits an existing LPN into two LPNs. A split transaction is an unpack and pack combined into a single transaction, though it is a separate transaction type. You can split the contents of an LPN into existing LPNs or into new LPNs.

Update

You can use LPN Update to change, any of the physical attributes of an LPN including the weight, volume, and corresponding units-of-measure. Furthermore, if the LPN is not associated with a container item, you can use LPN Update to make the association.

Bulk Packing

Bulk Packing allows you to specify a number of loose items or LPNs and automatically determine the number and type of containers or LPNs that this material should then be packed in to. The system makes the container type determination using the cartonization process where predefined container load relationships and category-based container grouping are considered. You can also specify a value for the level, which

controls how many levels up the cartonization hierarchy the system shuttlecock. LPNs will only be generated for the topmost level. Also, note that only LPNs that are also associated with container items to define the weight, volume, and dimensions of the container, can be bulk packed.

Related Topics

Warehouse Management Cartonization, page 12-1

Transaction Features

Most transaction features supported on the desktop are also supported on the mobile device. In addition, some additional features which enable faster or more controlled data entry are included with the mobile user interface.

Defaulting Account and Type

Oracle Warehouse Management supports user-defined transaction types defined for specific reporting needs. If a limited number of transaction types and accounts are used in an organization, you can define the menu structure so the transaction type and adjustment account default for the transaction through the menu definition.

Multiple Lots and Serial Range

Oracle Warehouse Management also supports transacting multiple lots in a single transaction, and generating new lots when receiving new material. You can perform receipt of serial controlled items by specifying either individual serial numbers or serial ranges. Transfers of serial controlled material is serial triggered, since a guaranteed range of serial numbers does not exist. Like lot numbers, you can generate serial numbers at receipt.

LPN Triggered Transactions

You can generate LPNs in new material receipts. An LPN can contain multiple serials, lots, or revisions of a single item, and a heterogeneous combination of items as well. The entire contents of an LPN are moved whenever the LPN is transacted.

Data Identifiers

All transactions support data identifiers, which you can use to support out-of-order data entry on the mobile device.

Transaction Processing Mode

Mobile devices support online, concurrent, and background processing. The actual processing mode used depends on the inventory transaction processing profile settings. Online processing means the transaction manager begins processing the transaction immediately, when you select Save. You relinquish control of the device while the transaction manager processes. The system returns control to you when the transaction manager completes. With concurrent processing, the transaction manager begins processing the transaction immediately, but you retain control of the device. In background processing, the transaction manager processes all transactions accumulated over the last interval you determined.

With online processing, you see any error messages encountered during transaction processing. With both concurrent and background processing, you do not have visibility to any errors. The system displays different success messages to you, depending on the transaction processing mode:

Success Messages

Processing Mode	Success Message
Online Processing	Transaction Success
Concurrent Processing	Transaction Submitted
Background Processing	Transaction Queued

LPN Controlled Subinventory

If a subinventory has the LPN Controlled flag disabled, it cannot store LPNs. LPNs moved into this subinventory are automatically unpacked. Miscellaneous receipts into this subinventory must be for loose material, and material in this subinventory cannot be packed.

Non-LPN controlled subinventories can be used for several different reasons, but two common scenarios are forward picking areas and backflush subinventories.

In a forward picking subinventory, material is always picked in small quantities, but is replenished with cases. By making a forward picking area non-LPN controlled, the system automatically unpacks any LPN moved into the area, saving you from performing an additional unpack transaction. Cartonization is most likely used in a subinventory that has only loose material.

Backflush subinventories are where material is automatically pulled for jobs, either as assembly pull or operation pull on the bill of material. Because the system keeps an accurate count of items that are in each LPN, if backflushing is setup from a locator that has multiple LPNs, the system will not know which LPN to pull material from. For that reason, operation and assembly pull material is always taken from the loose on-hand quantity. Therefore, to ensure that these areas always have loose material, a subinventory where backflushing is to occur should be non-LPN controlled. Note that this need not be the case, but that it will simplify inventory tracking.

Form Function Parameters

The following form function parameters are used to set up the various transactions:

Form Function Parameters

Form	Parameter	Valid Parameters	Description
Manifest Picking	TASK_METHOD	MANIFESTORDER	Enables manifest picking fields in the Order Picking page and Pick Slip page so you scan multiple order numbers/pick slip numbers. To review the manifest picking fields, use the mobile device: (N) Warehouse Management > Tasks > Directed Task > Outbound > Manifest Picking.
Manifest Picking	TASK_METHOD	MANIFESTPICKSLIP	Enables manifest picking fields in the Manifest Pickslip Picking page so you scan multiple pick slip numbers. To review the manifest picking fields, use the mobile device: (N) Warehouse Management > Tasks > Directed Task > Outbound > Manifest Picking.
Mobile Inventory Issue	TRANSACTION	ALIAS_ISSUE MISC_ISSUE	Determines if the operator must enter an account alias or an account number for an issue transaction. If no parameter provided, defaults to ALIAS_ISSUE

Form	Parameter	Valid Parameters	Description
Mobile Inventory Receipts	TRANSACTION	ALIAS_RCPT MISC_RCPT	Determines if the operator must enter an account alias or an account number for a receipt transaction. If no parameter provided, defaults to ALIAS_RCPT
Mobile WMS Pack/Unpack	TYPE	PACK UNPACK SPLIT CONSOLIDATE UPDATE	Determines if the transaction is a pack, unpack, split, consolidate, or LPN update transaction. A value for this parameter must be provided.
Mobile Inventory Issue Mobile Inventory Receipts Mobile Sub Transfer Mobile Org Transfer	TXN_TYPE_ID	Any valid transaction type id from MTL_TRANSACTION_TYPES.TXN_TYPE_ID that have the same transaction action and transaction source type as the applicable system defined transaction type	Defaults the transaction type and hides the transaction type field from the operator if a parameter is provided.
Mobile Inventory Issue Mobile Inventory Receipts	ACCOUNT	Any valid account alias as defined in CONCATENATED_SEGMENTS.MTL_GENERIC_DISPOSITIONS_KFV defined within the current organization	Defaults the transaction account and hides the account field from the operator if a parameter is provided. Note that this can only be used for Alias Issues and Alias Receipts.

Form	Parameter	Valid Parameters	Description
Mobile Inventory Receipts	SERIAL_TYPE	INDIVIDUAL RANGE	Determines if the serials are indicated by ranges or individual numbers. If no parameter provided, defaults to INDIVIDUAL
Mobile Sub Transfer Mobile Org Transfer	QTYTRG	Y N	Indicates if the lot and serial quantity is cross-checked for lot / serial transactions (Y), or if the transaction quantity is calculated from the lot / serial quantity (N). If no parameter provided, defaults to Y.

Transaction Processing Mode

You can set the transaction processing mode differently for each window. You can also set it at the site, application, responsibility, and user levels as a standard profile option. The profile options are the same as those used for the desktop windows. You can set the profile TP:INV Transaction Processing Mode to On-line processing, Immediate concurrent processing, Background processing, or Form level processing. This profile controls the behavior of all forms. If you select Form level processing the system checks the individual options at the form level. You can find all applicable profile options by performing a blind query using TP:INV%.

If background processing is used, the time interval with which the transaction manager should run must be set up. Because Oracle Warehouse Management uses the same transaction manager as Oracle Inventory, setup for Oracle Warehouse Management does not differ from Oracle Inventory.

Related Topics

Inventory Profile Options, *Oracle Inventory User's Guide*

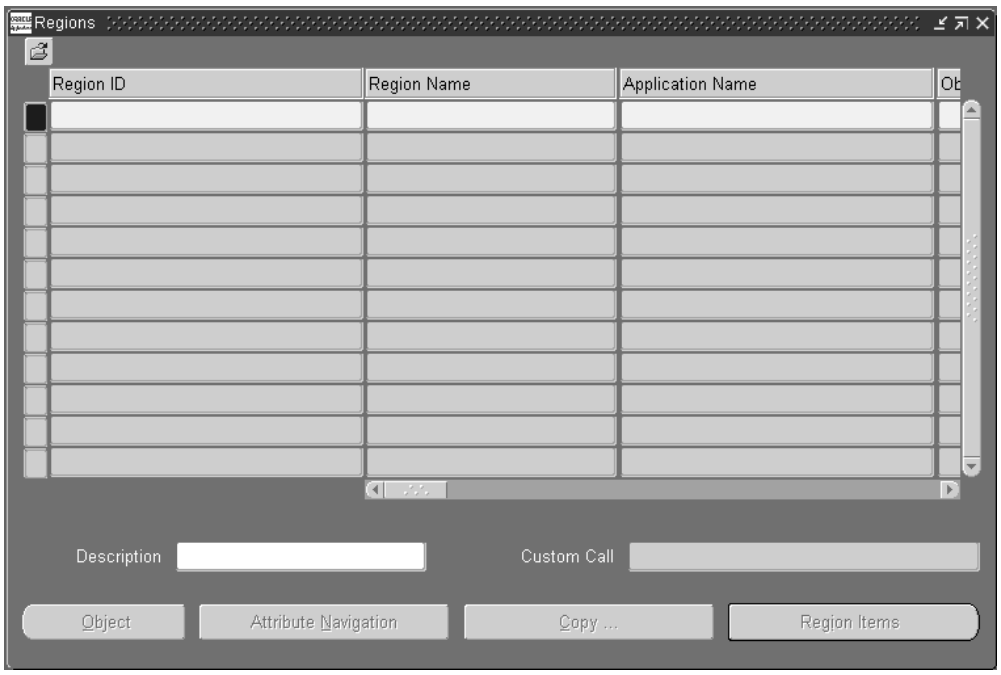
Customizing Hot Keys and Prompts

You can edit the hot keys you use, and the prompts displayed on the mobile device. To

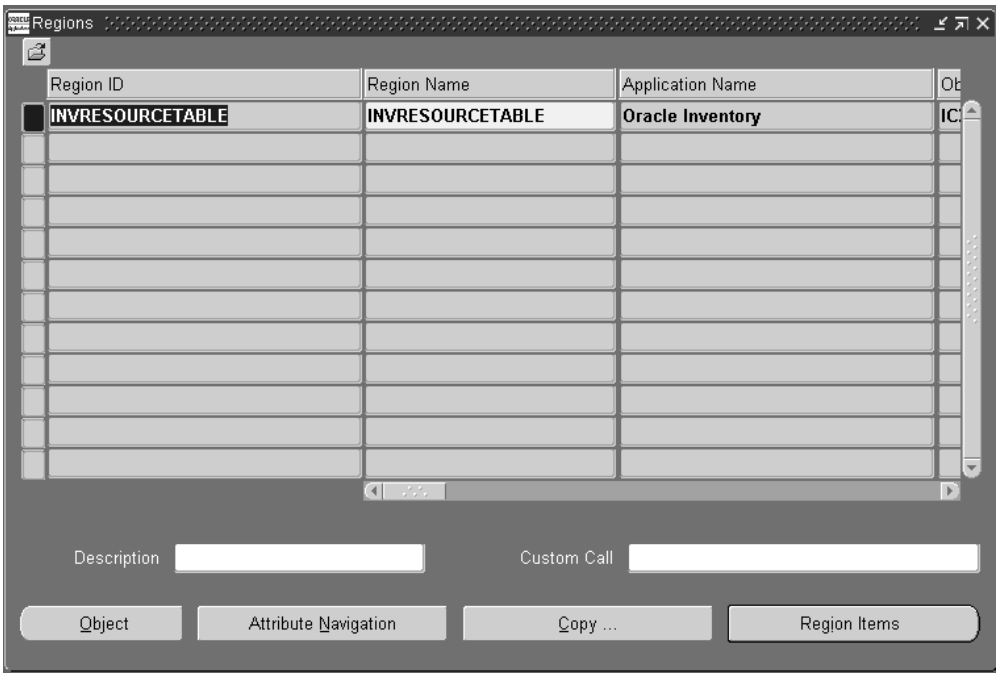
access the hot keys, press the Esc key followed by the highlighted letter on the button on the mobile device or keyboard. To edit the hot keys and prompts complete the following procedure:

> **Note:** To access the Define Regions window, you must log in under the Application Developer Common Modules Responsibility.

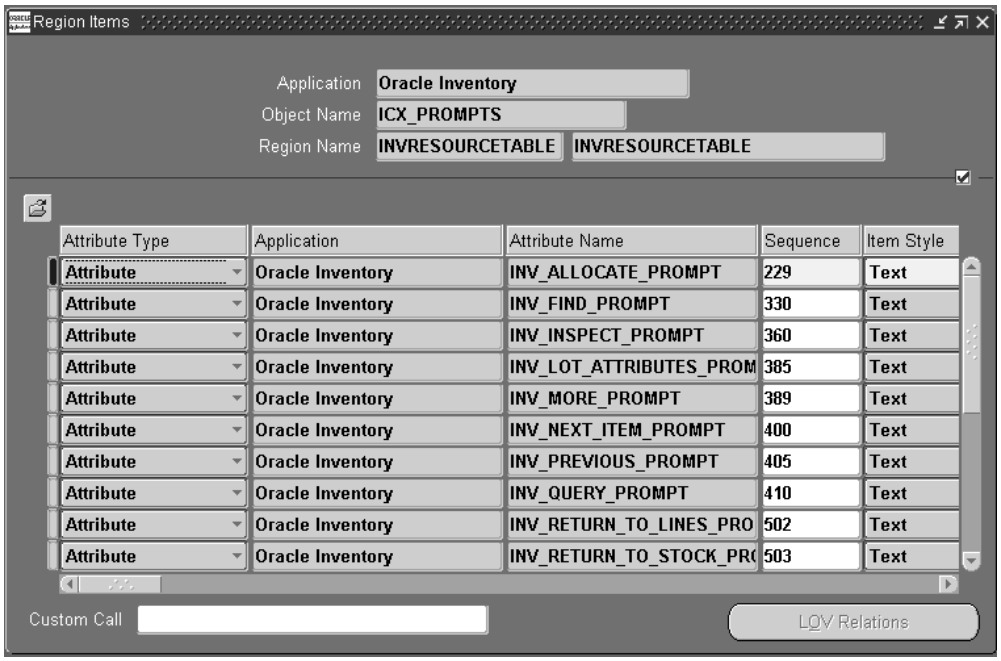
1. Navigate to the Define Regions window.



2. Query for the `INVRESOURCETABLE` in the Region ID field.



3. Choose Region Items



4. Make the desired changed to the Long Label field.

   The Long Label field contains the text that displays on the mobile device. An ampersand precedes the hot key character. You can change the text, and the position of the ampersand.

   Only prompts that are used for buttons have ampersands for hotkeys. Prompts that are used as page titles or field labels do not use hotkeys and any ampersand inserted into a prompt are automatically stripped if the label is used as a page title or field label.

Note: The system may truncate long text labels depending on the width of the screen, and very short labels may not be clear enough. If multiple buttons on the same page use the same hot key, the mobile device responds only to the first hot key with that label.

Note: Whenever you apply patches that include new or changed prompts, the system reloads the resource table `INVRESOURCETABLE` based on the definition seeded by development, overwriting any changes you have made. That means that any changes that you have made will be lost. Typically, this seed data does not change with small bug fixes, but frequently does change with new releases. However, to be safe, you should keep track of the modifications you make either manually, or by making a copy of the resource table prior to all patching and then comparing the entries in the two tables, updating the recently overwritten table when necessary.

5. Save your work.

Transaction Manager Stub

The transaction manager calls an empty stub when each transaction processes, regardless of processing mode. It can include any additional business logic to perform for each record in the transaction interface tables. The API specification is as follows:

```
CREATE OR REPLACE PACKAGE INV_TXNSTUB_PUB AS
/* $Header: INVTPUBS.pls 115.0 2000/02/25 01:30:26 sdirisal noship $ */
/**
*  p_header_id         = TRANSACTION_HEADER_ID
*  p_transaction_id    = TRANSACTION_ID
*  x_return_status     = FND_API.G_RET_STS_*;
*  in case of an error, the error should be put onto the message stake
*  using fnd_message.set_name and fnd_msg_pub.add functions or similar
*  functions in those packages. The caller would then retrieve the
*  messages. If the return status is a normal (predicted) error or
*  an unexpected error, then the transaction is aborted.
*/
PROCEDURE postTransaction(p_header_id IN NUMBER,
p_transaction_id   IN NUMBER,
x_return_status OUT VARCHAR2);
END INV_TXNSTUB_PUB;
```

Common Problems

The following are a list of common problems, when they may occur, and how to fix them. Miscellaneous transactions interact with many other entities, including label printing, lot and serial attributes, and material status.

Cost Group Commingling Error

A cost group commingling error arises whenever multiple cost groups exist in the same locator which cannot be otherwise differentiated by item, lot, serial, revision, or innermost LPN. If the transaction causing the error is a pack or a subinventory transfer, check the cost group of the transacted material and the cost group of the material in the destination locator and LPN. If there are no other differentiating attributes, then the items can not be stored together. The transaction can take place, however, if the item is packed into an LPN and then the LPN is moved to (or packed into) the destination.

Item Not Assigned to Destination Organization

To perform an organization transfer of an item, the item must be assigned to both the source organization and the destination organization. Items that are not assigned to both organizations do not appear in the list-of-values for transfers of loose material. When LPNs are transferred, an error indicates the LPN has contents which are not assigned to the destination organization. To eliminate this error, check which of the LPN contents are not assigned to the destination organization, and then make the assignment if desired, on the desktop.

Insufficient Quantity

For transactions that decrement inventory from a locator, such as issues and transfers, verify the result of the transaction does not drive the on-hand (packed or unpacked) or available quantity below zero. A parameter set at the organization level specifies whether negative balances are allowed. If negative balances are allowed, then a warning message is displayed and you can continue. If negative balances are not allowed, an error message is displayed and you cannot continue

This check is made independently for both packed and loose on-hand quantities. The error or warning is displayed if a transaction drive either one of the quantities negative, even if the net on-hand in that locator is positive.

Transaction disallowed by Material Status

You can assign material statuses that disallow certain transaction types to lots, serials, locators, and subinventories. If you enter transaction data that violates the material status restrictions, either the value does not appear in the list of values (in the case of lots, serials, locators, and subinventories), or you receive an error message that indicates the transaction is disallowed (in the case of LPNs). Verify the material status of the affected entities on the mobile or via the Material Workbench on the desktop, and update the material status if appropriate.

LPNs Disallowed by Subinventory

You can set a subinventory to disallow LPNs by disabling the LPN Controlled flag on the subinventory definition. Packed LPNs are not allowed in these types of subinventories. Subinventory transfers and other material movement transactions into that subinventory automatically unpack the LPN. The empty LPN is then available for reuse anywhere in the organization.

Miscellaneous receipts of packed material, as well as pack and bulk pack transactions are not allowed in these subinventories. In the case of a miscellaneous receipt, if you enter an LPN after selecting a subinventory, the system displays an error message that indicates this is a disallowed transaction. The message also displays for pack and bulk pack transactions.

Debugging

If you receive a Java error on the mobile device, it usually means either the package is invalid, or a code bug exists. To find code bugs, check the Transaction Manager log file, which can be located by viewing the profile option setting of INV: Debug file. Also, verify the following profile options to ensure that debugging messages are captured.

Debug Profiles

Profile	Setting
INV: Debug Trace	Yes
INV: Debug file	provide the complete path for the log file
INV: Debug Level	set a value larger than 1

Frequently Asked Questions

1. When is the transaction saved if I use the <Save/Next> button?

   The transaction is always committed on <Save>. For transactions that have <Save/Next>, the transaction is saved when you choose <Save/Next>. If you cancel a subsequent transaction, all prior transactions are saved; only the current transaction is canceled. A transaction is not committed when you choose <Next>. <Next> allows multiple records to be posted with the same header information.

2. Why can't I consolidate (or merge) two LPNs?

   Verify the following conditions for LPN consolidation:

   - They belong to two different deliveries and the operation plan link to the tasks within the LPNs have the consolidation method Within Delivery.
   - if the operation plans for the tasks within the two LPNs have the consolidation method set to across delivery, then verify the destination LPN is in a staging locator.
   - If the destination LPN is in a staging locator, then verify that a common deconsolidation point can be determined using regions and zones setup, and the Transportation Execution constraints if Transportation Execution is installed.

3. Why can't I unpack an LPN?

   There may be several reasons that prevent the unpacking of LPNs. First, verify that there is no material status that disallows the unpack transaction. The more common cause, however, is the LPN has been staged for delivery. LPNs staged for a delivery cannot be unpacked because the tie between the material and the sales order is made via the LPN. However, staged LPNs can be split and consolidated to make any nesting relationship that is necessary to accurately model and efficiently perform the shipment.

4. What is a cost group commingling error?

   Transactions that result in commingling of cost groups are prevented. Cost groups are considered commingled when there is no other distinction (such as lot, serial, revision, locator, item number, or LPN) that can be used to differentiate between them. For instance, within a single LPN, the same lot of an item cannot have two different cost groups. But if some of the material is outside the LPN and some of the material is inside the LPN, then the material can have different cost groups. A pack transaction of the loose material into the LPN, results in cost group commingling, so the transaction is not allowed.

5. What becomes of an LPN when it is moved into a non-LPN controlled subinventory?

   When an LPN is moved into a non-LPN controlled subinventory, the LPN is unpacked and the subinventory and locator are cleared from the LPN. In addition, the LPN context or state is updated to "Defined But Not Used", indicating that it is available for any transaction elsewhere in the organization. In this way, it can be considered a reusable tote

12

Cartonization

This chapter covers the following topics:

- Warehouse Management Cartonization
- Setting up Cartonization
- Cartonization Setup Steps
- LPN Controlled and Cartonization Enabled
- Bulk Pack API
- Packing Workbench
- Common Problems
- Debugging Notes
- Frequently Asked Questions

Warehouse Management Cartonization

Oracle Warehouse Management uses cartonization to suggest the best packaging configuration for a group of items. The system can present the packaging suggestion to you in one of many ways, including automatically generating license plates, printing container and shipping labels, and presenting the suggestion to you as part of a task.

Cartonization can segregate items by categories you identify based on different packaging requirements. For instance, refrigerated goods may require a particular type of insulated cooler, while miscellaneous goods can be packed into any standard corrugated cardboard box. In addition, the warehouse may use several sizes of each type of container. Items within a category can be commingled in the same license plate, or perhaps a particular item must be packed separately. You can also set minimum fill percentages for containers, below which the system suggests a smaller container.

You can create multiple levels of packaging, along with the requisite labels, so you can generate in a single operation, labels for inner cartons, packed inside outer cartons, and placed on a pallet. You can halt packing with a hierarchy of containers midway, and

then continue again at a later point, so you can pack material in a storage container when it is first received or completed, and then pack it again during sales order picking into a final shipping container.

All these considerations, in addition to the item dimensions, weight, and volume in comparison to the physical attributes of the container, are made when the system selects the container type and quantity to use.

Cartonization Uses

Oracle Warehouse Management uses cartonization in three places:

- Sales order and manufacturing picking
- Prepack for manufacturing completion
- Inventory bulk pack

Cartonization at Pick Release

Cartonization is automatically performed when sales order or manufacturing jobs / schedules are released for picking, if you enable the option on for the organization and subinventory. After the lines are allocated using the Rules Engine, sales order lines are grouped by delivery, or by the delivery grouping rule if no deliveries are created prior to or at pick release. Manufacturing allocations are grouped by job or schedule. Cartonization is then performed on each grouping. You may use this to suggest the carton to pick into, or the box to place on the conveyor belt if you perform conveyor-based picking.

Prepack for Manufacturing Completion

You can use the Container Prepack concurrent request, Container Prepack, to pre-print labels in preparation for a manufacturing completion. You can then perform the completion in an LPN triggered mode, minimizing further data entry during the completion.

Inventory Bulk Pack

You can use bulk packing of loose material to suggest the containers to pack material that already resides in inventory. You can use bulk pack for both loose and packed material. If you pack loose material, you can pack multiple items in a single operation. You can pack material into additional levels of packaging if you set up multi-level packaging, automatically creating the LPNs and labels for scenarios where inner cartons should be packed into outer cartons.

Related Topics

Setting Up Cartonization, *Oracle Warehouse Management User's Guide*

Cartonization Process

The cartonization algorithm Oracle Warehouse Management uses minimizes the number of containers used at each level in the packaging hierarchy, subject to volume, weight, and minimum percent fill settings of the containers. The algorithm also verifies the dimensions of the packed material can fit inside the dimensions of the container.

If you defined multi-level hierarchy after all the material is packed at the first level, the algorithm repeats itself with the new containers. The process continues until the top of the packaging hierarchy has been reached, the packaging process has completed the indicated number of levels, or no additional containers are available due to minimum percent fill, dimensions, or other physical attributes.

The following two examples illustrate how cartonization works on a single and a multiple level cartonization hierarchy. Although labels are generated at all levels in the cartonization process, LPNs are only created for the outermost level for each request.

Single Level Cartonization

Single level packaging hierarchies are most commonly used during sales order pick release for Pick by Label functionality, or to select the right packing container. You may also use it for packing material in inventory and generating labels prior to manufacturing completion if the labeling requirements are simple.

Suppose an item with the dimensions W:1' L:5' H:3', weighing 60 pounds, must be packed. There are five containers in the container group. Container groups are linked to the items that they can pack by using common categories. See:Overview of Item Categories, *Oracle Inventory User's Guide* . For this example, the following categories are defined and assigned to the item and the containers as follows:

Item	Contained Item	Container Item
A	-	Misc
B	-	Misc
C	-	Misc
D	-	Misc
E	-	Misc

The common category code assignment MISC to the item and to the indicates you can pack the item into any of the five container items. The dimensions of each of the five container items are as follows:

Container	Width	Length	Height	Capacity
A	1	1	1	40
B	2	4	4	60
C	6	2	2	75
D	2	4	6	80
E	4	4	6	100

You pack a single unit of the item. Oracle Warehouse Management rejects container A because it does not have sufficient weight capacity. Container B can hold the weight of the item, so Oracle Warehouse Management checks the dimensions. The largest dimension of the item, its length, cannot fit in any dimension of container B, so it is disqualified. The largest dimension of the item can fit into the largest dimension of container C, but the next largest dimension of the item, its height, does not fit into either the length or height of container C. Container D, however, is large enough for the item. Container E is also large enough for the item, but container D is selected because it has the smaller weight capacity of the two containers.

Multi Level Cartonization

Use multi level packaging hierarchies when you require labeling for more complex packaging configurations, such as when you need to pack inner boxes into outer boxes, that are placed on a pallet. The multiple levels can be packed all at once, or when using the mobile Bulk Pack page, can be broken up into several intermediate steps. Labels can be generated for each of the many levels of the hierarchy.

Suppose you have to pack an item with the dimensions W:6" L:6" H:6", weighing 2 pounds, when it completes from the manufacturing line. You wrap four of these items together into a 4-Pack, and place a label on the plastic shrink wrap. You then pack the 4-Pack into a large outer box of 10 4-Pack (40 individual units) per outer box. Finally, 12 outer boxes are stacked on a pallet. Labels are required for each of the three levels: 4-pack, outer box, and pallet.

Because of the way the material is packed, you should use the 4-packs and outer boxes only if they can be completely filled. You should not use a 4-pack if there are only 2 items to pack. However, you should use a pallet any time there are 4 or more outer boxes available. You can use the minimum fill percent attribute on the container item model these restrictions.

You can use the following category assignments to model the hierarchy:

Item	Contained Item	Container Item
Item	Inner	-
4-Pk	Outer	Inner
Outer	Pallet	Outer
Pallet	-	Pallet

You can translate quantity packed into the weight capacities of the containers. Because the weight of the item is 2 pounds, the weight capacity of the 4-Pack container item is 8 pounds, the outer container is 80 pounds, and the pallet 960 pounds. You do not need to define the dimensions of the items or container items because the system does not need to use them to determine how the items are packed.

Container	Capacity	Minimum Fill Percentage
4-Pk	8	100%
Outer	80	100%
Pallet	960	34%

In this scenario, where the item-container relationship is specific to the item and is based on a specific predetermined quantity, rather than dimensions in comparison to the containers, Container Load Relationships are easier to set up and maintain. See: Container Load Relationships, page 12-6.

In anticipation of a job completion, you pack 2000 units. Using the same cartonization algorithm defined above, you pack the 2000 units into 500 4-packs. However, because there is only one container item tied to the item via the category setup, and you defined weight and weight capacity, the process by which cartonization selects the 4-pack container item is more direct.

Cartonization now attempts to pack each of the 4-packs, treating each of these as the item to pack. You pack the 4-packs into 50 outer boxes, based on the weight capacity of the inner box. Because each outer box is filled completely, the minimum fill percent is met.

The 50 outer boxes are then packed. Based on the weight capacity of the pallet, 12 outer boxes can fit on each pallet container item. The 50 outer boxes thus require 5 pallets: four completely filled with 12 boxes each, and the fifth packed with the remaining two outer boxes. However, the two outer boxes weigh only 160# in total, less than 34% of the

pallet weight capacity of 960#, and thus that last partial pallet is not packed.

At the end of the cartonization process, therefore, 500 4-packs, 50 outer boxes, and 4 pallets have been packed, and if set up, labels for each of these container items are created.

Percent Fill Basis

The cartonization process considers both weight and volume when recommending specific container items to use. It uses, if defined, both of these criteria, in addition to an optional minimum percent fill, to restrict certain containers. The Percent Fill Basis parameter controls precedence of the volume or the weight when sequencing the containers for evaluation and in calculating the percent filled. See: Overview of Defining Shipping Parameters, *Oracle Order Management Suite Implementation Manual*.

You can set the parameter to either weight or volume. When you set the parameter to weight, the containers are evaluated in ascending sequence of the weight capacity, and the minimum percent fill calculates with respect to the weight capacity of the container. Similarly, if you set the parameter to volume, the containers are evaluated in ascending sequence of their volume capacity, and the minimum percent fill calculates with respect to volume capacity.

When evaluating containers to pack, the cartonization algorithm attempts to find the smallest container that can fit the complete request. The system determines the smallest container by the percent fill basis as described above. If that container is the correct size for the material, but cannot meet the minimum percent fill, then the cartonization process attempts to use the next smaller container, but still considers the physical attributes. This may require the request to be broken up into two or more containers. If after checking all the container items, cartonization cannot fit the material, it does not pack the material further.

Container Load Relationships

You can fix the relationship between items and containers based on a specific quantity. This type of relationship is also referred to as a standard pack quantity. For instance, the multi-level cartonization example described above has fixed the relationship between the item and the packing container. The physical attributes of the item are not directly relevant to the packaging process.

In these cases, container load relationships are easier to define and maintain. Container load relationships state an explicit quantity relationship between a container and the item (or other container item) that it includes. While you can define multiple relationships for each contained item, the cartonization process always uses the preferred relationship. Furthermore, using container load relationships allows the same container items to be used in multiple relationships while preventing item commingling within a specific level in the cartonization process.

Prior to evaluating the categories assigned to each item, the cartonization algorithm checks for any container load relationships. If defined, the system uses the preferred relationship, bypassing any cartonization groups.

Note: Only the preferred relationship is used, the cartonization process ignores any container load relationships you defined that do not have the preferred flag enabled.

You can use a combination of container load relationships and cartonization groups to define a multi-level packaging hierarchy. If you define a container load relationship, an item is never commingled with another item in that level. Only cartonization groups honor the minimum percent fill attribute of the container item; minimum percent fill for container load relationships is not honored.

Packaging vs. LPN

Only the outermost level created at each level of cartonization is defined as a license plate. License plates are not generated for intermediate levels. You can only calculate material availability at the innermost license plate level, and the rules engine cannot allocate nested LPNs and you cannot pick them in a single transaction. The way you create license plates and packaging entities impacts how labels print and on-hand balance maintenance.

In the multi-level example described above, 2000 items were packed into 500 4-packs. These 500 4-packs were packed into 50 outer boxes. 48 of these outer boxes were then packed into 4 pallets. There are 6 outermost levels, 4 pallets each with 480 units, and 2 outer boxes each with 40 units. The system generates a total of 6 license plates for the outermost containers.

You can use the inventory Bulk Pack window, to specify an arbitrary level to stop the packaging hierarchy. You can separate the packaging process into two or more separate steps, so you can perform the initial packaging and label generation when you first receive the material, and the second level packaging prior to shipment.

Because you generate license plates at the outermost level for each packaging request, when you perform Bulk Pack multiple times, license plates are nested. For instance, instead of performing the pack request prior to completion from manufacturing, you could perform Bulk Pack on the loose material after completion from manufacturing. If you perform Bulk Pack on 2000 loose units, specifying a packing level of 1, cartonization stops after packing the items into 500 4-packs, and the system generates 500 license plates.

You then pack the 500 4-packs to the end of the hierarchy by entering each of the license plates in the Bulk Pack user interface, which creates the 50 outer boxes and 4 pallets. Of the 50 outer boxes created, 48 are packed into pallets, and the system generates 4 new outermost license plates for the 4 pallets of 12 outer boxes each, and two new outermost license plates for the two remaining out boxes for a total or 6 outermost license plates. However, an inquiry on the contents of the outer boxes or pallets shows the license plates created at the 4-pack level. Because you packed in a single request for the pallets, the system did not generate license plates for the outer boxes contained in the pallets. If, you require license plates at all levels, you could break the packaging process into three distinct packaging steps.

Note: This does not impact single level packaging hierarchies. License plates always generate for these requests.

Content and Summary Labels

Labels generate for each level in the packaging hierarchy regardless of whether you create a license plate or record the level as packaging.

LPN Summary labels are printed at every level during the cartonization process. These multi-record labels include all the items contained at or below the current cartonization.

LPN Content labels print at every level that contains loose material. For levels that license plates are not generated, the innermost packaging level contains loose material and a LPN Content label may be printed. Because material availability calculations do not have visibility to packaging levels that do not have license plates, the system also prints an LPN Content label for the innermost license plate even if there are other levels of packaging inside the license plate.

You can identify all levels created by cartonization with a unique number. If a license plate exists, the number is the license plate number. If a license plate does not exist, the number is a packaging identifier that can be included on the label. You can print the identifier (packaging or LPN), as well as the immediate parent of the level on every content and summary label. Thus an LPN Summary label may be identified by a package ID and a parent license plate number, or by a license plate number and a parent package identifier. These relationships help you pack the material as determined by the defined packaging hierarchies.

Related Topics

Physical Attribute Group, *Oracle Inventory User's Guide*

Setting up Cartonization

You must perform several setups steps before you can use cartonization. For items that always require a specific container, use the container load relationship. For other items packed into containers in a container group, you must create categories to group the container types and the items. You must then assign the corresponding items to the categories, and assign the physical characteristics such as volume and weight. Finally, you must define the containers the, designate physical characteristics, and assign them to the corresponding categories. You must enable sales order cartonization at the subinventory and organization levels if necessary.

Categories

Setup for cartonization uses Category and Category Set functionality. There are 2 pre-seeded category sets:

- Contained Item

- Container Item

Within these category sets, you create categories that model the different types of packaging used for outbound loads. For example, miscellaneous loose material requires a simple corrugated cardboard box. These boxes, and the items that use these boxes, are given the category MISC within the category sets Container Item and Contained Item.

Refrigerated items, however, must be packed within coolers. These perishable items and the coolers are given the category COOLER within the two category sets.

First, you create categories. In the example above, this corresponds to defining BOX and COOLER. You define categories in the Categories window. You must associate the category with a flexfield structure, and enter a name and description. The structure name for the category must be Cartonization. You can define a name and description for the category.

Before assigning the categories to a category set, the "Controlled At" field at the proper level of control. Controlling the cartonization groups at the master level makes setup easier, particularly if the items already exist. However, it does limit the ability of different organizations to use different packing configurations.

At installation, the category sets Contained Item and Container Item are seeded with the flag Allow Multiple Item Category Assignments unchecked. This prevents assigning multiple categories in a single category set to a single item. The Cartonization algorithm does not support multiple category codes in a single category set assigned to a single item. Instead, you might want to define a new category representing both categories combined.

You can now assign categories to category sets. You must add each category to both the Contained Item and Container Item category sets. The check box Enforce List of Valid Categories should be checked to ensure that container items and contained items are assigned to categories to defined categories.

Related Topics

Defining Categories, *Oracle Inventory User's Guide*

Defining Category Sets, *Oracle Inventory User's Guide*

Contained Items

The next step is to assign the categories to the contained items and to complete the physical attributes of the item. Contained items, or items that are to be packed into containers, are given the appropriate category in the Contained Item category set. The weight, volume, and dimensions of the item can be entered in the Physical Attributes tab of the Master Items window. The unit-of-measure for these measurements should be within the same class for the contained items and the container items. For example, the cartonization algorithm can convert inches to centimeters because they are in the same class, Length. If an item specific conversion is setup to convert, say, 1 liter of an item to 2 pounds, the conversion will still be performed, but the system may be more

difficult to maintain because units-of-measure will have to be checked as well as the items physical characteristics.

Setting up all the physical attributes for the containers or the contents is optional. You can skip the set up of physical attributes or use a subset. For instance, if all the items for a sales order generally fit within all the containers with respect to volume but could potentially exceed the weight capacity of a container, then only the weight of the items and the weight capacity of the container need be entered.

If left null, the physical attributes on container items is assumed to be infinite, while the physical attributes on the contents is assumed to be 0. An item container item, if used in a multi-level packaging hierarchy, will at different times be considered as both contents and as a container.

Related Topics

Overview of Units of Measure, *Oracle Inventory User's Guide*

Defining Unit of Measure Classes, *Oracle Inventory User's Guide*

Defining Units of Measure, *Oracle Inventory User's Guide*

Defining Units of Measure Conversions, *Oracle Inventory User's Guide*

Defining Items, *Oracle Inventory User's Guide*

Physical Attribute Group, *Oracle Inventory User's Guide*

Container Items

You define container items the same way as contained items. Container items must have the appropriate category assignment within the Container Item category set. You can also define the three sets of physical attributes defined for contained items, weight capacity, volume capacity, and dimensions, for container items. These attributes pertain to the container itself. You must set the container flag as well as the internal volume and maximum load weight.

The units-of-measure for these measurements are the same units-of-measure used for the volume and weight of the container. You must also set the transactable flag for container items. The container weight and volume are different from its maximum load weight and internal volume. For a container, weight and volume are optional fields that give the weight of an empty container and the volume of an empty container. The maximum load weight and the internal volume are used to determine the capacity of the container. The container weight and volume are used to calculate the total gross weight and loaded volume of the LPN.

The total volume of an LPN may be calculated in one of two ways, depending on how the container is used. In the case of a pallet, where material is stacked on top of the container, the total LPN volume is the sum of the content and container volume. In the case of a drum, where material is packed inside the container, the total LPN volume is always the container volume, regardless of the quantity of material packed. Therefore,

the LPN volume is calculated as the maximum of the LPN volume and the content volume.

For example, an item weighs 15 pounds and requires 1 cubic foot. It can be packed into a drum or a pallet. Assume that both containers can hold at least 10 of the item, by dimensions, weight, and volume.

Container	Weight	Volume
Drum	10 pounds	20 cubic feet
Pallet	20 pounds	5 cubic feet

If you pack 10 of the item on a single pallet, the total LPN weight is 10 x 15 + 20 = 170 pounds, while the total LPN volume is max(5, 10 x 1) = 10 cu. ft. If you pack 10 of the item in a single drum, the total LPN weight is 10 x 15 + 10 = 160 pounds, while the total LPN volume is max(20, 10 x 1) = 20 cu. ft.

Container Load Relationships

Some items require specific containers. These items have container load relationships, which are direct relationships between a container item and a contained item. The relationship specifies how many of the contained item can fit into one container. You set up container load relationships in the Container Item Relationship window.

Although you can establish multiple relationships for a single contained item, the cartonization process uses only the preferred relationship. There can be only one preferred relationship for each content item.

Prior to setting up these relationships, the container items must be properly setup. Any container item setup using the steps above will is a valid container item for a direct relationship. Alternatively, to setup items just for direct container load relationships, the only required step is to check the container flag in the container object group. No other physical attributes of the contained item or container item need to be entered.

Related Topics

Describing Container Load Relationships, *Oracle Warehouse Management User's Guide*

Overview of Units of Measure, *Oracle Inventory User's Guide*

Defining Unit of Measure Classes, *Oracle Inventory User's Guide*

Defining Units of Measure, *Oracle Inventory User's Guide*

Defining Units of Measure Conversions, *Oracle Inventory User's Guide*

Defining Items, *Oracle Inventory User's Guide*

Physical Attribute Group, *Oracle Inventory User's Guide*

Subinventory and Organization Setup

You must setup cartonization for subinventories and organizations when you use cartonization during pick release if cartonization for sales orders or manufacturing is appropriate for your business process. Some subinventories may store items in LPNs that are already packed, such as a case or a pallet area.

Parameters on the Warehouse tab of the Organization Parameters window control the cartonization level, and the cartonization processes to use. The "Enable Cartonization" flag has three options:

- You can turn on cartonization, in which case pick released lines are cartonized regardless of the allocation subinventory.
- You can turn off cartonization in which case no pick released lines are cartonized.
- You can configure cartonization at the subinventory level. The system first checks the cartonization flag on the subinventory definition before cartonization.

In addition, there are two flags that independently control whether cartonization is performed during sales order pick release or manufacturing component pick release.

The cartonization flag on the subinventory has only two options: enabled or disabled. This flag is used if you set the "Enable Cartonization" to "Controlled at Subinventory" on the Organization Parameters window.

Cartonization Setup Steps

Setting up cartonization includes the following steps:

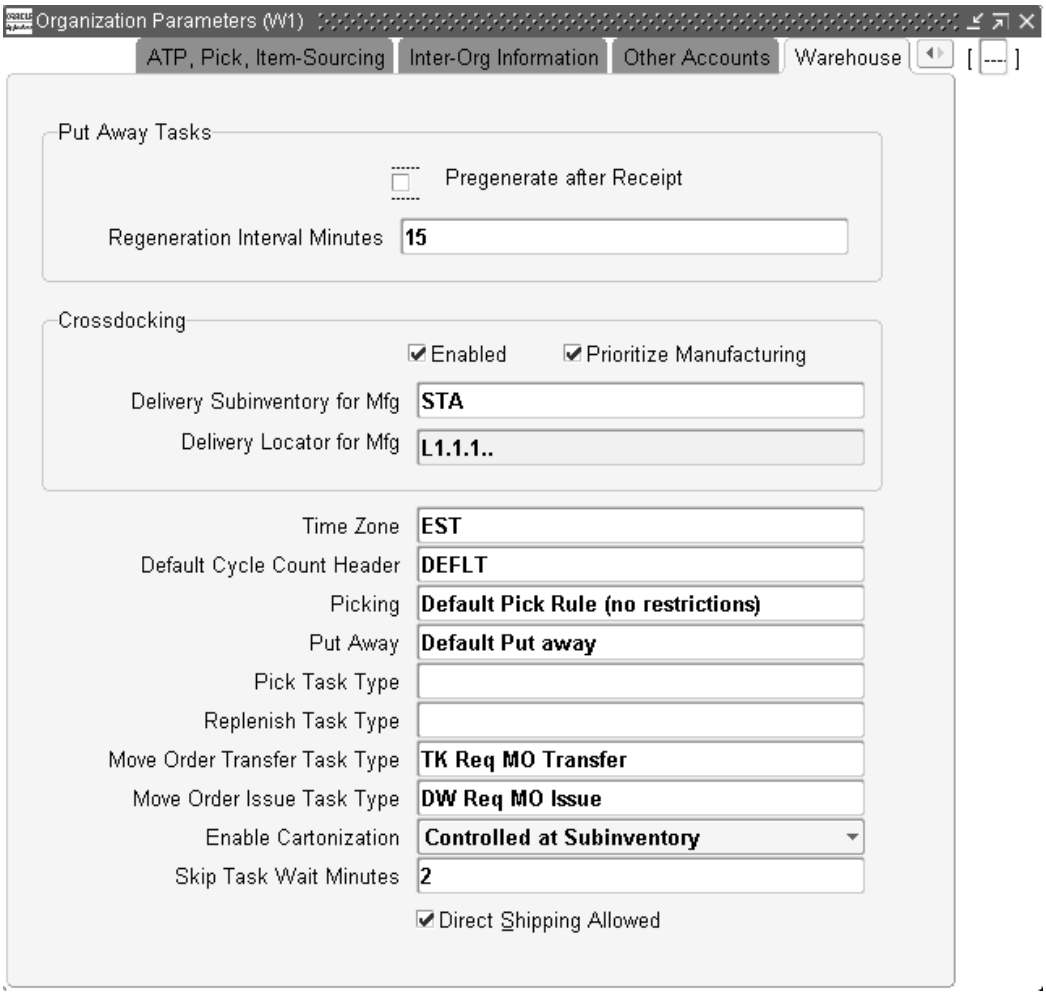
Step	Description
1	Enable cartonization, page 12-12
2	Define cartonization groups, page 12-14
3	Assign cartonization groups to cartonization category sets, page 12-15
4	Define containers items, page 12-18
5	Assign containers to cartonization groups, page 12-20

Step	Description
6	Define contained item physical characteristics, page 12-21
7	Assign contained items to cartonization groups, page 12-22
8	Define container-load relationships, page 12-23

Enable Cartonization for Sales Order Line Picking

To enable cartonization for sales order line picking (pick release), you must select Controlled at Subinventory in the Enable Cartonization field of the Warehouse tab within the Organization Parameters window.

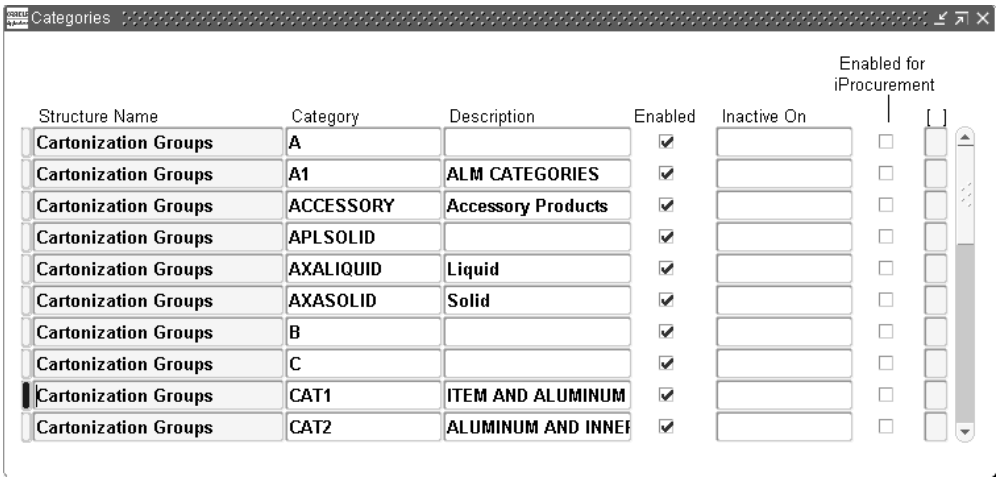
Controlled at Subinventory value means that cartonization is enabled for all subinventories, regardless of the cartonization flag setting at the subinventory level, and that the cartonization option will be determined at the subinventory level.



Define Cartonization Groups

A flexfield structure, called Cartonization Groups, is seeded with the system. Therefore, to define cartonization groups, you need only to select the Cartonization Groups flexfield structure and then set up a category code and description for each group.

1. Navigate to the Categories window.



2. In the Find Categories window click New.
3. In the Structure Name field, use the list of values to select Cartonization Groups.
4. In the Category field, enter a name for the cartonization group that you are defining.
5. Enter a description for the cartonization group.
6. Save your work.

Assign Cartonization Groups to Cartonization Category Sets

After you set up the appropriate cartonization groups (also known as category codes), you assign the groups to category sets. You must assign cartonization groups to the following two category sets:

- Contained item, which represents items that are packed
- Container item, which represents the actual container, such as a box, or pallet into which items are packed.

Both the Contained Item and Container Item have been seeded with the Oracle Warehouse Management. You should assign each category code that you define to both the Contained Item and Container Item category sets.

Specifying Cartonization Control Levels

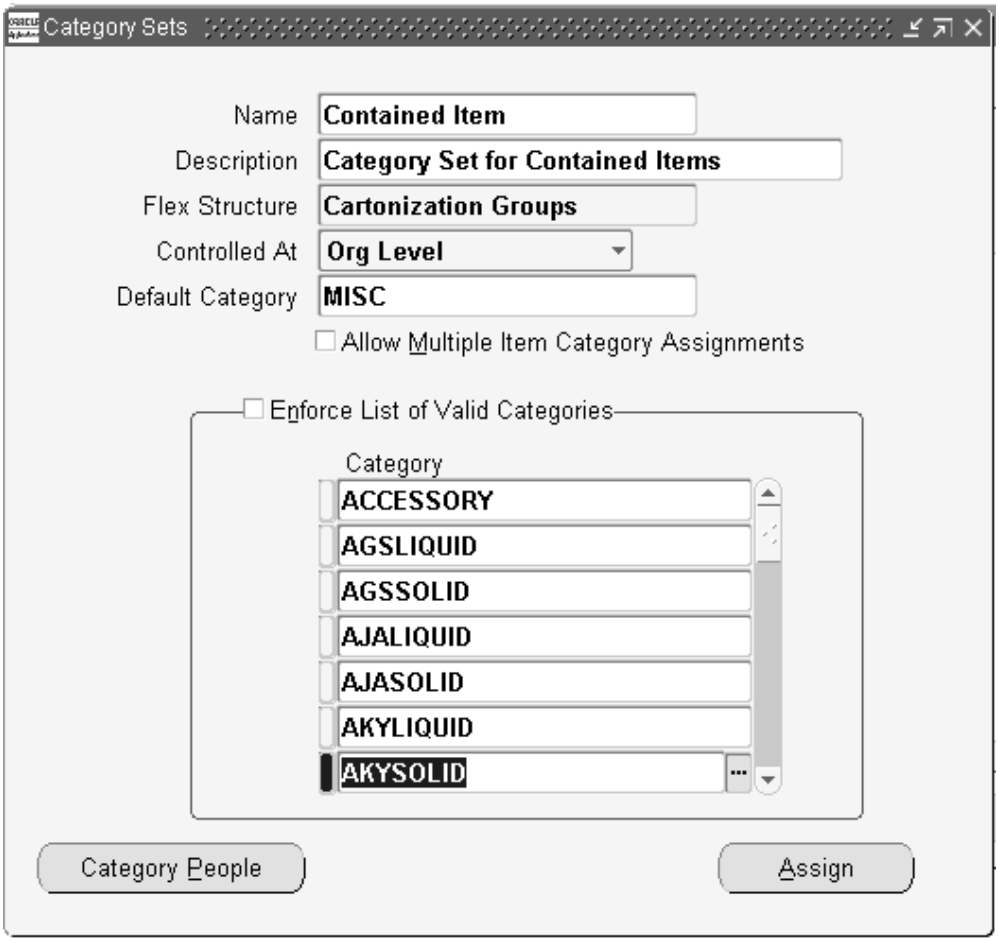
When you add a cartonization group to a category set, you must specify at which level–either the Master or Organization–that the cartonization group should be controlled. If there are organization-specific carton types, then you should specify that cartonization be controlled at the Organization level. If you do not have organization-specific carton

types, then you should specific that the cartonization group at the Master level.

Controlling cartonization groups at the Organization level enables different cartonization groups to be assigned to the same item for different organizations. However, it is easier to set up and maintain cartonization groups that are controlled at the Master level, because the category assignment need not be made for each organization.

How to Assign Cartonization Groups to the Contained Item Set

1. Navigate to the Category Sets window.



2. Select the empty field below the last category code.

3. Use the list of values to select the item category code to assign to the category set.

4. Save your work.

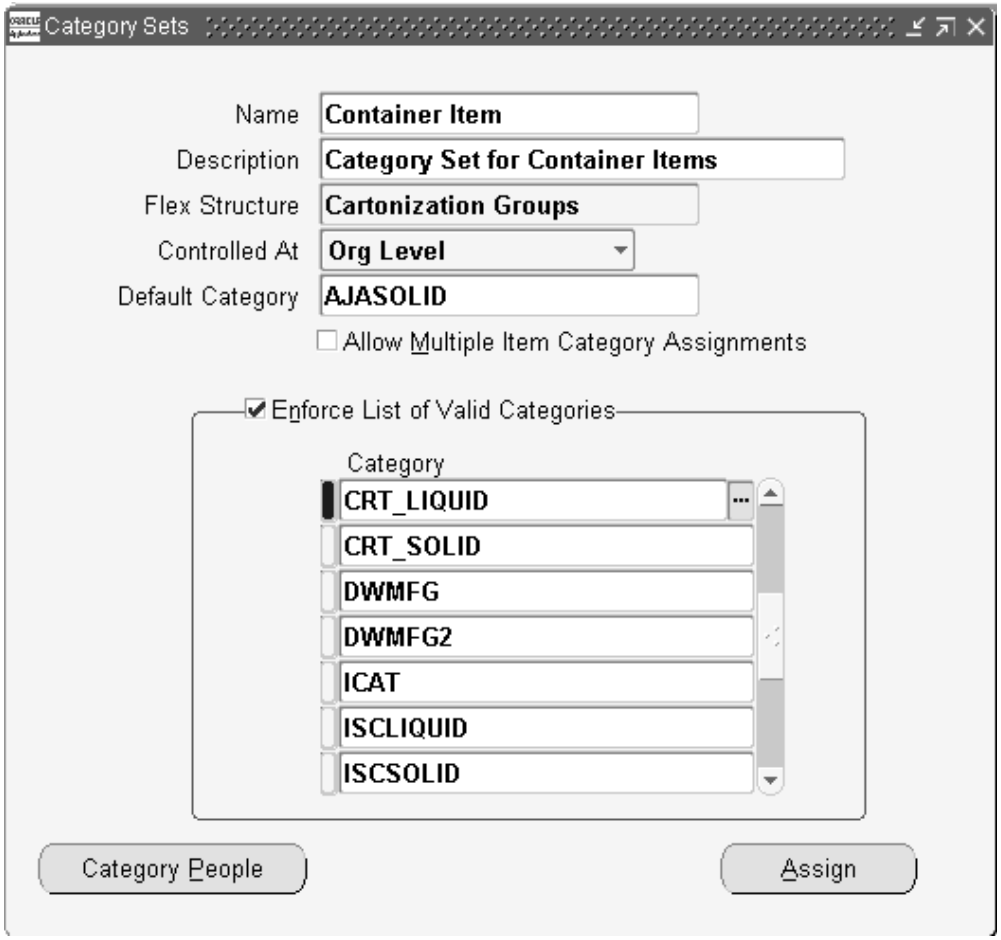
   If you want a default category to be associated with the Contained Item category set, you can optionally define a default category in the Default Category field. However, an item must still be assigned to the category set for the default category

code to be used. If you leave the Allow Multiple Item Category Assignments check box blank, you can restrict items to only one cartonization group.

If you select the Enforce List of Valid Categories check box, you can prevent users from selecting the inappropriate category set when they assign an item to a category set.

How to Assign Cartonization Groups to the Container Item Category Set

1. Navigate to the Category Sets window.



2. Query the Container Item category set.

3. Select the empty field below the last category code.

4. Use the list of values to select the category code (which represent the various container types) to which you want to assign the category set.

5. Click Assign to complete the assignment.

If you want a default category to be associated with the Container Item category set, you can optionally define a default category in the Default Category field. However, an item must still be assigned to the category set for the default category code to be used. If you leave the Allow Multiple Item Category Assignments check box blank, you can restrict items to only one cartonization group.

If you select the Enforce List of Valid Categories check box, you can prevent users from selecting the inappropriate category set when they assign an item to a category set.

> **Note:** Both category sets should have the same list of categories assigned to them.

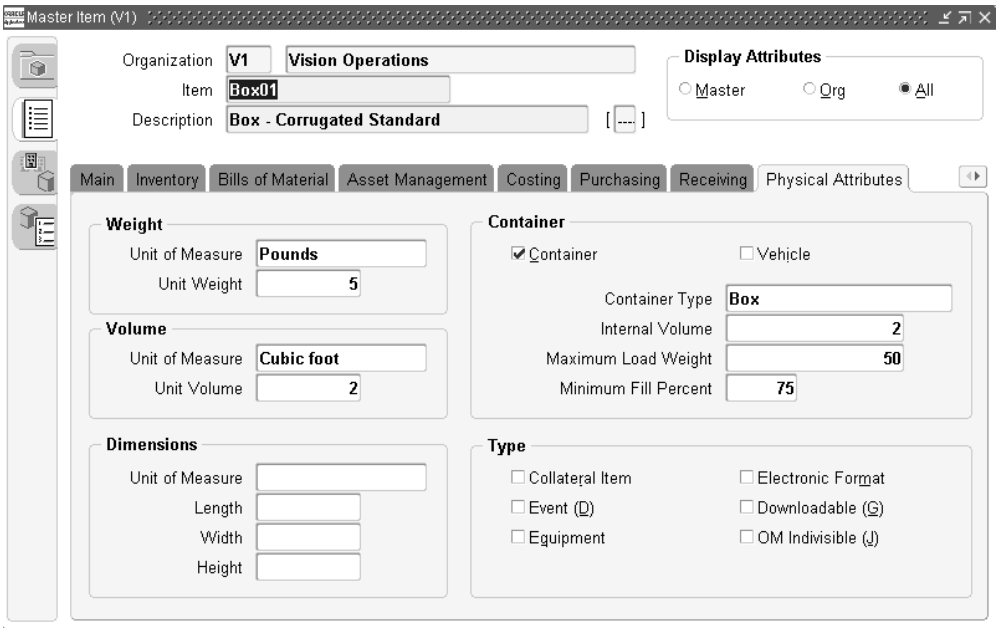
Defining Containers as Items

After you set up the appropriate category codes and category sets, you must define the containers and cartons into which you will later pack items. Because containers represent another type of item, you use the Master Items form to set them up.

> **Note:** You must define container items and contained item with the same unit of measure class. For example, if you have an item defined in inches, and a container defined in centimeters, the system will make the conversion from inches to centimeters (or centimeters to inches), because both units of measure are of the UOM class, Length.

The following instructions explain how to set up those attributes that specify the item as a container. For detailed instructions on setting up inventory items, see: Defining Items, *Oracle Inventory User's Guide*.

1. Navigate to the Master Item window
2. Query on or create a new item that you want to define as a container.



3. On the Physical Attributes tab, optionally enter the following information:

> **Note:** Physical attributes are optional, and by leaving a particular attribute blank, cartonization will assume that the item has 0 weight, volume, and dimension for the case of contents, or infinite capacity in the case of containers.

- In the Weight region, use the list of values to select the unit of measure associated with the container's weight, for example, pounds.
- In the Volume region, use the list of values to select the unit of measure that defines the volume for this container, for example, inches.
- In the Volume region, also enter the container's unit volume.

> **Note:** The internal volume is not necessarily equal to the product of the container's length, width, and height measurements. For example, a pallet might have dimensions of 4 feet by 3 feet by 6 inches, while the internal volume (or volume capacity) of the pallet might be 50 cubic feet.

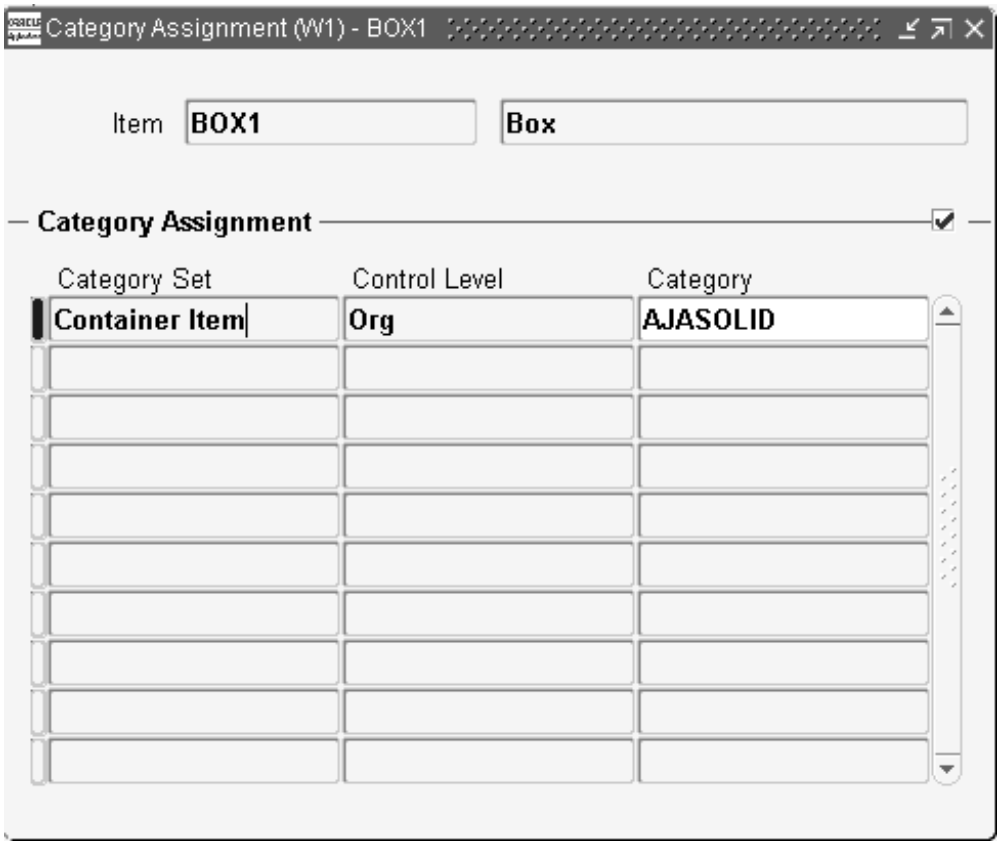
- In the Dimensions region, select the unit of measure associated with the dimensions of the container.
- In the Dimensions region, enter the length, width, and height of the container.

- In the Container region, select the Container check box to indicate that this item is a container.
- In the Container region, enter the container's internal volume and maximum load weight, in their respective fields.

Assign Containers to Cartonization Groups

After you set up container items, you must assign them to the appropriate cartonization groups. You designate this assignment at the Master item level or at the Organization item level, depending on the definition of the category set. For example, if the category set to which you want to assign a container item is controlled at the Master level, then when you assign the container item to the category set, you should specify that it be controlled at the Master level.

1. Navigate to the Master Item window.
2. Query on the container item to assign it to a cartonization group.
3. Select Categories from the Tools menu, to open the Category Assignment window.



4. In the Category Set field, use the list of values to select the Container Item category set.

5. In the Category field, use the list of values to select the cartonization group (or category) to which you want to assign the container.

6. Save your work.

Defining Contained Item Physical Characteristics

After you set up appropriate category codes and category sets, you must modify or update the attributes of the items for which you want the system to suggest containers. For cartonization to work properly, you must update the following item attributes:

- Item's category set from the Contained Item category set
- Physical dimensions of the item: weight, volume, and dimension

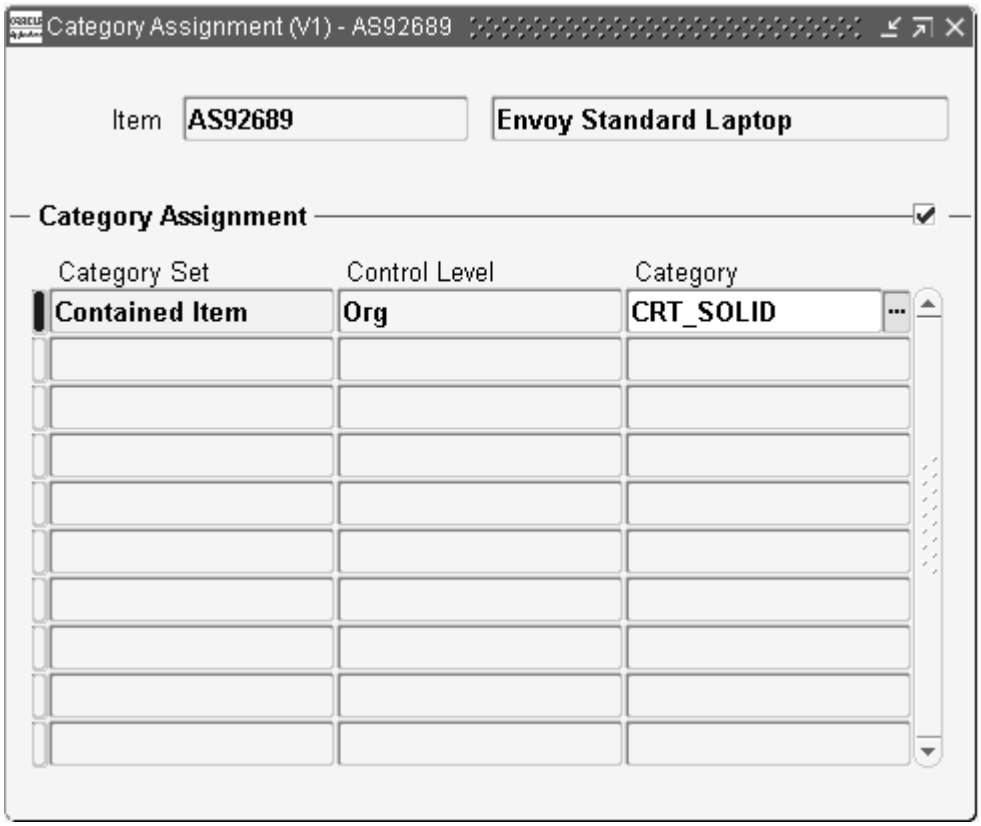
> **Note:** Optionally, you may specify a weight, volume, and dimension, and corresponding UOMs for items in which you want

the system to suggest cartonization, otherwise, cartonization will assume that the item has 0 weight, volume, and dimension for the case of contents, or infinite capacity in the case of containers.

1. Navigate to the Master Items window.
2. Query on the item for which you want to define weight, volume, and dimensions.
3. On the Physical Attributes tab, in the Weight region, use the list of values to select the unit of measure for the item, and then enter its weight.
4. In the Volume region, use the list of values to select the unit of measure associated with the volume, and then enter the unit volume.
5. In the Dimensions region, use the list of values to select unit of measure for the item's dimensions, then enter the item's length, width, and height.
6. Save your work.

Assigning Contained Items to Cartonization Groups:

1. Navigate to the Master Items window.
2. Query on the item that you want to assign to a cartonization group.
3. Select Categories from the Tools menu, to open the Category Assignment window.



4. In the Category Container Item Set field, use the list of values to select the Contained Item category set.

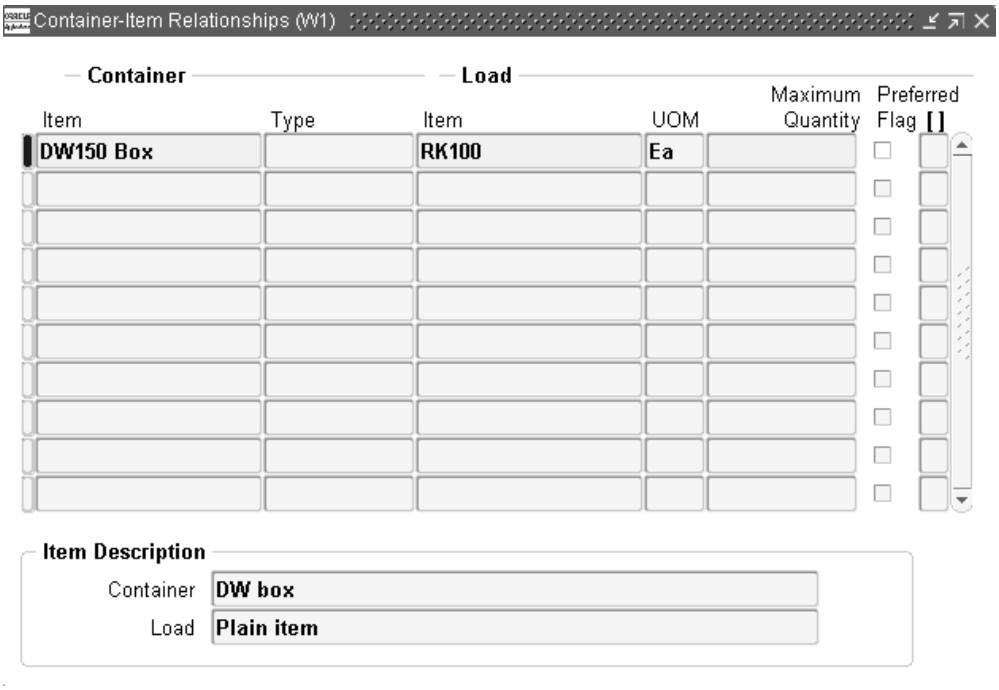
5. In the Category field, use the list of values to select the cartonization group (or category) to which you want to assign the container.

6. Save your work.

Defining Container Load Relationships

Recall that container-item relationships direct the system to suggest packing an item into a specific container, and override the relationships defined by the container groups.

1. Navigate to the Container-Item Relationships window.



2. In the Container region, Item field, use the list of values to select the container that you want to associate with a specific item.

3. In the Load region, Item field, use the list of values to select the item that you want to be packed in the container item that you selected in the previous step.

4. Mark the relationship as preferred if you wish Oracle Warehouse Management cartonization to use the container load relationship. Oracle Warehouse Management cartonization only considers the preferred container load relationships.

5. Save your work.

Related Topics

Defining Categories, *Oracle Inventory User's Guide*

Defining Category Sets, *Oracle Inventory User's Guide*

LPN Controlled and Cartonization Enabled

Cartonizing sales order lines that are allocated from subinventories where items are already packed in LPNs can cause confusion during picking tasks. If you pick an entire LPN you can either discard the suggestion the cartonization process makes, or place the entire picked LPN into the cartonization suggestion. If you use cartonization at pick

release the following setup is recommended:

- Organization setting of cartonization controlled at subinventory level
- Subinventories that enable cartonization disable LPN control

Therefore, whenever a task is cartonized by the system, you are guaranteed that loose material is available.

In some scenarios, you should enable cartonization in LPN-controlled subinventories. For instance, an item may require different shipping packaging that differs from the storage packaging even if it is already stored in a license plate. Task management also supports these scenarios.

LPN Allocation

The Rules Engine allocates a particular license plate for a task based on the rule allocation mode or on prior reservations. This is possible if you enable both LPN allocation and cartonization for a subinventory.

However, the system bypasses cartonization when an entire LPN is allocated by a single task, so you can perform the picking execution process in a single scan. If an LPN is partially allocated for a line, the system cartonizes it if cartonization is enabled for the subinventory.

Bulk Pack API

You can trigger the bulk pack process via the transaction interface table, MTL_TRANSACTION_INTERFACE, as well as from the mobile window. Bulk pack transactions are added to the interface table in exactly the same way as pack transactions. The only difference is the license plate column TRANSFER_LPN_ID is left null. In addition, the column CONTAINERS can be optionally populated with the level at which bulk pack should halt.

Packing Workbench

The packing workbench enables you to pack material in a fixed location. It provides information such as items eligible to pack, packing instructions, and items packed in LPN. It also supports packing requirements for inbound and outbound material movements.

For inbound and outbound unpack transactions after the system creates an MMTT record, is created but prior to processing, the LPN Content Spread table displays a line with a negative quantity that indicates this it is an unpack transaction. For inbound unpack transactions, the system can process the MMTT records before you close the LPN. After you process the transaction, the system removes the line with the negative quantity line and reduces the actual quantity. For outbound unpack transactions, the MMTT records are processed when you close the LPN, so the lines with negative

quantity remain.

Packing Process

Packing process is carried out by entering basic information such as the physical location of packing, identification of material eligible to pack and packing transaction to be carried out. Once this is done the material that user wants to pack either travels to the pack station in a conveyor (Goods to Man) or the user physically brings the material to pack station (Man to Goods). Subsequently the user performs and confirms the packing operation on the material that has been moved to the pack station. Labels are generated when packing transaction is complete.

Packing Initialization

Packing process is a user-initiated process. User specifies the information to initiate packing transactions in Packing Workbench Initialization window.

- The user specifies the physical location where the packing is carried out by entering the "Packing Station". Packing Station is a physical locator with a desktop PC and wedge scanner where packing transactions are carried out. It is defined as a locator of type "Packing Station". Packed/Unpacked material resides at packing station after packing transactions are completed

- The user enters the transaction Source for identifying the material that is eligible to pack. The user can following transaction sources:

  - Inbound: If transaction source is "inbound" received material residing in receiving subinventory is eligible for packing. Packing workbench can also be used to pack loose material received through desktop into LPNs.

  - Outbound: Staged material residing in a staging subinventory is eligible for packing. Packing transactions can be carried out any time after pick drop and prior to ship confirm. Material can be consolidated at the time of pick drop into LPN and/or locator prior to packing.

- The user enters the packing process such as pack, split, unpack or reconfiguration. He can specify additional parameters such as Each Pack, Serial Triggered or Kitting for the packing transaction.

  - Each Pack: This option always defaults the pack quantity to 1. This is useful when packing is carried out by scanning each and every unit

  - Serial Triggered: This option allows packing transaction to be carried out by just scan of serial number. Entry of item is not required if the serial number is unique

  - Kitting: If order was placed for a "Kit Item" or "Configured PTO Item", Packing

workbench also displays bill of material for the kit item or configured PTO item whenever a component of this BOM is scanned.

- The user can enter additional Material and document filter criteria to identify material for packing transactions. It is recommended that "Delivery State" field be used when locator based consolidation is used. This field can be used to identify the deliveries that are in "Completely Picked" status and hence eligible to perform packing.

Packing Transactions

This screen shows the eligible items based on the query criteria. The user can visually see the eligible items. The user can select items to pack if the packing process involves physically moving the material to pack station or Man to Goods flow. Once this is done one of the following packing process can begin.

- Pack: The user creates or scans a To LPN. This is the LPN into which the selected eligible material would be packed. The user subsequently performs the pack transaction by scanning the contents that go into To LPN. The contents could be an item, an LPN or a serial number. If item is scanned, the user also enters the quantity and if applicable, the lot information. If content is an LPN, the content LPN is nested within the To LPN.

- Split: The user creates or scans a To LPN. This is the LPN into which the selected eligible material would be packed. The user also scans a From LPN. This is the LPN from which contents will be removed and packed into the To LPN. The user subsequently performs the split transaction by scanning the contents of From LPN and at the same time physically packing them into To LPN. The contents could be an item, an LPN or a serial number. If item is scanned, the user also enters the quantity and if applicable, the lot information. If content is an LPN, the content LPN is nested within the To LPN.

- Unpack: The user scans a From LPN. This is the LPN from which the selected eligible material would be unpacked. The user subsequently performs the unpack transaction by scanning the contents of From LPN and at the same time physically unpacking them from LPN. The contents could be an Item (for inbound material only), LPN or a serial number. If item is scanned, the user also enters the quantity and if applicable, the lot information. If content is an LPN, the content LPN is unnested from within the From LPN.

- Reconfiguration: LPN reconfiguration is carried out by scanning an LPN and choosing either a "Merge up" or "Breakdown" method to unnest the LPN. A breakdown mode results in one or more child LPNs and all "container" only LPNs are destroyed. A "Merge up" mode of LPN reconfiguration, consolidates the contents of all inner LPN(s) into the outermost LPN. All "inner" LPNs are destroyed.

LPN Close confirms the packing transaction and triggers label printing using business flow Packing Workbench.Performing Packing Processes, *Oracle Warehouse Management User's Guide*

Packing Workbench Implementation Considerations

- The movement of material to packing station occurs only when the pack transaction is confirmed. The confirmation of pack transaction occurs at different points of time depending upon the transaction source:
  - Inbound: Packing of Inbound material is confirmed whenever a new content is entered or scanned. Therefore an implicit movement of packed material is carried out whenever packing is done for a new item/LPN/serial number. This is the reason why packing of inbound material cannot be undone using "Undo" button.
  - Outbound: Packing of outbound material is confirmed when a "Close LPN" transaction is done. Therefore an implicit movement of packed material to pack station is carried out on LPN Close.
- Packing workbench can capture the lot attributes if you receive a new lot on the desktop windows and subsequently pack the material in an LPN using the packing workbench.
- Packing Workbench allows packing activities to be carried out only in a locator of type "Pack Station". Therefore it's important to define a packing station to use packing workbench functionality.
- Packing workbench has been designed to perform high volume of pack transactions. The UI has been designed to facilitate desktop wedge scanners and touch screens. However it's not mandatory that desktop wedge scanners or touch screens be used.
- If Desktop wedge scanner is being used, consider appending a Carriage Return (CR) for every scan. Please follow the scanner manufacturer's documentation to configure the scanner for appending Carriage Return (CR) on every scan.
- Packing workbench supports GTIN and DFI functionality. This implies that a barcode belonging to GTIN data structure such as EAN.UCC-14, EAN-8, EAN-13 and UCC-12 (UPC) are supported. Please see the chapter on Global Trade Item Numbers (GTIN) for implementation details
- Packing workbench supports DFI functionality. However since desktop forms do not support non-printable characters, the scanner must be configured to send a printable character on every scan. This printable character can be specified in the form function parameter e.g. DFI='$'.

If form function parameter DFI='$'is entered, the scanner should be configured to prefix a '$' (without the quotes) for every scan. This should be done only when packing transactions are done by scanning barcodes with DFI. The following table illustrates the effect of this setting on an LPN label that has been bar-coded with DFI=J

Bar Code Data	Scanned Data	Value in Scanned Value
JLPN001	$JLPN001	LPN001

- Packing workbench can be used to enter secondary UOM and secondary quantity for catch weight enabled items. Form function parameter CATCH_WEIGHT is used for this purpose. This form function parameter can have the following values:
  - D (Disabled): Secondary UOM and Quantity cannot be entered in Packing Workbench for catch weight enabled items.
  - (Optional): Secondary UOM and Quantity are defaulted in Packing Workbench and user can optionally modify the values
  - R (Required): Secondary UOM and Quantity must be entered in Packing Workbench for catch weight enabled items

Packing Workbench can be configured to disable the entry of Secondary UOM and Quantity by form function parameter as: CATCH_WEIGHT='D'

Common Problems

The following problems relate to the operation of cartonization rather than the setup on the individual items or categories.

1. Different quantity for task than expected

   There are several possible reasons why you are dispatched a task for a different quantity than you expect. The line was split at allocation because the Rules Engine did not allocate the entire quantity from a single locator. The line was split at cartonization based on the weight and volume capacities of the suggested container. Finally the line was split when the task was created due to limited capacity of the required equipment. You can check for all tasks created for a particular sales order via the Warehouse Control Board.

2. Non-integer tasks not cartonized

   Cartonization is not performed on tasks with non-integer primary quantities unless container load relationships have been defined. Non-integer primary quantities are generally only found when the sales order lines were created with non-integer

primary quantities. This is because the system does not know into which fractional units the item can be split.

However, as container load relationships are item specific, and because container load relationships can be setup for non-integer quantities, the system assumes the item can be broken up into the quantity indicated on the container load relationships, regardless of the degree of precision.

3. Tasks not cartonized together when they should be

   If tasks are not being cartonized together as expected, or conversely, if different tasks have been cartonized together when they should not be, check the delivery grouping rules. The cartonization system does not cartonize across deliveries, but verifies the deliveries are created as expected.

   If you use container load relationships, different content items are not packed into the same LPN, even though both content items have relationships to the same container item. The cartonization algorithm considers merging different items into the same LPN when container groups, defined via categories and category sets, are used.

4. Task was not cartonized

   There are several reasons a task created by the pick release process may not be cartonized. Verify that cartonization is either enabled at the organization level, or the subinventory level, and the subinventory from which the task was allocated has cartonization enabled. Also verify cartonization is enabled for the sales order or manufacturing pick release processes on the Organization Parameters window.

   Verify you defined either the cartonization groups or container load relationships for the item and that the container item is transactable. If you use cartonization groups, verify at least one of the container items has the capacity for the item you are trying to pack, and that the container item is not invalidated based on item dimensions or container minimum fill percent. If you use container load relationships verify only one relationship for that particular content item is specified as the preferred or default relationship.

5. Container load relationships not honored

   The cartonization process honors only the preferred container load relationship and you can enable only one relationship for any given content item as the preferred relationship. Verify the expected container item is marked as the preferred relationship.

Debugging Notes

Several common mistakes are made when defining the container groups and the physical attributes of the container and contents. Several validation scripts are included below to verify the individual setup steps, and to aid in troubleshooting.

Category Assignments

This script checks the category assignments of an item at the organization level. Given an item name and three-letter organization code (both inside single quotes), the script returns any category assignment of the item in the Contained Item or Container Item category set. If the system does not return a category assignment or displays an incorrect category assignment, cartonization does not work properly.

```
select concatenated_segments, category_set_name,
mtl_categories.segment1 as category
from mtl_category_sets mcs, mtl_item_categories mic,
mtl_system_items_kfv msik, mtl_categories_b mc,
mtl_parameters mp
where concatenated_segments = &Name
and mp.organization_code = &Org_code
and mc.category_id = mic.category_id
and msik.organization_id = mp.organization_id
and mic.organization_id = mp.organization_id
and mcs.category_set_id = mic.category_set_id
and msik.inventory_item_id = mic.inventory_item_id
and category_set_name in ('Container Item','Contained Item')
```

This script lists the items the system recognizes as valid containers for a given contained item. Verify the inventory_item_flag and the transactions_enabled_flag for the container items are set to Yes. They must both be set to Y for the cartonization system to generate LPNs for the container item.

```
select kfva.concatenated_segments as contained,
  kfvb.concatenated_segments as container, kfvb.inventory_item_flag,
  kfvb.mtl_transactions_enabled_flag
from mtl_category_sets setsa, mtl_item_categories itema,
  mtl_system_items_kfv kfva, mtl_categories_b cata,
  mtl_category_sets setsb,mtl_item_categories itemb,
  mtl_system_items_kfv kfvb, mtl_categories_b catb, mtl_parameters
where mtl_parameters.organization_code=&org_id
  and kfva.concatenated_segments = &Name
  and cata.category_id = itema.category_id
  and kfva.organization_id=mtl_parameters.organization_id
  and itema.organization_id=mtl_parameters.organization_id
  and setsa.category_set_id = itema.category_set_id
  and kfva.inventory_item_id = itema.inventory_item_id
  and setsa.category_set_name = 'Contained Item'
  and catb.category_id = itemb.category_id
  and kfvb.organization_id=mtl_parameters.organization_id
  and itemb.organization_id=mtl_parameters.organization_id
  and setsb.category_set_id = itemb.category_set_id
  and kfvb.inventory_item_id = itemb.inventory_item_id
  and setsb.category_set_name = 'Container Item'
  and cata.category_id = catb.category_id
```

If both of scripts give the expected results and bulk packing still fails, then physical attributes may be missing or incorrectly defined.

Physical Attributes

Physical attributes are optional. You only need a subset of them for a given container or item. The only physical attributes setup that prevent a particular item or container from

cartonization relate to the unit of measure. If physical attributes are defined, ensure they have a corresponding unit of measure and unit of measure conversions. The units of measure must all be in the same class; inter class conversions are only used when converting the transaction unit of measure to the primary unit of measure of the item.

This script displays all the physical attributes for all items (both contained items and container items) of a particular category.

```
select concatenated_segments as item, volume_uom_code,
  unit_volume, unit_weight, weight_uom_code,
  dimension_uom_code, unit_height, unit_length, unit_width,
  internal_volume, maximum_load_weight, container_item_flag
from mtl_system_items_kfv msik, mtl_item_categories mic,
  mtl_categories_b mc, mtl_parameters mp, mtl_category_sets mcs
where mp.organization_code=&org_code
  and mc.segment1 = &Category
  and mp.organization_id = msik.organization_id
  and mp.organization_id = mic.organization_id
  and mc.category_id = mic.category_id
  and mic.category_set_id = mcs.category_set_id
  and mic.inventory_item_id = msik.inventory_item_id
  and mcs.category_set_name in ('Container Item','Contained Item')
  order by container_item_flag
```

Bulk Pack Verification

In general, the printed labels are bulk pack and prepack. However, you can use these scripts to retrieve cartonized LPNs when label printing is not set up, such as for early stages in an implementation or in a testing environment.

This script gives all the LPNs that contain a particular item. It also displays lot and revision information, if applicable to the contained item. This script is valid for items that are not serial controlled.

```
select b.concatenated_segments as container, license_plate_number,
  quantity, a.concatenated_segments as contained,
  contained.lot_number, contained.revision, lpn_context
from wms_lpn_contents contained, wms_license_plate_numbers container,
  mtl_system_items_kfv a, mtl_system_items_kfv b, mtl_parameters
where mtl_parameters.organization_code = &org_id
  and b.inventory_item_id = container.inventory_item_id
  and contained.organization_id = mtl_parameters.organization_id
  and a.concatenated_segments=&ContainedItem
  and a.organization_id =contained.organization_id
  and container.lpn_id = contained.parent_lpn_id
  and container.organization_id = contained.organization_id
  and a.inventory_item_id=contained.inventory_item_id
  and b.organization_id = a.organization_id
order by lpn_content_id
```

This script give all the LPNs that contain serial controlled items.

```
select b.concatenated_segments as container,
  license_plate_number,quantity,
  a.concatenated_segments as contained, sn.revision,
  sn.serial_number, sn.lot_number, lpn_context
from wms_lpn_contents contained, wms_license_plate_numbers container,
  mtl_system_items_kfv a, mtl_system_items_kfv b,
  mtl_parameters, mtl_serial_numbers sn
where mtl_parameters.organization_code = &org_code
  and b.inventory_item_id = container.inventory_item_id
  and contained.organization_id = mtl_parameters.organization_id
  and a.concatenated_segments=&ContainedItem
  and a.organization_id =contained.organization_id
  and a.organization_id =contained.organization_id
  and container.organization_id = contained.organization_id
  and a.inventory_item_id=contained.inventory_item_id
  and b.organization_id = a.organization_id
  and sn.lpn_id = container.lpn_id
  and contained.inventory_item_id = sn.inventory_item_id
order by lpn_content_id
```

Both scripts work for LPNs that are packed with either the Bulk Pack form or the Concurrent Prepack request. LPNs packed via bulk pack have an LPN context of 1, that indicates that it is currently in inventory, while LPNs packed via the concurrent request have an LPN context of 3, that indicates the LPN contents are not yet available for inventory.

Frequently Asked Questions

1. How are lot prepacked?

   The lot number must be known when an LPN is prepacked. You can enter an existing lot number, if the assemblies are to be completed into an existing lot. However, if it is a new lot, you can leave the lot number blank on the prepack request and the system automatically generates a new lot number using the item lot generation prefix and starting number. The lot number can then be printed on the label. Only a single lot can be prepacked in each request.

   This means it is possible to have a prepacked lot in an LPN, with the lot number indicated on WMS_LPN_CONTENTS, but no corresponding lot number created in MTL_LOT_NUMBERS.

2. How are serials prepacked?

   Individual serial numbers are not prepacked. This is because the system has no way to indicate which serials are expected in each LPN short of printing a serial label for each serial number, which may not be set up. Therefore, a request is made to pack a particular quantity (and potentially lot and revision) of a serial controlled item, but the serials are only entered (and potentially created) at the completion.

   This means it is possible to have prepacked serials in an LPN, with the serial quantity indicated on WMS_LPN_CONTENTS, but no corresponding serial numbers created in MTL_SERIAL_NUMBERS.

3. Can the prepacked item, quantity, or lot be overridden?

   No, the prepacked item, quantity, or lot cannot be overridden at time of completion, nor can the revision or container item (type of container) be changed. For instance, an LPN with 25 of an item prepacked in it cannot be used for a completion of a job with only 24 remaining to complete, and LPNs prepacked with one item cannot be used for a completion transaction of another item.

   However, as there is no tie between the prepacked LPNs and the job prior to the completion transaction, there is no need to use the prepacked LPNs or to cancel the prepacked LPNs; new LPNs can be generated on the fly.

4. Can non-preferred container load relationships used?

   When container load relationships are setup, multiple relationships can be established for a single contained item. Exactly one of these must be specified as the preferred container. The preferred container is always used for cartonization of sales orders and inventory bulk pack, and is also the default container selected for prepack requests. However the operator can choose a different container item than the preferred container for container prepack. If there is a container load relationship setup for this different container, the system determines the correct quantity of that container. If there is no container load relationship setup for the container item you entered the system assumes the entire quantity can be packed into a single instance of that container item.

5. What happens when an LPN is picked for a cartonized task?

   Despite the implementation suggestion that sales order cartonization only be enabled for subinventories that are not LPN controlled, in some situations, it may make sense to cartonize tasks allocated from subinventories where cases, pallets, and other larger LPNs are stored. In these cases, a combination of loose and/or packed material can be picked for a cartonized task. If the LPN quantity is less than or equal to the remaining task quantity and there are no other contents of that LPN, then the entire LPN is loaded onto the pickers equipment, and then you can pick additional LPNs or loose material. If any contents do not match, the contents that do match can be picked from that LPN which are automatically unpacked from the original LPN and then repacked in the cartonized LPN.

6. How do cartonization and LPN allocation interact?

   Depending on the allocation mode indicated on the rules selected by the Rules Engine, the allocation may be made to the LPN detail level, or only to the locator level. Furthermore, the Rules Engine may allocate an LPN in its entirety, or only part of an LPN may be allocated.

   Whenever the Rules Engine allocates an entire LPN, cartonization is bypassed for that LPN. However, partially allocated LPNs may still be cartonized.

7. What if a subset of the physical attributes are defined?

The simplest setup for cartonization uses no physical attributes. The containers are assumed to have infinite capacity in relation to the items in the same category code. This setup is useful if cartonization is necessary for pick and pass picking and the sales order lines that would be cartonized together rarely would require more than one tote. However, a subset of the physical attributes can be used. If only weight is relevant in selecting the number and type of cartons, for instance, then only the weight (and corresponding unit of measure) need be setup for the container item and the contents. Similarly, only the volume, or only the linear dimensions may be applicable. Cartonization uses previously set up attributes.

There are some combinations, however, that cannot be used or which may not make sense. If there is a weight (or volume), but no corresponding UOM for either the container or the contents, that container item is not used. On the other hand, if there is a weight UOM (or volume UOM), but no corresponding measurement for either the container or the contest, the UOM is ignored. If either the container or the contents has a weight and weight UOM (or volume and volume UOM), but the contents do not, that dimension will be ignored. If only a subset of the linear dimensions have been defined, the system assumes the null dimensions are infinite for containers or zero for contents. Finally, if there are multiple cartons in a container group and one can fit infinite quantity, the infinite capacity carton will be chose; if there are many such cartons, one will be chosen arbitrarily.

8. Why are only some LPNs available for bulk pack?

   Only license plates that reside in inventory or have been picked are available for bulk packing. Furthermore, these LPNs must be associated with a container item, so the system knows the dimensions, weight, and volume of the container item, as well as which of potentially many packaging hierarchies should be used. The container item association may be made either manually via the LPN Update available on the mobile, or systematically from a previous bulk pack request that was halted at an indicated level.

9. How are items sequenced for packing?

   After sales order pick release, the items are packed in sequence based on the subinventory and locator picking order that has been defined. If the next item in the sequence cannot fit into a box that is currently being packed by the cartonization process, cartonization closes the suggestions on the current container and start processing a new container, rather than attempting to fit some other item in the same cartonization group and delivery in the container. This is based on the assumption that a single operator, traveling in the user-defined picking order, may be picking to the containers suggested by the system. By sequencing in this way, then you have only one active container at a time.

10. How can I determine what level to enter for bulk packing?

    During a bulk pack transaction you initiate, you can indicate the level in the cartonization hierarchy the system should bulk pack. This level indicates the

number of times the system should iterate through the cartonization process with successive container items. It should be thought of as the number of additional levels above the current level cartonization should proceed, not as the number of levels from the bottom.

If you enter a number greater than the remaining levels in the hierarchy, cartonization stops at the top of the hierarchy. Similarly, cartonization may stop prior to reaching the top of the hierarchy for other reasons, such as inability to meet minimum percent fill for all of the container items. The level entered by the user is applicable regardless of whether cartonization groups or container load relationships, or some combination, are being used.

11. What labels are available during a manual label reprint?

    During a multi-level cartonization process, labels may be generated at all levels in the packaging hierarchy. Recall that LPNs are generated only at the outermost levels. The system does not track the on-hand balances in the individual packaging entities; transactions could have been performed on the license plate after cartonization and the system does not know for which package inventory should be incremented or decremented. The system knows the overall quantity, revisions, and lots in the license plates.

    Therefore, manual label reprints for the license plate support printing labels for the levels at which LPNs were created. In order to re-create all the labels for the intermediate non-LPN levels produced during cartonization, the cartonization process must be repeated.

12. Does auto pick confirm honor cartonization suggestions?

    The system automatically transacts move orders created by the pick release process, if auto pick confirm is enabled on pick release. Auto pick confirm confirms the allocated revisions, lots, and if enabled, serials, from the allocated subinventory and locator from loose material. It moves the material to the staging lanes without packing the material into any LPNs; the cartonization suggestion is discarded. If auto pick confirm is enabled, ship confirmation can only be performed on the desktop, or via the mobile Quick Ship window.

13

Dock Management

This chapter covers the following topics:

- Functional/Business Flow Description
- Setup
- Implementation

Functional/Business Flow Description

Material enters the warehouse through the receiving dock and exits through the shipping dock. In some cases, the same set of dock doors could be used for both receiving and shipping. Upon receipts or prior to shipping, activities such as assembly of loads, consolidation of inventory transfers, and scheming efficient warehouse material flow occur in the staging lanes that lies in the proximity of dock doors.

There is an opportunity for logistics involving plan, control, and execution of the activities in the docks and staging area. Outbound docking logistics pertains to shipments while inbound docking logistics involves handling receipts. Docking logistics includes scheduling and assignment of dock doors to inbound receipts, outbound shipments, and associating staging lanes to receipts or shipments.

Dock management provides a form for the warehouse manager to assign dock doors to outbound trip stops, inbound unloading activities, and other activities. Dock door and staging lane associations can be established. For outbound shipments, staging lanes will be suggested for picking tasks based on dock appointment, staging lane/dock door association, and staging lane availability.

Setup

Locator Classification

Dock door and staging lanes are modeled as locators in warehouse management. The inventory locators are classified into the following types:

- *Stock Locator*: Inventory stock locators that are used for storing inventory.
- *Dock Door*: Dock doors are inventory stock locators where carrier trucks could be docked.
- *Staging Lane:* Staging Lanes serve as an interim stock locator, just before loading.

Staging Lane - Dock Door Association

A staging lane stages material that is to be loaded to many loading docks. Similarly, a loading dock loads material staged in many staging lanes.

A multiple-to-multiple relationship between dock doors and staging lanes can be established through Dock Door to Staging Lane Assignment Form.

Default Staging Lane (Subinventory and Locator)

A default staging subinventory and default staging locator can be set for an organization from Shipping Parameters Form. This information will be used by pick release process as the last resort if staging lane can not be derived from dock appointment and staging lane is not specified during pick release.

Related Topics

Defining Stock Locators, *Oracle Inventory User's Guide*

Set Up Locator Parameters, *Oracle Warehouse Management User's Guide*

Dock Scheduling and Trip Planning

Trip - Dock Door Association

For outbound activities, during trip planning, each trip will be assigned with a dock door from which the truck will be loaded. A dock appointment can be created from Dock Assignment form for this purpose. Inbound unload activities or other activities can be scheduled to a particular dock door as well. These appointments are for informational purpose only. They do not drive any Oracle Warehouse Management functionality.

Pick Release

During pick release process staging lane (drop off subinventory and locator) needs to be provided to Oracle Warehouse Management allocation engine before the engine can determine the picking location. Following is the logic for deriving a drop off staging lane.

In Release Pick Waves form, staging subinventory and locator will be defaulted from shipping parameters and the user can override it to any other staging lane. If this is specified then it will be used for allocation. If the user leaves these fields blank, the system will try to derive the staging lane based on dock appointment, given the fact a

dock appointment has been created for the trip of this wave. If a dock appointment does not exist, or a trip has not even been created, or for any other reasons the staging lane cannot be derived from a dock appointment, the default staging lane in Shipping Parameters will be used.

Derive Staging Lane for Trip from Dock Appointment

If a trip has been created for this wave, and a dock appointment has been created for this trip, the staging lane can be derived from the dock appointment. The following is an example of the logic:

First of all if the staging lane has been previously assigned for this trip, the same staging lane will be used. If the trip has not been associated with any staging lane yet, and a dock appointment has been created for this trip, the staging lanes associated with this dock door become candidates. The system will search for a staging lane that has not been assigned to any trip through dock appointment and return this staging lane. If all of the staging lanes have been associated with trips, the system will return the staging lane that will be finished loading the earliest.

Implementation

Locator Classification

Dock door and staging lanes are modeled as locators in Oracle Warehouse Management. Locator type can be specified in Stock Locators form under Setup > Warehouse Configurations > Warehouses manual.

Refer to the *Oracle Warehouse Management User's Guide* for detail on setting up locators.

Staging Lane - Dock Door Association

The multiple-to-multiple relationship between dock doors and staging lanes can be established through the Dock Door to Staging Lane Assignment form under Setup > Warehouse Configurations > Warehouses manual.

Refer to the *Oracle Warehouse Management User's Guide* for detail on setting up Staging Lane - Dock Door Association.

Default Staging Lane (Subinventory and Locator)

Default staging subinventory and default staging locator for an organization can be set from the Shipping Parameters form under Setup > Warehouse Configurations > Warehouses manual.

Refer to the *Oracle Warehouse Management User's Guide* for detail on setting up default staging lanes.

Dock Scheduling and trip planning

Trip - Dock Door Association

Dock appointments can be created for outbound trips from the Dock Appointment form under Outbound Logistics.

When Oracle Transportation Management is integrated with Oracle Warehouse Management, you can optimize dock door usage, ensure dock doors are synchronized with the transportation plan, and stage material accurately to the correct dock door. For information on synchronizing dock appointments with Oracle Transportation Management, see the *Oracle Transportation Management Integrating Oracle Transportation Management with Oracle E-Business Suite* guide.

Release Pick Wave

A sales order or wave can be released through the Release Pick Waves form under Outbound Logistics Manual. On the Inventory tab, the Default Staging Subinventory and Default Locator will be populated from shipping parameters after specifying the Warehouse field. The user can override these fields or clear them. If these fields have values, picking tasks being generated will honor these values as drop-off locators. This can be verified though the WMS Control Board. If these fields are left blank, the drop off locator will be derived from one of the staging lanes associated with the dock door that has been scheduled for this trip. If there is not any dock appointment scheduled for this trip, the drop off location will be defaulted to the shipping parameters.

Related Topics

Setting Up Dock Door Appointments, *Oracle Warehouse Management User's Guide*

Releasing Sales Orders for Picking, *Oracle Shipping Execution User's Guide*

14

Warehouse Management Picking for Manufacturing

This chapter covers the following topics:

- Overview
- Manufacturing Picking
- Implementation
- Common Problems
- Frequently Asked Questions

Overview

Warehouse Management System is tightly integrated with the manufacturing modes supported by Oracle Work in Process and Oracle Shop Floor Manufacturing. Instead of using static paper-based picking lists to gather components required for a job or schedule, you can use the advanced features available from Oracle Warehouse Management. The integration is available for discrete, flow, repetitive, and lot-based manufacturing.

Supported features include:

- Rules Engine based allocation
- Task dispatching
- Opportunistic crossdocking
- Compliance label support
- Pick Methodologies

Picking for Manufacturing is completely integrated with warehouse management.

Features such as material status control, pick slip grouping rules, task skipping, and device integration are applicable to manufacturing requirements.

> **Important:** The advanced catch weight feature is available only for sales order picking.

Manufacturing Picking

The items and quantities required for a job or schedule are specified on the bill of materials. With this as a main exception, component pick release for manufacturing and sales order pick release follow nearly identical processes. If you are familiar with the Warehouse Management sales order pick release process, you will recognize the following steps performed by the manufacturing pick release.

- Allocate material using the warehouse management Rules Engine
- Identify unavailable material as backordered
- Determine the task type necessary to perform the task

The pick release process provides tasks associated to move orders (or material allocations). These tasks are then dispatched to you on the mobile device and sequenced by locator and subinventory picking order.

You then perform the task, and confirm the material identified in the allocation was picked. Depending on the supply type, performing the task either issues the material directly to the job, or moves the material to the supply subinventory and locator indicated on the bill-of-materials to be pulled later by an operation move or assembly completion.

Pick Release Process

You can view material requirements for a job when it is pick released. There are four different query windows available to use. The query window you use depends on the manufacturing mode. For example, you may use one window to query for a particular job number for discrete manufacturing, and use another window to query for repetitive manufacturing lines and assemblies.

Once the appropriate jobs are selected from the query criteria, you can view the material requirements for each job, and remove jobs from the pick release process. Select Release after you select the jobs.

A note appears on the desktop window that indicates if the Rules engine allocated all, some, or none of the material requirements. Material may not be allocated if none of the material available meets the rule restrictions. You can query the job in the Pick Release window to view the unallocated requirements. In addition, you can print the move order pick list report for the batch as part of the pick release process. The note includes

the request number of the report.

Only jobs in a transactable status with open requirements appear in the Pick Release window. Transactable statuses are Released and Complete. Statuses such as On Hold, Pending, Cancelled, and Complete – No Charges are not transactable and jobs with these statuses are not returned by the query criteria. Because only open requirements display, jobs whose requirements are completely allocated by the pick release process, or fulfilled via material issues, are not returned by the query criteria. In addition, allocated and fulfilled material requirements on the bill of materials do not display in the Pick Release window. However unfulfilled requirements for the same job appear on the Pick Release window.

A concurrent process is available for each of the four manufacturing modes that release all requirements in a transactable state. If pick release of manufacturing requirements is done regularly and without any decisions of what to release, the concurrent request streamlines the process. The concurrent program picks up only transactable jobs.

Supply Types

Bills of Material supports several different supply types, including:

- Push
- Assembly pull
- Operation pull
- Phantom
- Supplier
- Bulk

Only push, assembly pull, and operation pull components can be pick released. The system ignores components with other supply types for the pick release process. However the other supply types behave the same as without Picking for Manufacturing. In addition, you can exclude pull components from the pick release process on the WIP Parameters window. If you exclude pull components, the system assumes they are replenished in the supply subinventory through some other means. See: Defining WIP Parameters, *Oracle Work in Process User's Guide*.

A requirement with supply type push and a null supply subinventory / locator creates a move order, where the source is inventory and the destination is the job. Transacting the task issues the material from the subinventory from which the allocation was made to the job.

A requirement with supply type of operation or assembly pull creates a move order, where the source is inventory and the destination is the supply subinventory / locator on the bill of materials. Transacting the task moves the material from the subinventory where the allocation was made to the supply subinventory. The material is pulled from

the supply subinventory on the operation move or assembly completion. As the supply subinventory / locator are not required fields on the bill of materials, they default from the WIP Parameters form if they are left blank.

A requirement with supply type push and the subinventory / locator populated on the bill of materials creates a move order where the source is inventory and the destination is inventory. The only difference between this and a material requirement with supply type pull is that the material must be manually issued to the job. The job does not pull the material at assembly completion or operation move.

Allocation Rules

Move orders are created for the material requirements selected from the Pick Release window. The Rules Engine allocates material based on rules you define.

You can base rules on any attribute related to the job, inventory, organization, or other information related to the material requirement. For example, you may build rules that rotate stock, allocate a single lot, or clean near-empty locators. In addition, there are several objects that support attributes of the job. If you use these objects, you can allocate material from different subinventories based on the department, or inventory lots with particular attributes because of the comments on the bill of materials or routing indicate specific requirements for this job.

Task Type Rules

Once you create and allocate the move orders for the material requirements, you must assign the task type to the move order. Task types model the qualifications or skill sets required to perform a particular task. For example, a task in a high rack may require an operator trained to use the high-bay forklift, while a task of hazardous material may require an operator trained in HAZMAT material handling.

You can base task type assignment on any data related to the material requirement, job, organization, or other attribute. Task type assignment also uses the Rules Engine.You can use several of the additional objects used for allocation rules for task type assignment rules.

Loading Tasks

The task is now ready to be dispatched. Indicate the initial dispatch subinventory, the available equipment, and the devices to use.

To confirm the material allocation, confirm the allocated item and, if applicable, the revision, lots, and serials. If you confirm the pick with an LPN that matches the allocation, instead of loose material, you can skip the confirmation fields.

You also confirm the suggested subinventory and locator; however, you can override the suggestions. You must also confirm the quantity picked, but can under pick if the required quantity is unavailable. You can configure the Pick Load page to accept an over or under pick without exception. When you confirm the picked quantity, the

system treats it as an exact match. If you do not configure the Pick Load Page to accept an over or under pick without exception, you must enter a task exception for the pick.

You must load the task into an LPN if the material is loose or if you picked only part of an LPN for a task. The LPN identifies the material that was picked for a particular task. You can load multiple requirements into the same LPN as long as they are for the same manufacturing mode.

You can also access information about the job that created the task from the load screen. After confirming the allocated material, you can load the material on to the equipment and continue with additional loads, or drop the task.

Related Topics

Explaining Over Picking, *Oracle Warehouse Management User's Guide*

Explaining Under Picking Without Exception, *Oracle Warehouse Management User's Guide*

Dropping Tasks

The issue transaction is integrated into the drop only for push supply types where the task is dropped to the job. You drop a pull requirement to the supply subinventory indicated on the bill of materials, and a push requirement to the job. The issue transaction is integrated into the drop.

You can also record exceptions on the drop of pull material. You can override the suggested supply subinventory. The override reason you enter can trigger a corrective workflow, such as updating the bill of materials to pull the inventory from the new drop locator.

Pick Methodologies

Picking for manufacturing supports all the pick methodologies supported for sales orders. This includes cartonization / pick-and-pass picking, where the system suggests specific totes for tasks as part of the pick release process. It also includes pick slip grouping rules, where tasks are queued in groups, defined by user-specified criteria, such as job / schedule name, department, operation, source subinventory / locator, etc. As part of the pick slip grouping rules, bulk picking is also supported for manufacturing. Tasks for the same subinventory / locator, item, and revision, are merged into larger tasks. These larger tasks are then deconsolidated as part of the pick drop process. Manufacturing picking has full support for cluster picking, where the system dispatches you a pre-specified number of clusters of tasks with the first task.

Job Cancellation

You can cancel a job can at any point after the status has been changed to Released. If the job has not pick released, then no allocations or tasks exist and you do not need to take corrective action. However, if pick release was run for the job, then different

corrective actions are taken depending on the status of the tasks.

The system deletes tasks in status of Pending, Queued, Hold, or Error and relieves the allocations. Completed tasks are not changed and manual intervention is required to return the material from the job to inventory, if appropriate.

Dispatched tasks enable you to load the material, but you cannot drop the material to the job. Similarly, you cannot drop loaded tasks. You must unload both loaded and dispatched tasks. You can view whether the job (or sales order) that created the loaded task was cancelled from the current tasks page. You also receive a message that indicates that dropping the LPN is not allowed.

You cannot drop push requirements without a supply subinventory because the destination of the task is the job, and you cannot issue material to a cancelled job. In addition, pull requirements require manual intervention to return the inventory to its initial locator. Therefore, you can unload the loaded LPN. After the LPN is unloaded, the task is cancelled and the allocation is relieved.

Completed tasks for a cancelled job are not affected. If a job was cancelled, and then pick released again, only the uncompleted tasks and backordered requirements are allocated.

Change Management

Picking for Manufacturing supports limited change management beyond job cancellation. If the job quantity is increased, then the job can be re-released and the new material requirements for the additional job quantity will be allocated (or backordered). If the job quantity is decreased, then any backordered or unallocated requirements are reduced. When the job is pick released, material requirements are not created for the quantity that is no longer required.

Manual Material Issue

You can manually issue material to a job. If the job is not pick released, then the manual material issue reduces the open requirements (and the allocation quantity) when the job is pick released. If the job was pick released, then a manual material issue posts to the job in addition to the allocated or backordered quantity.

A manual material issue does not reduce the backordered quantity until the job is pick released again. This means that if a material issue is made for a backordered component, if the job is not pick released again, additional material may be crossdocked to the job. However, if the job is pick released again, the backordered quantity is reset. If you use both manual material issues and crossdocking ensure material is not over-issued to a job.

You can also use a manual material issue to issue material to a job when the supply type is push but the bill of materials contains a supply subinventory / locator.

Unloading Tasks

You can unload an LPN at any time. Unload reverses the load transaction and returns the task to a status of pending. If you cancel the job (or sales order) that created the task, then the task and allocation are cancelled as well.

If you loaded a complete LPN then you must unload the entire LPN. If you picked the items from loose material, then return loose material to the original locator. Please refer toCommon Problems., page 14-13

There are several limitations to the unload process. A loaded LPN can contain several tasks, and you must unload each task individually. If you scan an LPN instead of selecting it from the list of values, the system assumes you mean to unload the first task associated with that LPN in the list-of-values. In addition, you cannot unload a loaded LPN that contains loose tasks unless you first unload the loose (or partial LPN) tasks.

Backordered Requirement

If you cannot allocate the material at pick release, the system backorders it. Backordered material requirements for jobs are similar to backordered material for sales orders. You can re-release backorders, or use opportunistic crossdocking to fill the demand. If you do not enable crossdocking, you can only fill backordered requirements by re-releasing the job.

The component Pick Release window queries jobs with at least one open (unallocated) material requirement. It displays only open material requirements so a job with multiple requirements displays the necessary requirements. If the system backordered one of the required components at pick release, you receive a message when you select the Release button.

Warehouse management does not support backordering component requirements for flow manufacturing. The component requirements for a flow schedule are allocated in total. If material is not available for one or more of the operations, the entire schedule is not allocated and a message appears on the desktop window.

Crossdock Support

Warehouse management supports opportunistic crossdocking to jobs.If you enable crossdocking for an organization, then when you put away from purchase order receipts, the system checks for backorders first before trying to put away to inventory. If there are existing backorders for the component, then the system directs you to drop the material to the job for push requirements or to the supply subinventory for pull requirements.

Multiple job backorders are filled in sequence of the material requirement date. You can also backorder an item for both a job and for a sales order. An organization parameter controls the fulfillment order.

Paper Assisted Picking

Warehouse management also supports paper assisted picking. Instead of the system dispatching you tasks on the mobile device based on task types, you can dispatch tasks to yourself based on the task identifier on the Move Order Pick Slip Report. You can print the report for all untransacted move orders for jobs, as well as for other additional criteria. You can print the move order pick slip report automatically as part of the pick release process.

Label Printing

Label printing is integrated with the business flows, so you can print defined labels automatically as part of any transaction. Use the System Rules Engine, page 3-1 to determine the best label format of multiple different formats.

An additional label type, WIP Contents, can be printed automatically as part of the pick load or the pick drop process. This label includes details of the job or schedule, the LPN into which the material is packed, and attributes of the specific material requirement and operation for which the material has been picked.

In addition to the WIP Contents label, the LPN, LPN Contents, LPN Summary, and Material labels can be printed with these business flows.See: Label Printing Integration Kit, page 8-1 .

Updating Allocation

You can update move orders allocated for job material requirements on the desktop Transact Move Orders window. You can change the quantity, allocated lots, allocated serials, or the destination subinventory. These changes are reflected in the task the system dispatches to you.

Updating Tasks

In addition to the allocations visible on the desktop, the tasks are also visible on the Control Board. You can re-prioritize and reassign tasks as appropriate. You can query tasks by job name or other criteria specific to discrete, flow, repetitive, or shop floor manufacturing.

Retain Dispatched Tasks

When you press F2 tasks normally tasks return to the status of queued or pending; however, you can such a form function parameter so the tasks status remains dispatched even if the user logs out of the system. The next time the user logs in, the system dispatches these tasks before it sends other tasks to the user depending on the menu option, and the sign on details. To enable this feature, you must set a form function parameter.

Prioritize Dispatched Tasks

You can set a form function parameter to control if dispatched tasks execute prior to queued and pending tasks. When you set the parameter to Yes, then the user must complete the dispatched tasks first. If you set the parameter to No, then the system dispatches dispatched tasks with queued and pending tasks.

Implementation

You must make several decisions when implementing Picking for Manufacturing that impact functionality.

Pull Requirements

An organization may not want to create tasks for individual pull requirements if it is easier to use a different method to replenish material. For example, if you define inexpensive fasteners as an assembly pull requirement, then min-max replenishment of the supply subinventory is likely the more appropriate way to manage the pull material. However, an organization may want to create tasks for the pull material if the business processes requires this control.

Include Pull Components

The parameter "Release Backflush Components" controls if pull requirements are included in the pick release process. This flag is located on the WIP Parameters window and is organization specific. If pull components are not included in pick release, then they do not appear on the Pick Release window and no tasks will be created for them. Those components will be pulled from the supply subinventory at operation move or assembly completion. Note that this pull happens unchanged by component pick release. The system considers a job completely allocated, if all the push requirements are allocated, regardless of the status of the pull requirements. These jobs are no longer available on the pick release window.

Lot / Serial Pull Components

After performing a task to drop a pull material requirement to the supply subinventory, the material is backflushed automatically into the job as part of the operation move or assembly completion. However, the system loses visibility to which lots or serials were transferred for that particular job. Rather than pulling lots allocated by the Rules Engine, the system pulls lots based on the "Lot Selection Method" indicated in the WIP Parameters window.

You cannot pull serial controlled items from all of the mobile completion pages. The LPN based completion pages, the flow completion page, and the work orderless completion page support pulling serialized components. These pages require you to enter the serials to pull. However, the mobile operation Move and the mobile Non-LPN Based Discrete Job Completion window do not support entering serial numbers. Any

requirements you must pull from transactions entered on these pages cannot be serial controlled. Warehouse management supports entry of serial numbers for backflushed components on the applicable desktop window. Lot based jobs do not provide mobile support for any transactions beyond those provided to perform component picking.

Because the job has no visibility to particular lots or serials allocated for pull requirements, if you must use specific allocation logic to allocate lots or serials setup the material requirement as a push requirement. Otherwise, with manual selection of the lots and serials for pull, it is possible that two jobs could stage different lots or serials of the same item to the same supply locator, and then each job may receive lots and serials that had been staged for the other job. However, this may not pose a problem if it does not matter which lot or serial goes into each job.

Supply Subinventory

The supply subinventory must be setup in a particular fashion for it to function properly.

As Oracle Work in Process only supports pulling loose (unpacked) material, the supply subinventory must not be LPN-controlled. All LPNs moved (or dropped from a task) into a non-LPN controlled subinventory are unpacked. The empty LPN is updated to the context 'Defined but not Used' so it becomes available for other processes in the warehouse.

The supply subinventory must also be non-reservable. This prevents picking of dropped and staged material from the supply subinventory for open requirements for other jobs or for sales order lines. When the system pick releases the job, the allocated material for the move order is no longer available for other transactions. However, once you drop the material, the allocation is transacted and there is no longer any connection between the dropped material and the job. In an ordinary subinventory, this material is available. The system can only avoid allocating other requirements from the supply subinventory if it is non-reservable.

These first two requirements are enforced during pick release. That is, if any of the supply subinventories for an operation pull or assembly pull component are reservable or LPN-controlled, the system halts pick release for the entire batch. The system makes this check prior to committing any allocations. After correcting the erroneous subinventory settings, you can use the same query criteria to build the batch. For the purposes of this validation, push components for which a supply subinventory / locator has been populated are treated identical to pull components.

The supply subinventory must be locator controlled. You can set the locator control to either dynamic entry or prespecified. However prespecified is easier to control and maintain for a supply subinventory.

Do not set capacity for the locators defined for the supply subinventory unless modeling capacity is critical. The bill of materials determines the supply subinventory / locator. The Rules Engine will not override it; it can only validate it. Therefore, if the supply locator is full, then no pull move orders with that supply locator are created. A

null capacity value on the Stock Locator window indicates infinite capacity.

Allocation Rules

You can use any of the object the Rules Engine provides to build allocation rules. These objects include the following: lot number, the WIP bill of materials, and the bill of materials routing. Some of these objects may not be applicable for all jobs. For example, a rule that uses the objects WIP Operations, BOM Operations, or BOM Routing applies only to jobs with routings. Rules that include the object WIP Repetitive Schedule are only applicable for repetitive manufacturing..

If no specific logic is necessary for allocating move orders for sales orders or jobs, the quickest implementation would be to define a single rule, perhaps with sort criteria to ensure stock rotation, and to assign the rule as the default pick rule in the Organization Parameters window. However, complex allocation logic can be modeled with the objects. Refer to the Rules Engine chapter of this guide for additional assistance in defining rules.

Along with picking rules, a dummy rule that validates the supply subinventory must exist. Each material requirement creates a move order. The source and destination of a move order that resides inventory goes through the Rules Engine. Even though the supply subinventory and locator on the bill determine a pull move order destination, the Rules Engine must validate the destination to ensure the material status and locator capacity are honored. Therefore, unless there are specific requirements for why pull move orders should not be created, the put away rules setup must have the supply subinventory as a valid destination. This is similar to the requirement for sales orders that the staging lanes be valid destination locators.

Task Setup

You must also perform task setup. This enables you to assign tasks with particular attributes to different task types. Only operators with the appropriate qualifications, or signed on with the required equipment, can perform the tasks. This setup is identical to that performed for outbound sales order tasks.

Setup steps include the following:

- Defining equipment items
- Defining resources
- Defining departments,
- Defining task types
- Assigning employees to resources,
- Defining task type assignment rules.

- Set up User Task Type Attributes

You can use job related attributes to define task type rules. For example, you can assign task types so only certain operators may pick components required for operations in a manufacturing department. See: Overview of System Task Management, page 9-1 for more information.

Pick Methodologies

Manufacturing picking supports the same pick methodologies supported for sales order picking.

A delivery grouping rule is used to stamp a carton grouping ID on the lines for both cluster picking and cartonization at sales order pick release. The system uses this rule to indicate which lines you can pack together, and includes criteria like Customer and Ship Method. However, the criteria are not relevant for manufacturing. All tasks for a single job or schedule are considered in the same group and eligible to be packed together (for cartonization) or picked as a single cluster (for cluster picking).

An organization may wish to control cartonization for sales order picking independently of cartonization for manufacturing picking. There are two flags on the organization parameters window to configure this functionality. You can perform cartonization for tasks coming from only one of those sources, both, or none.

Task dispatching uses pick slip grouping rules to queue all tasks with the same pick slip number to a single operator when the first task in that group is accepted. Some criteria on a pick slip grouping rule are applicable only for sales orders, other criteria are applicable only for manufacturing, and yet other grouping criteria are applicable for both manufacturing and sales orders. Only those criteria that are applicable for the mode in which the rule is used are honored by the system; other criteria that are not applicable are ignored. For instance, if a particular grouping rule indicates the sales order number is one of many grouping criteria, and that rule is used for manufacturing pick release, than the sales order grouping criteria is ignored, while any other criteria potentially applicable to manufacturing is honored.

Crossdocking

Crossdocked material is put away to the supply subinventory for pull requirements, but push material is crossdocked directly to the job. However, Oracle Purchasing requires a delivery be posted to a subinventory; a job is not a valid destination. Therefore, push material is received to a subinventory and locator, and then immediately issued to the job. This receipt and issue is invisible to the end-user; it appears as a single put away transaction to the job. A close examination of the transaction history shows the two transactions.

The Organization Parameters window provides the ability for the implementation team to determine what subinventory / locator these crossdock receipt and issue transactions post to. They need not necessarily be a subinventory or locator set up particularly for

this purpose, but the subinventory must be LPN controlled and must not have any material statuses assigned to it that would disallow purchase order receipt or issue to WIP transactions.

Common Problems

The following section contains the most common causes of the problems, and some basic debugging scripts.

Job not available in Pick Release Window

If the job is not available in the Pick Release window, there are several potential causes.

Verify the job status is either Released or Completed. If the job status is something else, it does not appear in the list of values.

If the job status is Released or Completed, and is in the list-of-values on the Component Pick Release window, open requirements for the job may not exist. Recall pull components are included only if indicated on the WIP Parameters window, and that Bulk, Phantom, and Supplier supply types are not included in component pick release. If applicable, check the autocharge flag. Discrete job and repetitive requirements with this flag disabled are not included in pick release.

For push and pull material requirements, view the job details to verify if any of the components were issued to the job. For discrete jobs, this information is available from the Components window. For lot-based jobs, the applicable window is Define Lot Based Jobs. Check for any material allocations on the Transact Move Order window. If the sum of the allocated material and the issued material is equal to the material requirement, then the requirement is not available on the component Pick Release window. If all the component requirements for a job are allocated or issued, then the job is not displayed on the Component Pick Release window, even though the job number is displayed in the list-of-values.

You can also check for open material requirements from the tables if the WIP_ENTITY_ID of the job in question is available. The following query shows all material requirements for a given WIP_ENTITY_ID:

```
select item.concatenated_segments as item,
operation_seq_num,
meaning as supply_type,
required_quantity as reqt,
quantity_issued as issued,
nvl(quantity_allocated,0) as alloc,
quantity_backordered as backorder,
required_quantity
-nvl(quantity_allocated,0)
-quantity_issued
```

```
as remaining_to_allocate
from wip_requirement_operations wro,
mtl_system_items_kfv item, mfg_lookups
where wip_entity_id = &wip_entity_id
and item.inventory_item_id = wro.inventory_item_id
and item.organization_id = wro.organization_id
and mfg_lookups.lookup_type = 'WIP_SUPPLY'
and wro.wip_supply_type = mfg_lookups.lookup_code
```

Search for any record for the job where REMAINING_TO_ALLOCATE is greater than zero. If no records are present, then the job is not available to pick release because all requirements were issued or allocated. This script is also useful to view allocated and backordered job requirements.

Error Releasing Batch

Prior to allocating any material, the system verifies that all the supply subinventories are non-reservable and not LPN-controlled.

By performing these verifications you avoid potential problems further along in the supply chain. Verify the supply subinventories included in the release meet the requirements.

No Move Orders Created from Pick Release

If the system did not allocate all of the requirements, you receive a warning in the component Pick Release window. If you query the Pick Release window with the same criteria, you can view the backordered requirements.

Picking Setup

Backorders generally occur when the Rules Engine does not find enough material available to allocate to a job. The debugging steps are similar to the debugging steps required for sales order pick release. Verify that enough material is on-hand, and that material is available for allocation. The available quantity is visible on the desktop Material Workbench or on the mobile Item Inquiry window. Verify the available material is not restricted by any picking rules, and that it resides in a reservable subinventory.

Check the material statuses of the subinventories and locators where the material is located, and if applicable, the material statuses of the available lots and serials. Any material that has a material status that disallows the transaction types WIP Component Issue or Backflush Transfer is ignored for push requirements or pull requirements.

In the case of pull materials, verify the material to allocate does not reside in the supply locator. If you create move orders for pull requirements, then the material must be available for allocation in a subinventory other than the supply subinventory. This is for two reasons: the supply subinventory is non-reservable, and also the Rules Engine cannot create a move order where the source and destination locator are the same.

Put Away Setup

Pull components are dropped to the supply subinventory. The Rules Engine validates the supply subinventory, for material status and capacity restrictions. If the material status of the supply subinventory or locator disallows Backflush Transfers, you cannot create pull move orders to this subinventory or locator.

If the supply locator has capacity restrictions, verify the capacity is not exceeded. It is suggested that you do not assign capacities to locators in a supply subinventory.

Finally, the destination locator (supply subinventory) must be a valid location for put away of the move order. Verify the setup of the put away rules allows put away to the supply subinventory.

Error on Task Drop

There are two main reasons you receive an error message when you drop a task to a job for a push requirement.

You cannot post material issues to a job that has a status other than Released or Completed. If the job was pick released, and then changed to a status other than Cancelled, then tasks for push material requirements error on the drop. If allocations (and tasks) need to be cancelled for a job, cancel the job before changing to the desired status. The only job status that impacts move orders and tasks after creation is Job Cancellation.

If you create a task and the supply type of the material requirement is push, but the supply type on the bill of materials is changed to pull, then the task errors on the pick drop. This prevents material from being doubly issued for a job. Two corrective actions can be made. You can revert supply type to push temporarily to allow the task drop to complete, and then make corrections which include a material return and changing the supply type back to pull. You can also cancel the job and unload the task. This cancels the task. You can then change the job status back to Released and pick release the job again.

Cannot Load to a Particular LPN

The last field on the pick load page is the LPN to which the task is loaded. You cannot load tasks with different manufacturing modes or for different document types to the same LPN. For example, you cannot load a sales order task and a discrete job component to the same LPN, nor could you load a discrete job component and an Oracle Shop Floor Management component to the same LPN.

Cannot Unload a Task Line

The unload option enables you to reverse a pick load. This is useful if you start a task but cannot complete it by the end of the shift. You must also unload a task if you loaded it for a push requirement and the job was cancelled before the LPN was dropped.

The LPN list-of-values in the current tasks page contains an entry for each time you select Load for a task. This means if you load a full LPN that partially fulfills a single

task, and load the remaining quantity loose into the same LPN, there are two lines in the current tasks list-of-values, even though you loaded one LPN. If you load additional to the same LPN, each Load adds one more entry to the current tasks list-of-values.

Entering an LPN to drop from the current tasks page drops all lines loaded to the LPN; this is the most common flow through the page. When you unload you must select an individual line. You have loaded the LPN may from multiple locators and only part of the process may need to be reversed. The LPN information may not be enough to determine which line to unload.

If you enter only an LPN to unload (rather than selecting a detail line from the list-of-values), the system selects the first line to unload. It directs you to drop the material exactly as it was picked.

This means that an LPN that was fully consumed or loaded intact for a task cannot be unloaded before any other tasks which were subsequently loaded to the same LPN are first unloaded. In the example above any additional tasks must be unloaded before the first pick load that loaded the full LPN can be unloaded.

Cannot Print Labels at Pick Load or Pick Drop

You can print the WIP Contents, LPN, LPN Contents, LPN Summary, or Material labels at either pick load or pick drop. Two business flows, WIP Pick Load and WIP Pick Drop, are available so the WIP Contents label can be printed for manufacturing picking tasks, but not for sales order picking tasks.If you do not print labels for manufacturing picking tasks, ensure the label types are assigned to the WIP Pick Load or WIP Pick Drop business flows. Labels for manufacturing picking tasks are not printed for the business flows Pick Load and Pick Drop.

Frequently Asked Questions

1. Must a Warehouse Management enabled organization use picking for Manufacturing?

   Picking for manufacturing is an optional feature. The WIP picking report that lists material requirements can be used in concert with the mobile or desktop manual material issue forms to continue with a fully manual process. However, in order to use the Rules Engine, tasks dispatching, and other warehouse management features, you will need to migrate to the component picking process. This migration can be done at any point.

   It is suggested that if this functionality is not going to be used for an organization, then the component Pick Release forms be removed from the menu to avoid mistakenly pick releasing a job.

2. Is any of this functionality provided without Warehouse Management?

   Some of the functionality provided with Picking for Manufacturing is also available for an Inventory organization that is not WMS enabled. Material requirements are

pick released in the same fashion. Instead of creating tasks that are dispatched to qualified mobile users, the system creates move orders that are available on the desktop Transact Move Orders window and on a new Mobile page (for Mobile Supply Chain Applications). The functionality here is very similar to allocating and transacting move orders for sales orders.

Many of the advanced functionality relies on features available only with Oracle WMS, such as opportunistic crossdocking, rules based allocation, exception handling, and task management.

3. Which job statuses are transactable?

   A transactable job is a job to which charges, such as resource usage and material issues, can be posted. Jobs in either a status of Released or Completed (not Completed – No Charges) are transactable. Only transactable jobs can be pick released, and material issue transactions can only be posted to transactable jobs.

4. Is allocated material available for other transactions?

   Allocated material is not available for other transactions. It is not allocated to other material requirements, nor can it be issued or transferred. However, after a pull task is transacted the material it transferred is no longer allocated. The only way to ensure the material staged in the supply subinventory is not available for other transactions is to make the supply subinventory non-reservable.

5. How are non-reservable items handled?

   Non-reservable items are allocated in the same way as any other item. The pick release process creates an allocation for the item. No reservations are necessary to allocate this material.

6. How are by-products handled?

   The pick release process ignores by-products. By-products are indicated by negative requirements on the bill of materials. The functionality surrounding by-products is not changed by the Picking for Manufacturing features.

7. Are non-standard jobs supported?

   Non-standard jobs are fully supported with Picking for Manufacturing.

8. Must jobs have routings?

   A job does not need a routing to be pick released. A routing provides additional detail on the requirement, including the department and operation sequence. This additional information is provided to the operator on the mobile pages when material is being dropped to a job. This information would not be available if the job does not have a routing.

   In addition, several of the Rules Engine objects are related to the routing on the job, and no allocations would be made by a rule that uses a routing-related object for a

job without a routing. However, other than these two limitations, jobs without routings behave identically to jobs with routings within the scope of Picking for Manufacturing functionality.

9. How do the autocharge and countpoint flags impact pick release?

   If the autocharge flag, located on the bill of materials, is disabled for the material requirement, then the material requirement does not appear on the Component Pick Release window for discrete and repetitive manufacturing, and no move order is created. Flow and lot-based jobs still include these items for allocation.

   Other then the impact of Autocharge to Component Pick Release, the behavior of countpoint and autocharge within pick release is not modified with this functionality.

10. What happens if the material pull occurs before the task is completed?

    There is no restriction preventing the assembly completion or operation move from occurring before the task is dropped; the completion and move have no direct visibility to the status of the task that replenishes the supply subinventory.

    Therefore, the pull is still attempted. If the organization allows negative balances, or inventory exists in the locator, the pull is successful. If the locator does not contain any of the required material and the organization does not allow negative balances, the pull fails and the operation move or assembly completion does not complete.

11. How does the system know which material should be pulled?

    The system selects pulls material from the supply subinventory / locator indicated in the bill of materials.

    If the material is revision controlled, the revision located on the bill of materials will be pulled. Note also that only the revision located on the bill of materials will be allocated as that revision is placed on the move order before the Rules Engine allocates the move order.

    If the material is lot controlled, the lots are pulled into the job in the sequence determined by the Lot Selection Method on the WIP Parameters window. Note that because this selection method has only three options (receipt date, expiration date, and manual entry), it cannot capture the same decision criteria that the Rules Engine used to allocate particular lots. Therefore, if any of the automatic lot selection methods are used, lots that were allocated for a different job but are staged at the same locator could potentially be pulled into a job. It is suggested that manual selection be chosen as the lot selection method so that the operator can pull the appropriate lots into the job.

    If the material is serial controlled, backflush transactions are only supported on the desktop. You must indicate which serials in the supply subinventory should be pulled into the job. Operation move and assembly completions are not supported on the mobile device if some of the material that will be pulled is serial controlled.

12. Are manual material issues supported?

    Manual material issues are supported. As component pick release is optional, if component pick release is not used then manual material issues is used to issue material to a job.

    Even if an organization is using pick release, manual material issues are still supported, but care must be taken to ensure that material is not doubly issued to a job. Manual material issues can be used to issue material above and beyond the requirements to the job, of items that may not even be on the bill of materials. In addition, manual material issues of materials that are on the bill of materials that are performed before the job is pick released will reduce the requirements of that component for pick release.

    However, manual material issues that are performed after the job is pick released will be added to the any components that have already been allocated or that have been backordered. To restate, backordered requirements will not be decreased based on material issues.

    Note that manual material issues are a necessary part of the process flow when the supply type of a material requirement is push and a supply subinventory has been entered in the bill of materials, as the task will have been created to transfer the inventory to the supply subinventory and the material will not be pulled into the job.

13. How are material returns supported?

    Manual material returns are supported. You can use a material return if the system issues excess material to a job, or if you need to return defective components to inventory.

    A material return does not increase the quantity on the job to pick release. Specifically, if material is returned from a job, and then the job is pick released again, the quantity returned will not be considered as a material requirement. If additional material is required, a manual material issue must be performed.

14. Which revision of a revision-controlled item is allocated?

    The currently effective revision of a component is allocated for the move order. The revision is not stored on the bill of materials, but the bill always displays the current revision of the component, and the Rules Engine does not override this restriction.

15. Is yield taken into account in the material requirements?

    Yield is taken into account when calculating the material requirements. The quantity that you see in the form View Material Requirements is used as the quantity the Rules Engine attempts to allocate.

16. Is overpicking supported?

    Overpicking is supported for WIP tasks. You can overpick tasks on the mobile

device. The system would allow to overpick provided the additional material is available within the given LPN, Subinventory , locator and allocated Lot, whichever is applicable.

17. What happens when a task is underpicked?

    Underpicked tasks backorder the missing requirements, so that they are available for re-release at a future time, or may be crossdocked to, if enabled. In addition, you must enter an exception reason at the time of underpicking. This exception reason is recorded in the task history and can be viewed from the Warehouse Control Board. The exception reason can also trigger a user-defined workflow, which might e-mail the material manager, request a cycle count, or perhaps even place the job on hold.

18. Will the task be split based on equipment capacity?

    The task could potentially be split into multiple smaller tasks if the equipment required by the task cannot handle the weight and/or volume of the task.

19. Will the tasks be merged based on picking methodology?

    Manufacturing picking supports bulk picking. Tasks that meet the bulk picking criteria, which includes same source subinventory / locator and item / revision will be merged into a larger consolidated task. You are directed to drop off the material from the larger task to the specific jobs or supply subinventories that require it.

20. What types of exceptions are allowed for tasks?

    The same exception handling supported for sales order tasks are also supported for Picking for Manufacturing tasks. You can override the subinventory and locator from which the material was allocated. For pull tasks, you can override the drop subinventory and locator.

    Ordinarily, the suggested drop locator is the supply subinventory / locator specified on the bill of materials. This is the subinventory / locator for which the material is pulled at the operation move or assembly completion. Overriding the drop locator does not update the supply locator on the bill of materials. Material is pulled from a different locator than where the material was staged, unless the bill of materials is manually updated.

21. Can the task be transacted on the desktop?

    You cannot transact tasks on the desktop Transact Move Order window. You can only transact tasks on the mobile device. Only manual move orders can be transacted on the desktop. You can update allocations for any move order on the desktop Transact Move Order window.

22. Can tasks be prioritized?

    Warehouse management supports manual task prioritization via the Warehouse Control Board. You can assign priorities to tasks, and tasks to users from the task

control board. Higher priority tasks are dispatched to qualified users before lower priority tasks. Queued tasks are always dispatched before pending tasks.

23. What types of changed management are supported?

    Once the job has been pick released, several attributes about the job can be changed. If the job has been cancelled, the move orders are deleted if possible. If the job quantity is increased, then re-releasing the job allocates the additional requirements. If the job quantity is decreased backordered (or un-allocated) requirements is reduced appropriately.

    If the job is changed to a non-transactable status other than Cancelled after pick release, then tasks for push material fail when you attempt to drop them. You can unload the tasks, but the only way to cancel the allocations and tasks is to change the job status to Cancelled.

    If the supply type of the material requirement is changed from push to pull on the bill of materials, then the task cannot be dropped. If the supply type has been changed from pull to push, then the task is dropped to the supply subinventory and a manual issue is required to issue the material to the job.

    If the supply subinventory on the job has been changed after pick release, the move order does not recognize the new supply subinventory. However, the job pulls the material at operation move or assembly completion from the new supply subinventory.

    For discrete jobs, a copy of the bill (and routing) is made when the job is created. When the bill is changed after the job has been created and pick released, the system considers the lot-based job to have changed. However, the discrete job is only changed when the copies have been changed; changing the bill for the assembly (rather than for the copy) has no effect on the job.

24. Do all tasks need to be loaded to an LPN?

    If the LPN has been picked for a pull requirement, it will be dropped to a non-LPN controlled subinventory and thus unpacked as part of the transaction. If the LPN is picked for a push requirement, the material is emptied from the LPN and issued to the job. In both cases, the LPN is empty after the transaction is complete and thus is available for reuse. The subinventory and locator on the LPN will be blank, and the LPN will be given the context "Defined but not Used".

25. What happens to the LPN when it is dropped?

    If the LPN has been picked for a pull requirement, it is dropped to the supply subinventory. The supply subinventory should be non-LPN controlled. The task drop unpacks the LPN, and the LPN is left empty in the supply subinventory. You cannot pack material in to the LPN while it resides in the supply subinventory. You can reuse the empty LPN at a later point if you move it out of the non-LPN controlled subinventory.

    If the LPN is picked for a push requirement, the material is emptied from the LPN

and issued to the job and the LPN itself will get a context indicating that it can be reused: Defined but not used. The subinventory and locator on the LPN are null, so that the subinventory can be reused for any transaction, including another Picking for Manufacturing task.

26. What kind or receipts support crossdocking?

Put away from both standard routing and inspection routing purchase order receipts can be used for opportunistic crossdocking. In addition, completions for the LPN-based completion window, which support discrete and flow manufacturing, first check for crossdock opportunities before being directed to inventory. Direct purchase order receipts, as well as miscellaneous receipts do not check for crossdocking opportunities.

15

Logistics Service Provider (LSP) Management in Oracle Warehouse Management

Overview of LSP Management

To reduce costs and achieve a leaner distribution model, some companies outsource parts of their supply chain to specialized third party companies called *logistics service providers* (LSPs). Logistics service providers provide typical warehousing activities such as receipts, shipments, inspections, packing for specific clients, and then bill the client for these warehouse services. After the logistics service provider receives the shipment or receipt notifications from the client, the logistics service provider sends a confirmation to the client who can then invoice their customer or pay the supplier.

The LSP assists in maintaining a smooth flow of material across the supply chain by enabling timely delivery of finished goods to end customers or storing and supplying the raw materials to clients for just-in-time manufacturing.

Oracle Warehouse Management supports two fundamental components for LSP management: multi-tenancy capability and third party logistics (3PL) billing. Multi-tenancy refers to supporting the same purchase and sales order and item number of different clients in the same warehouse, while third party billing refers to the ability to bill the transactions periodically based on the agreements between the client and the LSP.

Multi-Tenancy Warehousing Within a Warehouse

Multi-tenant warehousing occurs when LSPs provide third party logistics (3PL) services to more than one client at a time within a warehouse. When engaging in multi-tenant warehousing, the LSP must differentiate between each client's material. The LSP must also be able to support the same purchase order number, sales order number, and item number of different clients in the same warehouse.

Features of Logistics Service Providers Management

LSP Management

Logistic service providers management is the outsourcing of logistics operations to a third party. Companies, or clients, use these third parties known as logistics service providers (LSPs) to provide logistics services. LSPs may provide logistic services to one or more clients at any given time. Clients may choose to outsource a portion, or all of their logistics services to one or more LSPs. When sending information to an LSP, the client communicates the receipts or shipment to the LSP, which then runs the transaction on behalf of the client.

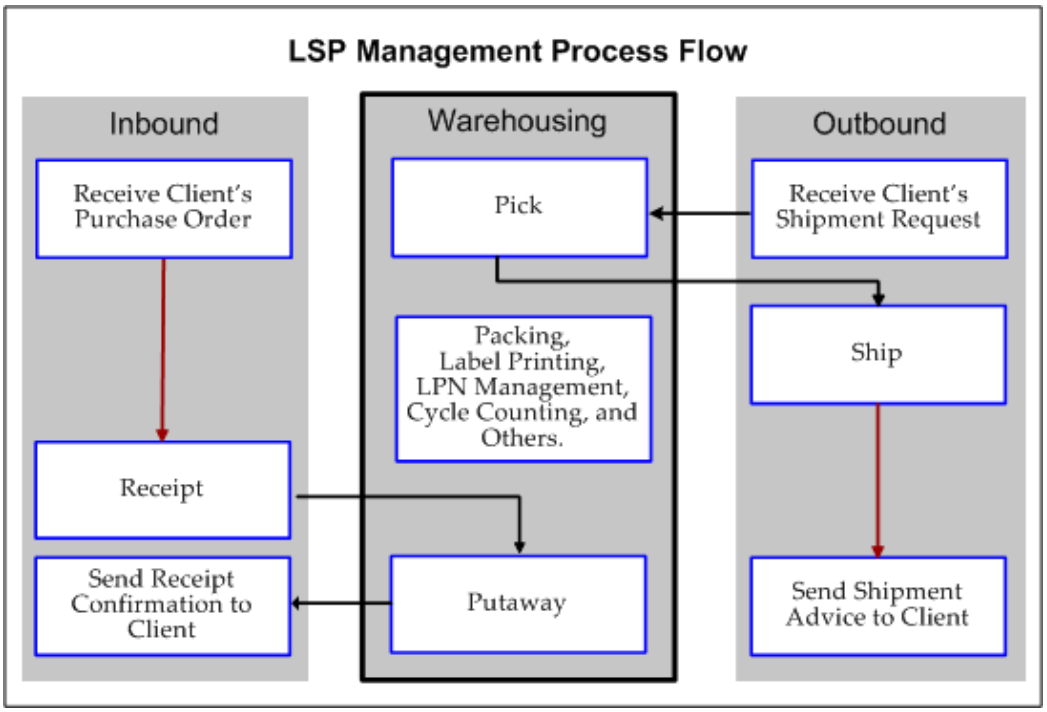
LSP Billing

LSPs provide logistic services for clients and bill them periodically for services rendered. An LSP may handle the logistics services for one or more client at any given time. The LSP establishes an agreement with an individual client for the warehousing, services provided, rates, and billing frequency. Third-party billing for LSPs within WMS enables you to bill by activity.

It uses service contracts, pricing of logistics services and activity data in WMS to produce an itemized bill based on the actual services an LSP performs on behalf of its clients. WMS provides billing sources for common logistics services such as receiving, put away, storage, staging and shipping of goods. It also enables you to identify your own billing sources such as sweeping and processing of hazmat material.

Understanding the LSP Management Process Flow

The following section describes the LSP management process flow including the inbound, warehousing, and outbound flows.



Inbound Flow

In a typical third party billing scenario, clients synchronize the master data such as items and UOMs with the logistics service provider before outsourcing the inbound and outbound activities. In the Inbound process, the client communicates the purchase order (PO) information to the LSP, and provides advanced communication about the supplies to be received. The LSP creates a client PO reference, and when the material arrives, the receiving clerk receives the material with reference to the client's PO and item information. On completion of receipt, the LSP sends a receipt confirmation to the client which signals the Client to proceed with the supplier invoicing process.

For Inbound Transactions

1. A client purchase order (PO) is synchronized to the LSP system with the necessary receiving controls. A unique PO number is created in LSP system with:

   Note: The following events result from integrations.

   - Client PO Number + Client code as LSP PO number (concatenated number is stored in the segment 1 of PO headers).
   - Clients PO line numbers are mapped as lines numbers in the LSP system (it is assumed that the clients PO line numbers are always numeric, Positive integer).
   - Client's item is copied as PO line item after the client code is added to the item segment as in the following example:

* Client Item: AS549888

* Client Code: WMT

* Item is stored in the LSP as (AS549888.WMT). For an item, the client code is always stored in the *client* segment (to be defined by the customer). If customer is using multiple item segments, then the *client* segment must be the last segment in the item key flexfield definition.

2. Client: Optionally sends an advanced shipment notification (ASN) messages referencing the PO and item. The LSP converts and stores this ASN with reference to the internal PO.

3. LSP: Receives the material and goods by client-specific PO or ASN using the Receipts window.

4. Client-specific receipt transactions are identified as ready for receipt confirmation.

5. LSP system communicates the receipt confirmation to the specific LSP clients.

For Inventory Onhand Balances and Adjustments

- Onhand balances of LSP items (the item's client segment with client code) are stored and sent periodically to the client.

- Adjustments of LSP-specific requests with the onhand inventory are communicated back to the client.

For an item, the client code is always stored in the *client* segment (to be defined by the customer). If the customer is using multiple item segments, then the *client* segment must be the last segment in the item key flexfield definition.

Warehousing Flow (Features)

Client-Specific WMS Rules

You can define client-specific WMS rules to perform picks, putaways, label printing, task management, and related actions defined by client-specific business rules. You can define a specific client category and associate the category to items and use this category to define client-specific rules.

Inventory counts/adjustments can be carried for all clients' items based on the agreed frequency of the counts. (Clients can communicate the frequency and tolerance limits for adjustments while synchronizing the item data. This helps in setting up different tolerance limits for different items for adjustments.)

Label Printing

You can create and assign labels by client to ensure that material is associated with the proper client. When you create a label format, you can assign the client code and client item code information.

Note: You can use the flexfield attribute you created during setup to assign the client code information.

You can define client and client item information for the following label types:

- Material
- Serial
- LPN Content
- LPN Summary
- Shipping Contents

Onhand Tracking by Client Using the Material Workbench

The LSP user can track onhand inventory by client and client-specific item using the Material Workbench to query client-specific item inventory (it is recommended to define a category to identify client-specific items).

Cycle Counting

Cycle counting can also be used in an LSP warehouse:

- LSP creates a predefined classes and all client items are allocated to any one of the class. While synchronizing items, client also synchronizes the following:
  - Cycle counting class
  - Cycle counting tolerances
- Adjustments are approved if the difference is within the tolerance limits specified in the item.
- If variations exceeds the tolerance limits, the LSP communicates the details to the client, gets approval, and then approves the adjustments.

Outbound Flow

For the outbound flow, the client sends the shipment request to the LSP to ship the material to its customer. The LSP performs the picking, packing, and shipment transactions and sends a shipment confirmation to the client. Note that all of the outbound documents such as the packing slip and the bill of lading have client-specific information. The client updates the inventory in its system and raises an invoice to bill the customer.

Shipment requests from the clients are created as sales orders using WSH delivery interfaces (the sales order terms and their LSP equivalent are shown in the following table):

Sales Order Entity	In LSP System
client code (in header)	order source
request number	sales order number
order type (defined in the Client Definition window)	sales order type
request line (client sales order line)	sales order line number

The LSP should creates a unique order type for each client and associates it in the Client Definition window. If two clients of an LSP have the same sales order number, then the unique order type makes the sales order number and order type combination unique for definition and transaction purposes in the LSP system.

1. Client items on the shipment requests are included in the Lines items in the sales order lines.
2. LSP ships the goods with reference to client sales order and shipment documents are printed with client information.
3. Client-specific shipment transactions are identified as ready for confirmation similar to inbound side.
4. The concurrent program communicates the shipment confirmation to the specific LSP clients.

Returns

Returns LSPs can also perform returns for their clients. They can return material to suppliers as well as handle customer returns. In the return to supplier process, the LSP notifies the client of the need to return goods to a supplier. The client sends a return request to the LSP and requests the LSP to return the goods to the supplier. When returning the goods to the supplier, the LSP references the client's PO. The LSP performs an return to vendor (RTV) transaction and returns the material to the client's supplier based on the return request and sends return confirmation to the client. The client receives the return confirmation from the LSP and a material receipt confirmation and credit note information from the supplier. The client then creates a debit note, which will be adjusted in the future payments.

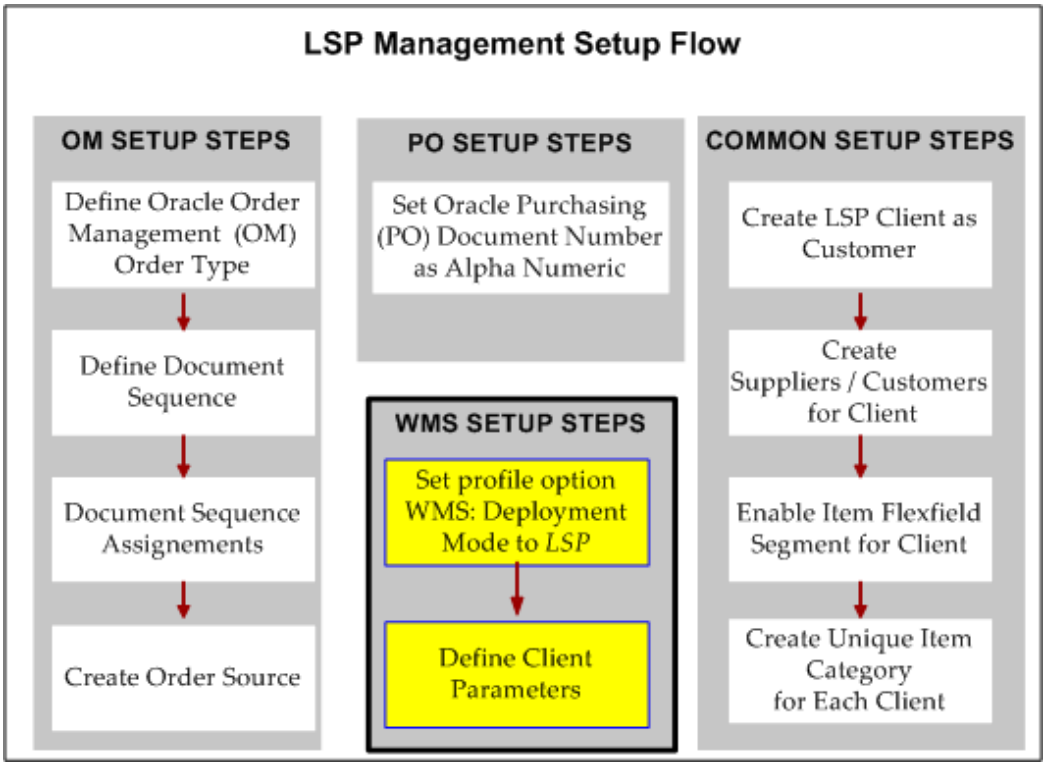
Related Topics

Oracle Warehouse Management User's Guide, Logistic Service Providers (LSPs) Management

Setting Up LSP Management Services

Oracle Warehouse Management enables logistics service providers (LSP) to manage their warehouse in multi-tenant mode. Multi-tenancy enables multiple clients to access warehouse services, allows automatic segregation of activities for every client, and also enables process level differentiation for each client using client level rules.

The following graphic shows the general setup steps and specific steps required in Oracle Warehouse Management to enable the LSP management feature:



Complete the following setups specific to Oracle Warehouse Management:

1. Set the profile option *WMS: Deployment Mode* to LSP to enable multi-client support for the logistics service provider industry.

   Note: If the profile option WMS: Deployment Mode is set to LSP, then the Client field is enabled on Oracle Shipping Execution windows such as the Release Sales Orders for Picking and the Query Manager window.

2. Define client parameters.

   Defining client parameters enables the LSP to define client-specific WMS rules for picking, putting away material, printing labels, managing tasks, and other actions

that require client-specific business rules.

Related Topics

Implementing Profile Options, page 1-25

Defining Client Parameters, page 15-8

Defining Client Parameters

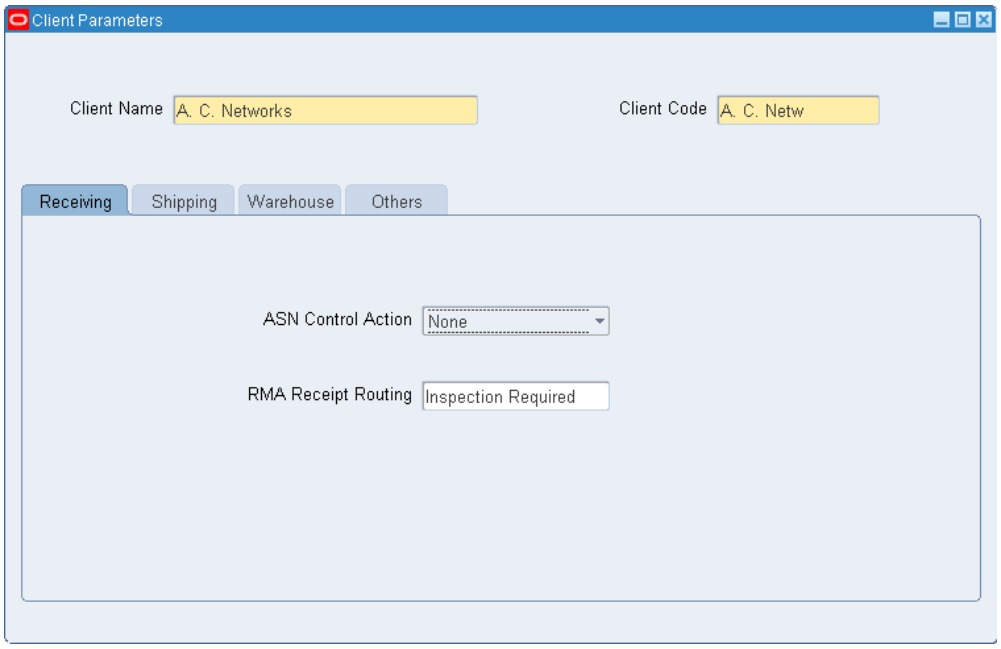
Use the Client Parameters window to define parameters such as the client code, receiving and shipping parameters, and warehouse controls for a specific client. The system uses this information to differentiate between clients, and to set shipping and receiving standards required by individual clients. For example, suppose Warehouse Corp. provides logistics services to both ABC Stores and BigMart. ABC Stores requires that you inspect all customer returns at receipt. BigMart does not. However, BigMart requires that you are able to create deliveries across orders. ABC Stores does not have such a restriction. You can then bill the client for the services rendered. The Client Parameters window enables you to satisfy all of these requirements. Use the following procedure to define client parameters.

Prerequisites

- ❒ The profile option WMS: Deployment Mode must be set to LSP.
- ❒ The client name must exist as a customer in the trading community architecture setup (TCA).

To define client details:

1. Navigate to the Client Parameters window.



2. Enter the client you defined in the Trading Community page.

3. Enter a Client Code. This is the code by which the customer will be known in the system, and which will be appended to items (for example, AS18947.Cargill). In outbound labels, typically the client code is removed from the item name, so the end customer sees the actual item name as defined by the client and not the appended client code.

   Important: The code will be appended to the item only after the setup in the item key flexfield is done.

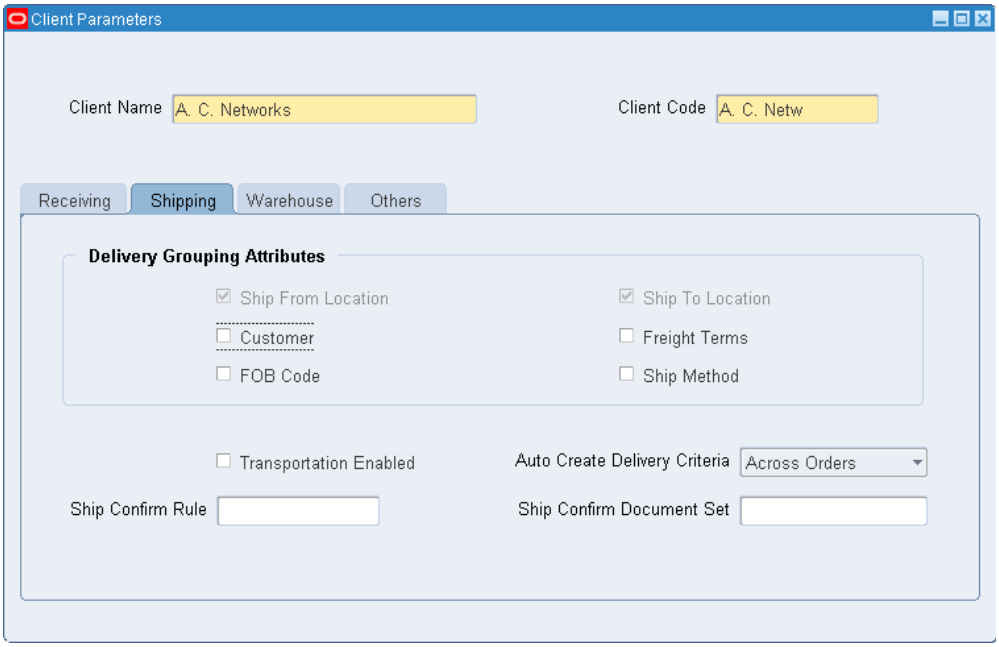
   You can search by Client code in various places throughout the application. The maximum length for the client code is 10 characters.

   Note: The client code cannot be changed after you save the client record.

4. Select an ASN Control Action:
   - None
   - Reject
   - Warning

5. Select the action to perform when you receive an RMA receipt for this customer:
   - Standard Receipt: Perform the standard two-step receipt for this return.
   - Direct Delivery: Perform a direct receipt for this return.
   - Inspection Required: Inspect the return before putting it away in to inventory.

6. Click the Shipping tab. For Outbound transactions specific to a client, these parameters are considered over the regular shipping parameters. This helps LSP to have different shipping controls for each client in the same warehouse.



7. In the Delivery Grouping Attributes region, select one or more of the following attributes which will be used to group delivery lines into deliveries.
   - Delivery Grouping Attributes
     - Ship From Location: The location from which the material is shipped. This is the ship-from location you entered in the Trading Community page.
     - Ship To Location: This is the final destination for the material.
     - Customer: This is the customer to which the material is being shipped.
     - Freight terms
     - FOB Code: This is the code which identifies when the transfer of ownership will take place.

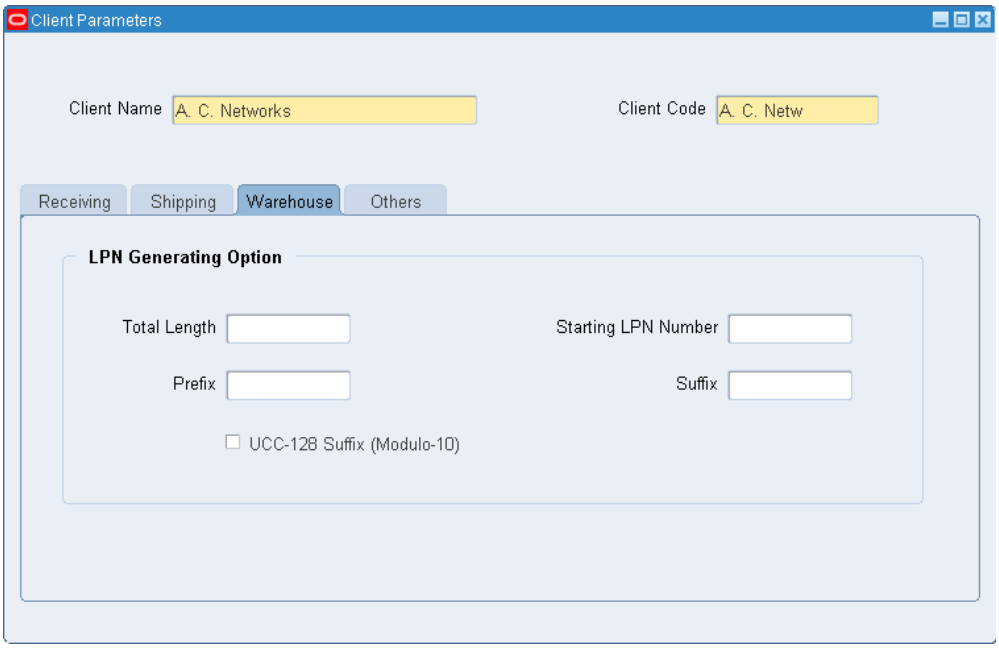
- Ship Method: The method which the material is shipped to the customer, for example, DHL.

8. Select Transportation Enabled, if you are an Oracle Transportation Management customer, and you perform transportation activities for this client.

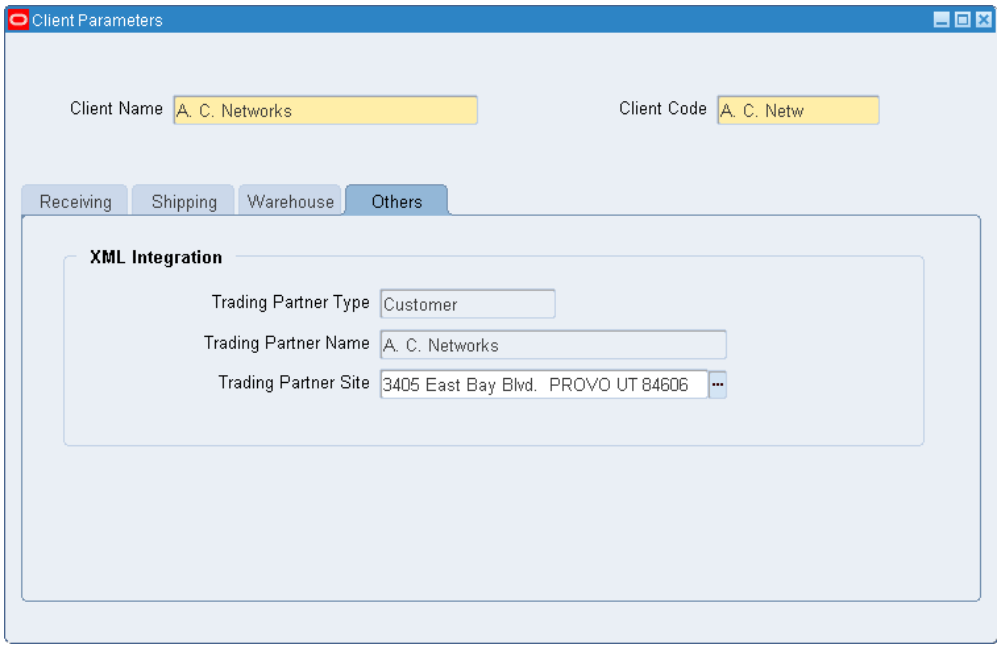
9. Select the Auto Create Delivery Criteria:
   - Null
   - Across Orders: Enables you to create deliveries across orders for the same ship-to location.
   - Within an Order: All picks for the delivery must be for the same sales order.

10. Select the appropriate Ship Confirm rule and Ship Confirm Document Set for the client.

11. Click the Warehouse tab. When you perform warehousing transactions specific to a client, the system considers these parameters over the standard WMS parameters. If you do not enter any warehouse parameters, then the system uses the standard warehouse parameters.



12. In the LPN Generation Option region, optionally enter the following parameters:
    - Total Length: This is the total length of the LPN.
    - Prefix: Enter a prefix for the LPN. For example, you can enter BIG for your client Bigmart and CAR for your client Cargill. The LPN for Bigmart would then be BIG123456, and for Cargill the LPN would be CAR123456.
    - Optionally, enter the Starting LPN Number.
    - Optionally, enter a Suffix.
    - If your client has UCC-128 labeling requirements, then select the UCC-128 Suffix (Mofulo-10) check box.
13. Click the Others tab. The Trading Partner Type and Trading Partner information automatically default from customer definition that you defined on the Trading Community page.
14. Select the Trading Partner Site from the list of values. This is the customer location with which you would like to associate the client.



Setting Up LSP Billing

The following section provides an overview of the general setup steps required to implement LSP billing (also called, 3PL billing). Implementing the LSP billing feature requires various setups in Oracle applications including Oracle Service Contracts (usage based billing feature), Oracle Install Base, Oracle Advanced Pricing, and Oracle Warehouse Management. The steps specific to Oracle Warehouse Management are identified with the product code (WMS) and are described in more detail in this guide.

1. Foundational Setups
    1. Set the profile option WMS: Deployment Mode to LSP (a site level profile).

        Note: This profile option is enabled only if you have licensed the LSP billing capability

    2. Complete setups in Oracle Service Contracts.

        Complete the basic setups in Oracle Service Contracts that enable service agreement and usage-based billing capability.

    3. Create service items and counter items.

        Create service items (non shippable, non inventory) with service type as Usage. Create counter items as non-shippable, non-inventory, and install base trackable items.

4. Complete setups in Oracle Install Base.

   Complete the basic setups in install base for associating service item and counter item instances.

2. Create Service Agreement and Billing Rules

   1. Create service agreements.

      Create a service agreement and add the service items to the agreement. Define the payment and billing terms. Add the service items to the contract and associate the price lists, discounts, and surcharges to the service item. Create the billing schedules for each service line. Optionally, add legal terms and conditions using the structured terms library. Validate the agreement ensuring all conditions are satisfied, then route the agreement through approvals to identify any exceptions.

   2. Create price lists, discounts, surcharges.

      Based on your negotiations with the client, set up the price lists as appropriate with price breaks. Add any promotional offers such as discounts or surcharges as appropriate.

   3. Create billing sources (WMS)

      A billing source determines how the billing/usage units of a service are calculated. Although Oracle Warehouse Management provides some basic seeded billing sources, you can write custom PL/SQL procedures to calculate the billing units and then select the procedure when setting up the billing source.

   4. Create billing rules (WMS)

      A billing rule extends the service agreement to enable LSP billing. In this setup, each service line of the agreement is associated to a billing source so that the billing units for each service can be calculated as desired.

   5. Billing

      1. Calculate usage/billing units for each service (WMS).

         This Calculate Billing Units concurrent program calculates the billing units on a periodic basis for each service provided to a client. The billing units are stored against the counter instance in the Oracle Install Base.

      2. Run billing program.

         The billing concurrent program in Oracle Service Contracts calculates the charges for the service based on the billing schedule and posts the date to Oracle Receivables for creating the invoice. You can also run the concurrent

program in a preview mode so you can review the bill and make any corrections before generating the final bill.

3. Review invoice details and billing history.

   After the accounts receivable system generates the invoice, you can review the invoice details from the service agreement and view the entire billing history.

Related Topics

Oracle Warehouse Management User's Guide, Creating Billing Rules

Oracle Warehouse Management User's Guide, Creating Billing Sources

Oracle Warehouse Management User's Guide, Calculate Billing Units concurrent program

16

Distributed Warehouse Management System

Overview of the Distributed Warehouse Management System

The Oracle Warehouse Management System (WMS) is an integral part of the Oracle E-Business Suite comprised of transaction source systems, like Oracle Purchasing and Oracle Order Management, and execution systems, like WMS, residing and operating within the same instance. This integrated solution eliminates the need for reference and transaction data integrations which are typically required when WMS is implemented as a "bolted-on" solution (that is, installed independent from the E-Business Suite).

However, when a business is required to implement Oracle EBS WMS outside the framework of the Oracle E-Business solution, Oracle Warehouse Management provides a distributed deployment option that supports all the routine warehouse and inventory functions currently available in the Oracle E-Business suite. This solution enables WMS to be independent from the enterprise resource planning (ERP) instance while still capable of serving multiple independent warehouses or organizations.

Features of the Distributed Warehouse Management System

The following list describes the main features of the Distributed WMS solution:

- Distributed WMS can integrate with any host system including legacy systems, other ERP systems like SAP, or another Oracle ERP system.
- Distributed system is an independent WMS solution with minimal setup requirements. It supports all the routine warehouse and inventory functions currently available in the E-Business suite.
- Distributed system is a pure execution system without any costing or accounting implications of material transactions. The financial implications of the transactions are maintained in the host system.
- 'The distributed system executes the transactions and sends the confirmations back

to the host system.

- Any change management supported for the transaction documents like sales orders and purchase orders in the E-Business Suite is supported in the Distributed WMS system.
- Distributed WMS solution provides a view from which the host system can pull the current on-hand inventory snapshots or adjustments when needed.
- The profile option *WMS: Deployment Mode* identifies the instance as distributed.

Setting Up the Distributed Warehouse Management System

For detailed information about setting up and using the Oracle Distributed Warehouse Management System, see the following documents available on My Oracle Support:

- Oracle Distributed Warehouse Management System (Architecture and Solution Overview)
- Oracle Distributed Warehouse Management System (Setup Document)
- Oracle Distributed Warehouse Management System (Technical Implementation)
- Oracle Distributed Warehouse Management System (Integration)
- Oracle Distributed Warehouse Management System Post Patch Application Steps
- EBS 11i10 to Distributed WMS Integration paper

Troubleshooting

This section provides tips on handling situations involved when running the Oracle Data Integrator (ODI):

Issue	Description
Transaction type appears corrupted after Oracle Data Integrator (ODI) is synchronized from the Oracle Distributed Warehouse Management System to the host environment: the transaction type is changed to Accounted transactions instead of Misc Txns (miscellaneous transactions).	Not an error. After the ODI mapping `INV Txn Interface` completes normally, and the records are inserted into the host instance, the system identifies the miscellaneous receipt as an *alias* receipt so that user-defined transaction types can be accommodated too.

Related Topics

For more information on the *Oracle Distributed Warehouse Management System*, refer to the white papers and documents on My Oracle Support.

17

Warehouse Management Shipping Transactions

This chapter covers the following topics:

- Overview of Shipping Transactions
- Setting Up Windows
- Advanced Catch Weight Entry
- Setting Up the Advanced Catch Weight Feature
- Assign Re-pricing Workflow to Order Type
- Transaction Processing Modes
- Scale Integration for Weight
- Common Problems
- Debugging Notes
- Frequently Asked Questions

Overview of Shipping Transactions

Oracle Warehouse Management system provides a full-suite of tools that enable a warehouse to effectively manage outbound shipments. Several methods to ship are available, which differ primarily in the level of shipment planning they utilize. Shipments can be made on the mobile device for individual order lines, for order lines grouped into a common destination, and for entire trips consisting of multiple deliveries.

Shipment confirmation is the final step in the outbound process. The outbound flow includes the following steps, each is discussed in other technical manuals:

- Pick release & material allocation

- Cartonization
- Task type assignment
- Task dispatching and pick confirmation
- Shipment confirmation

Shipping is the point at which picked material leaves the warehouse for an order. All material is packed into containers, uniquely identified by a license plate number (LPN), at the pick confirmation step. Shipment confirmation is then simply confirming that all the LPNs picked for a staged for a particular order or trip are loaded onto a truck.

Definitions

- Delivery: A delivery is a collection of order lines that are going to the same customer and delivery address. A delivery can have many different items on it, and can span multiple orders so long as the orders have the same customer and delivery address. One order can be split among different deliveries. For example, a customer, Business World, placed two orders on different days for its Redwood Shores location, each with several different items on it. Even though the orders were placed at different times, they have the same requested delivery date so they were manually grouped into a single delivery so that they could be shipped together. Business World placed a third order for its San Jose location; this must be on a different delivery because the delivery address is different. A third delivery was created for the first order line on a large order placed by a different customer.
- Trip: A trip is a collection of deliveries that will be shipped on the same outbound truck. For example, all three deliveries will be leaving the warehouse on the same truck, so they are all assigned to a single trip.
- Trip Stop- A trip stop is created for each pickup and delivery address on the trip. For example, the trip above has four trip stops:

  The initial pickup stop at the warehouse

  The three drop-off stops for each of the three deliveries
- Staging Lane: A staging lane is a special type of inventory locator where picks are dropped off. A warehouse can have multiple staging lanes, which model the physical lanes in the warehouse. Packed inventory is temporarily stored here until the actual ship confirmation removes it from the staging lane and issues the inventory.
- Dock Door: A dock door is a special type of inventory locator where LPNs are loaded. A warehouse can have multiple dock doors, which model the doors in the warehouse. All LPNs in a dock door will be shipped together once all validation has been performed.

- Ship Set: A ship set is a group of order lines, linked by a common number, for which the entire quantity must be shipped together. Partial shipments of ship sets are not allowed.

- Catch Weight Pricing: Several industries price the products they ship based on a secondary item quantity (e.g. weight) for which an exact conversion to the ordered quantity does not exist. This is also called secondary quantity pricing. For instance, many meat products may be sold as individual pieces or cases, yet priced according to the specific weight of that particular case (which varies). Paper or metal may be stocked by the reel, but priced on the reel length, which due to manufacturing processes may differ from reel to reel.

  Important: The advanced catch weight feature enables catch weight pricing for both primary and secondary UOM.

  - Primary quantity: The quantity in which the item is tracked and costed; typically easily identifiable countable units.

  - Secondary quantity: The quantity in which the item is priced; typically a measured quantity that may not be easily identifiable by sight, such as length, potency, or weight. Note that in WMS, secondary quantity is not used to track on-hand balances.

Shipment Confirmation

The actual shipment confirmation transaction impacts many entities in the application, spanning Order Management, Shipping Execution, and Inventory. In Order Management, the order line is updated as shipped. In Shipping Execution, the delivery is closed and the pickup trip stop is closed. In Inventory, the on-hand balance is decremented, serial numbers are issued (and also generated, for serial at sales order issue items), and the LPN is issued.

Shipment Types

Four different types of shipment confirmation can be performed on the mobile device with Oracle Warehouse Management:

- Quick Ship enables the operator to confirm an entire delivery by entering only the delivery number. It provides the fastest method of shipping, and only requires delivery planning. However, all the items must be staged prior to Quick Ship, and it does not allow shipment of serial at sales order issue items.

- LPN Ship does not require any shipment planning such as deliveries or trips, although it provides additional functionality if deliveries are created. With LPN Ship, the operator confirms which LPNs are to be shipped. If deliveries are used

here, the system will prompt the operator for any missing LPNs or missing items.

- Dock Door Ship allows for loading of an entire trip. It includes the same exception handling as LPN Ship, and also provides for dock door appointment scheduling and system-directed staging in the most appropriate staging lane. With Dock Door Ship and LPN Ship, multiple users can load LPNs onto a dock door, and then all LPNs are ship confirmed with a single transaction.

- Direct Ship allows for shipments to be performed without the overhead of pick release and pick confirmation. This greatly streamlined process is most commonly used in ATO environments, where material is manufactured, reserved, and staged for specific sales orders and therefore, the picking and task management processes are not necessary.

All four methods enable the operator to enter any shipment-specific information, such as shipment gross weight, waybill number or shipment method. This data is posted to the shipment transactions form for management and reporting purposes.

LPN Ship and Dock Door Ship offer an additional mode for interfacing with a third party shipping solution. A verification mode provides the same interface, validation, and error-checking as the actual shipment page. Once the validation has been performed, however, instead of shipping the LPNs, the LPNs are returned to their pre-loaded state for the third party package to ship.

Quick Ship

Quick Ship is used to ship an entire delivery without confirming the individual LPNs. It requires that deliveries be set up, as it is triggered by the delivery number. All the order lines on the delivery must be staged prior to performing an Quick Ship. The statuses of the staging subinventory, locator and the lots and serials contained in the delivery should allow the shipment confirmation. Also, no items that are serialized at sales order issue may be on the delivery. Any ship sets must be completely contained within the single delivery or the delivery will not be allowed via quick Ship. After entering the delivery number, the operator will be notified of any of the issues above. After the delivery number is entered, the screen where additional (optional) information is entered appears, and the shipment is complete.

> **Note:** The quick ship process enables you to ship the return to supplier order with shipping integration deliveries as well. However, the `Return To Stock` button will not be enabled for this kind of delivery.

Quick Ship provides the operator with a return option, which releases the reservations on all items that are contained on a delivery. This is the quickest way to cancel an outbound process if the customer order is canceled after all lines have been staged for shipping. This return to stock option does the following:

- Change the delivery line status from Staged to Ready to release
- Disassociate the LPNs with the delivery lines
- Unassigns the delivery detail lines from the delivery
- Deletes reservations for the material

At this point, the Rules Engine can be invoked via a manual putaway to put the LPN into the best storage location.

LPN Ship

LPN Ship is used to individually confirm the shipment of all LPNs on a delivery, or to create new deliveries and confirm the shipment of LPNs that do not yet have a delivery. An operator begins by scanning the dock door that the LPNs will be shipped out of. Then each LPN to be shipped is scanned. If the LPN cannot be ship confirmed because of a material status assigned to a lot or serial contained in the LPN or the staging subinventory and locator, the operator will be informed of this. Multiple operators can load LPNs for LPN ship to the same door. Loading the LPN changes the LPN context to Loaded to Dock. Operators enter serial at sales order issue information when an LPN that contains serial at sales order issue items is scanned. At this point, serial attributes (if applicable) are also given to the serials.

At any point during the process, the operator can check for missing LPNs or missing items required at any dock door. However, when the operator tries to continue to the next step, shipping all loaded LPNs, the system will not let the operator continue if there are missing LPNs or missing items. Missing LPNs are LPNs that have been staged, but not yet loaded, while missing items are lines which have not yet been pick confirmed or pick released. This check is performed for all deliveries that are loaded to the selected door. Note that if trip planning is used, but LPN Ship is used for shipment confirmation, the check will be extended to all deliveries that are attached to any trip that is currently loaded at that dock door. The operator has the option of unassigning missing items from the delivery and continuing with the transaction, or continuing with loading but waiting for the missing items. Missing LPNs cannot be removed from the delivery via the mobile device; they must be removed on the desktop. When Ship is selected, the system checks for missing LPNs, items, and ship sets, verifying that the entire ship set is present. Operators will be informed with all the ship set names which are partially loaded.

Once the validation performs successfully, the deliveries and trips are created for LPNs that do not already have deliveries created using the delivery grouping rules. For each delivery that is at the dock, the operator can optionally enter the shipment weight, shipment method, waybill number, and other delivery specific information. This step completes the shipment confirmation process for LPN Ship.

Dock Door Ship

Dock Door Ship is used to load and ship entire trips. Dock Door Ship uses a dock

schedule and dock door appointments to intelligently suggest the best staging lane for the material. To take advantage of these features, the trip and a dock door appointment must be set up prior to pick release. The process flow, and the required setup for Door Ship will be discussed. The staging lane selection algorithm will also be described in greater detail. The actual ship confirmation user-interface is nearly identical to that of LPN Ship, but will also be discussed in further detail.

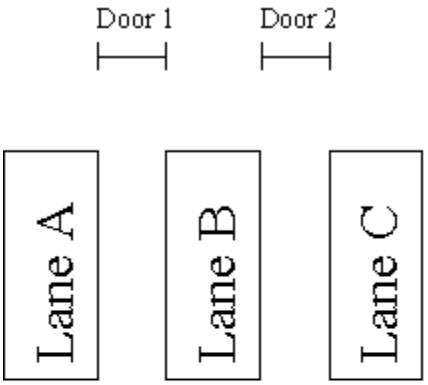
Required Setup

Prior to creating appointments for dock doors, the dock doors and associated staging lanes must be setup. Both dock doors and staging lanes are modeled as locators; the only difference between these locators and standard locators is a Locator Type field on the locator definition. For more information on setting up dock doors and staging lanes, see Setting Up Dock Doors to Staging Lane Relationships, *Oracle Warehouse Management User's Guide*.

After the special dock door and staging lane locators have been setup, the staging lane to dock door relationship must be established. A lane can be associated to multiple doors, and a door can have multiple lanes. This setup is done using the desktop form Dock Door to Staging Lane Assignment.

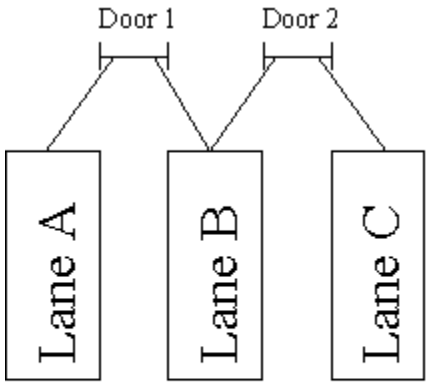
Example

Suppose there are three parallel staging lanes and two dock doors in the shipping area of a warehouse:



One possible assignment is that the central lane is used for both dock doors, while the outer lanes are dedicated to their corresponding doors, so that each dock door has two

lanes associated with it:

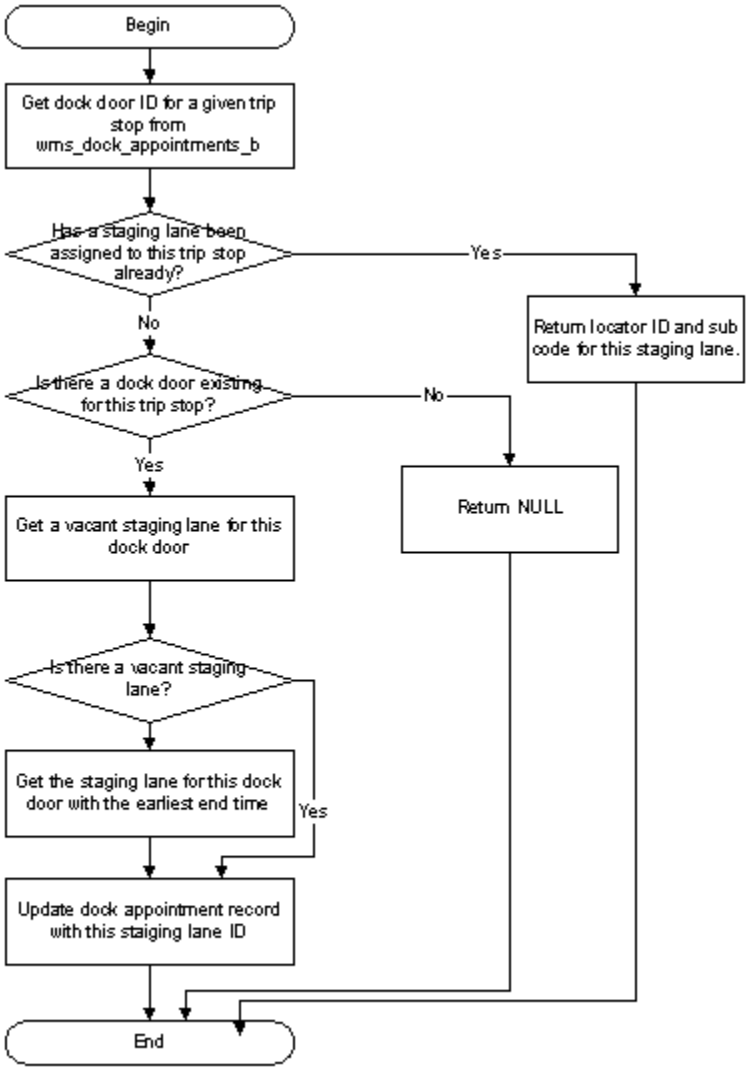


As appointments are made with dock doors, after this association, the system knows which staging lanes feed to which dock doors.

Dock Door Appointment

For the system to suggest the appropriate staging lane for the material, a dock door appointment must be setup for the trip prior to pick release. After the trip has been created an appointment is made for the trip with a particular door using the Dock Appointment form. Repeating appointments can be setup here as well. See Creating Trips, *Oracle Shipping Execution User's Guide*.

At pick release, the system checks the trip for dock door appointments, and assigns a staging lane to the pickup trip stop. The entire decision process is as follows:



Direct Ship

Direct Ship is typically used in ATO environments where specific LPNs are manufactured, reserved, and staged for specific outbound orders, and the pick release and pick confirmation process do not provide additional value. Any available LPN that resides in inventory can be selected for use in Direct Ship. Ship confirmation from Direct Ship automatically updates the delivery details from Ready for Release to Shipped, and closes any related delivery or trip stops.

Because Direct Ship can be performed directly on the mobile device without any manager intervention to run pick release and without any qualification-based task management, care should be taken to restrict access to Direct Ship in organizations where it will not be used. To that end, an organization parameter must be explicitly

enabled to allow mobile users to access the Direct Ship page; failure to enable that parameter disables Direct Ship for the entire organization. In addition, Direct Ship is subject to the standard responsibility-based security, in that the mobile page can be removed from the menu option or selectively provided just to those users that require access and have been trained to use to Direct Ship.

An operator begins direct ship by scanning the dock door which will be loaded. Then each LPN to be shipped is scanned. At this point, material status is verified and serial numbers for serial at sales order items are collected. After entering the LPN, the operator will enter the sales order number and sales order lines for which the LPN will be shipped. At least one sales order line must be entered for each item in the LPN. Both under and overshipment are allowed. If a sales order line only partially meets the order line quantity, the order line will be closed if it is within the undershipment tolerance, or otherwise will remain open. If the quantity on a sales order line does not wholly consume the quantity on the LPN, overshipment tolerances will be checked, but if there is still additional quantity in the LPN that cannot be consumed even by applying these tolerances, the system will prevent the operator from loading the LPN without entering additional order lines to consume the extra LPN quantity.

However, if the LPN were reserved to particular sales orders in advance of attempting to load it for Direct Ship, then the user need not re-enter the sales order information. Rather, the sales order fields will be hidden from view. Note that if the LPN is only partially reserved, the user will be given the option of entering additional sales order lines or attempting to use the additional quantity for overshipment. As above, if the overshipment tolerances cannot wholly consume the LPN, the user will be unable to load the LPN. LPN reservations can be made manually in the Reservations form, or systematically via an LPN-based completion from a job or schedule that was reserved to a sales order, as is the case for ATO flows.

The same validation described for LPN Ship with respect to checking for missing items and missing lines applies to Direct Ship as well.

Direct Ship can be assisted by use of the Scheduled Shipment Report, which shows all shipments scheduled to be shipped in the user-specified time horizon of a particular sales order, delivery, or trip. In addition, this report can optionally include many attributes entered on the sales order line specific to ATO manufacturing environments.

Direct Ship and Catch Weight Processing

The Direct Ship mobile application page supports catch weight entry. Various form function parameters control the catch weight behavior. For more information, see *Oracle Warehouse Management Implementation Guide*, Form Function Parameters.

Shipping Process Flow

The trip now has a staging lane and a dock door. The actual shipment loading is identical to the flow for LPN Ship, except that the process is initiated by the selection of a dock door with appointment, rather than by selecting any dock door. So rather than displaying all available dock doors, the operator will only be able to select from dock

doors that have open trips during the current time.

From here, the user-interface is identical to that in the LPN Ship. One or more operators can load LPNs on that trip, and missing LPNs or missing items can be viewed at any point. Because all outbound transactions with this process are assigned to a trip, the validation is also performed at the trip level. Once the validation is completed, the Ship button enables the operator to enter delivery specific details, and then the shipment is complete: LPNs are issued, inventory is decremented, order lines are completed, and the departure trip stop is closed.

Verification Mode

For implementations that integrate with third-party shipping solutions, other software packages may perform the issue, decrement the inventory, and close the order lines, as well as perform other updates. For these situations, Oracle WMS should not change the status of any entity, though the validation for material status, missing items, and missing LPNs, and the serial and attribute entry for serial at sales order issue items, may still be necessary. For these cases, both the LPN Ship and the Dock Ship forms have a verification-only mode. The user-interface is identical to the actual shipping mode with the following exception: instead of selecting the Ship button when complete, the operator selects Verify. When Verify is selected, the system checks for missing items, missing LPNs and ship sets. If everything is in place, then the LPN context is reverted back to Resides in Inventory from Loaded at Dock, and the shipment is ready for third-party shipping. By returning all LPNs to their previous state, the validation step becomes optional and the decision to use it becomes part of the business process.

Setting Up Windows

There are four distinct types of shipping: Quick Ship, LPN Ship, and Dock Ship. LPN Ship and Dock Ship have a shipment mode and a verification-only mode, as described earlier. These combine to give six different flavors of shipment confirmation on the mobile. The Quick Ship and Direct Ship modes have their own page, but the other modes are setup using different form function parameters of the same page. The forms and the parameters are included below:

Mobile Shipping Forms and Parameters

Mode	Form	Parameters
Quick Ship	Mobile Quick Ship	None
LPN Ship	Mobile LPN Ship Confirm	DOCK=N VERIFY_ONLY=N
LPN Ship Verification	Mobile LPN Ship Confirm	DOCK=N VERIFY_ONLY=Y

Mode	Form	Parameters
Dock Door Ship	Mobile LPN Ship Confirm	DOCK=Y VERIFY_ONLY=N
Dock Door Ship Verification	Mobile LPN Ship Confirm	DOCK=Y VERIFY_ONLY=Y
Direct Ship	Mobile Direct Ship	None
Catch Weight Update	-	TYPE=CT_WT_ALL
Catch Weight Entry	-	TYPE=CT_WT_NEW

Note that the default form function parameters are `VERIFY_ONLY=N` and `DOCK=N`, giving the LPN Ship page.

All the shipment modes support entering serial numbers for serial at sales order items except Quick Ship. Serial numbers for these items can be entered either individually, or by specifying a range. This functionality is controlled by a form function parameter called `SHIP_SERIAL_TYPE`, that can take on one of two values: `RANGE` and `INDIVIDUAL`.

Advanced Catch Weight Entry

The catch weight used for pricing must be captured prior to ship confirm either:

- in the picking process in the Task page.
- in a separate mobile application page after you load the pick task.

> **Note:** When the fulfillment base is secondary, the catch weight will be the primary quantity. Item pricing will typically be by primary as well, and the repricing of order lines based on entered catch weight is supported.

The capture method may depend on whether you have access to a scale or measuring device during the picking transaction (for example, easily transportable measuring device or goods-to-man environment) or if the quantity was recorded in advance (for example, the length, weight, or potency may be recorded on labeling visible to the picker). For Direct Ship transactions, you must do the catch weight entry as the LPNs are loaded to the dock door.

Ordinarily, the order line is not re-priced during ship confirmation; the line price determined during order entry is the price for which the customer is billed.

The quantity must always be populated for an item prior to ship confirm. If defaulting

is allowed on the item setup, then the quantity defaults based on a nominal conversion from the primary, and you do not receive any error messages indicating that secondary entry was not performed. For this reason, take care in allowing the secondary quantity to be defaulted.

The quantity is recorded at the delivery detail level. You must enter the quantity per lot and revision, but not for individual serial numbers. Because you can define the quantity as an optional field on the task page, this raises the possibility that the quantity could be entered for an item, revision, or lot, and then additional quantity for which the secondary quantity was not entered could be picked into the same LPN.

Because there is no physical way to differentiate the material for which catch weight was entered from the material for which it was not entered, in this scenario, the catch weight you entered is cleared. Similarly, if the same thing happens but in the reverse sequence, you cannot enter a catch weight quantity for the second task loaded into the same LPN because it is ambiguous whether the secondary quantity applies to the entire primary quantity in the LPN, or only the quantity just picked.

You can also enter the quantity after the LPN is loaded, and the same restrictions about recording it for a quantity prior to the entire identifiable unit of that quantity being present in the LPN apply here as well. In addition, you can use profile options to restrict the mobile Catch Weight Entry page to display all items loaded and staged for which the quantity has not yet been entered so you can identify the items requiring weighing, or all items for which quantity can be captured to allow easy corrections and updates.

Related Topics

For information on the catch weight processing, see the following white paper on My Oracle Support: *Catch-Weight Solution in Oracle E-Business Suite Applications*, Document ID 1551171.1.

Setting Up the Advanced Catch Weight Feature

It can be challenging for manufacturing and distribution companies to procure, stock, and sell customized products that may be required in various units-of-measure (UOM): for example, a manufacturer may need to procure the raw material in one UOM then manufacture to finished goods in another UOM, pack and store in yet another UOM, and eventually ship in a totally different UOM.

> **Important:** To implement the advanced catch weight feature, you need to also install Oracle Warehouse Management.

Catch weight processing permits the capturing of a secondary quantity and unit of measure in addition to the primary quantity and unit of measure. This secondary unit of measure can be used for billing and pricing to the customer. The secondary quantity is captured for the purpose of pricing and invoicing.

Several industries price shipped product based on a secondary item quantity (e.g. weight) for which an exact conversion to the ordered quantity does not exist. For instance, many meat products may be sold as individual pieces or cases, yet priced according to the specific weight of that particular case, which varies with each case. Paper or metal may be stocked by the reel, but priced on the reel length, which due to manufacturing processes may differ from reel to reel.

Oracle enables you to perform the fulfillment process (receive, stock, order, pick to ship) using advanced catch weight features that enable you to

- Manage items in two different UOMs (primary and secondary, with defined conversions).
- Order and procure in a totally different UOM which has conversions set up with either the primary or secondary UOM.

> **Note:** When the fulfillment base is set to *Secondary*, then the catch weight is the primary quantity.

With catch weight support, the material is still stocked and transacted in the primary quantity only (for example, each, reel, case). However a secondary quantity and unit of measure can be entered during the picking step, or at any other point prior to ship confirmation using the mobile page. This information may then be used to control pricing and invoicing.

Configuration options by item control this feature and how (or if) default conversions should be performed. In addition, user-defined tolerances may be established to minimize the potential for user error. To use the catch weight feature, you need to complete the following implementation setup steps:

1. Set profile option OM: Default Fulfillment Base.
2. Set the catch weight general ledger account.
3. Set up the nominal UOM conversions.
4. Define the catch weight item attributes.
5. Define price for secondary UOM.
6. Define catch weight field in task page.
7. Verify fulfillment base.

1. Set profile option OM: Default Fulfillment Base

Set the profile option OM: Default Fulfillment Base to Yes to enable the advanced catch weight feature at the site level or select No (the default value).

2. Set the catch weight general ledger account:

The On-hand Adjustment Account on the Organization Parameters window (Other Accounts tab) is the default general ledger account for catch-weight transactions that is used for catch-weight adjustments, and for lot increase and decrease transactions.

For more information about the On-hand Adjustment Account, see the *Oracle Inventory User's Guide*, Defining Other Accounts Parameters.

3. Set up the nominal UOM conversions:

Set up the desired UOM conversions such as inter-class conversions between items; for example, a) between Each and Lbs b) between Case and Each.

The nominal conversion is used in concert with the primary quantity and the tolerances to ensure that the secondary quantity is within the allowed range, and to default the secondary quantity, if allowed, after the primary quantity is known. The nominal conversion is set up using a normal unit-of-measure conversion.

The conversion is typically, but not necessarily, inter-class because the primary quantity is typically in a count class (such as each, dozen, case), while secondary quantity is typically in a weight or dimensional class (such as gallons, feet, pounds). Therefore, the conversion is also typically item-specific.

1. Create an inter-class conversion for the item; for example, between each and pounds such as 1 Each = 6.74 lbs.

2. Create an intra-class conversion for the item; for example, between case and each such as 1 Case = 4 Each

   For more information, see Lot-Specific Unit of Measure Conversions, .

4. Define catch weight item attributes:

Set up catch weight items with item attributes that are required for catch weight usage; for example, items must be set with dual UOM and defaulting specified as default/no-default with an item deviation defined as large as possible. (The item deviation enables the system to perform conversions beyond the UOM conversion specified between primary and secondary UOM).

These attributes enable catch weight items to be:

- Managed in two different UOMs (primary and secondary, with defined conversions).

- Ordered and procured in a totally different UOM which has conversions set up with either the primary or secondary UOM.

You can define attributes for catch weight items in the Master Item / Organization Item windows. For information on defining attributes for catch weight items, see *Oracle Inventory User's Guide*, Defining Catch Weight Item Attributes, *Oracle Inventory User's*

Guide.

5. Define pricing for secondary UOM:

This is done via standard pricing setup.

6. Define catch weight form function parameters:

A form function parameter enables you to change the appearance, behavior, default values, and other features of an Oracle Applications window or mobile application page. Oracle Mobile Supply Chain Applications relies on form function parameters to simplify the user interface and navigation.

The following catch weight parameters control catch weight features for the following mobile application pages:

- Parameters for the Catch Weight page:

  Important: The tare weight fields on the Catch Weight mobile pages are hidden by default, and need to be enabled by setting the following form function parameters.

  - CTWT_LPN_TARE
  - CTWT_PKG_TARE
  - CTWT_CCNT_SEC_RESD
  - CTWT_MAX_PRI_RESID

- Parameters for the Direct Ship page:
  - FULFILLMENT_BASE
  - CATCH_WEIGHT

    Note: Use the Direct Ship page function name WMS_LOAD_TRUCK when setting up the catch weight parameters for the Direct Ship page.

For more information about setting the catch weight parameters, see the *Oracle Warehouse Management Implementation Manual*, Form Function Parameters.

7. Verify fulfillment base:

The fulfillment base attribute appears on the sales order line level at the time of UOM defaulting and when changes occur to the item or UOM (or from warehouse management using the fulfillment matrix API).

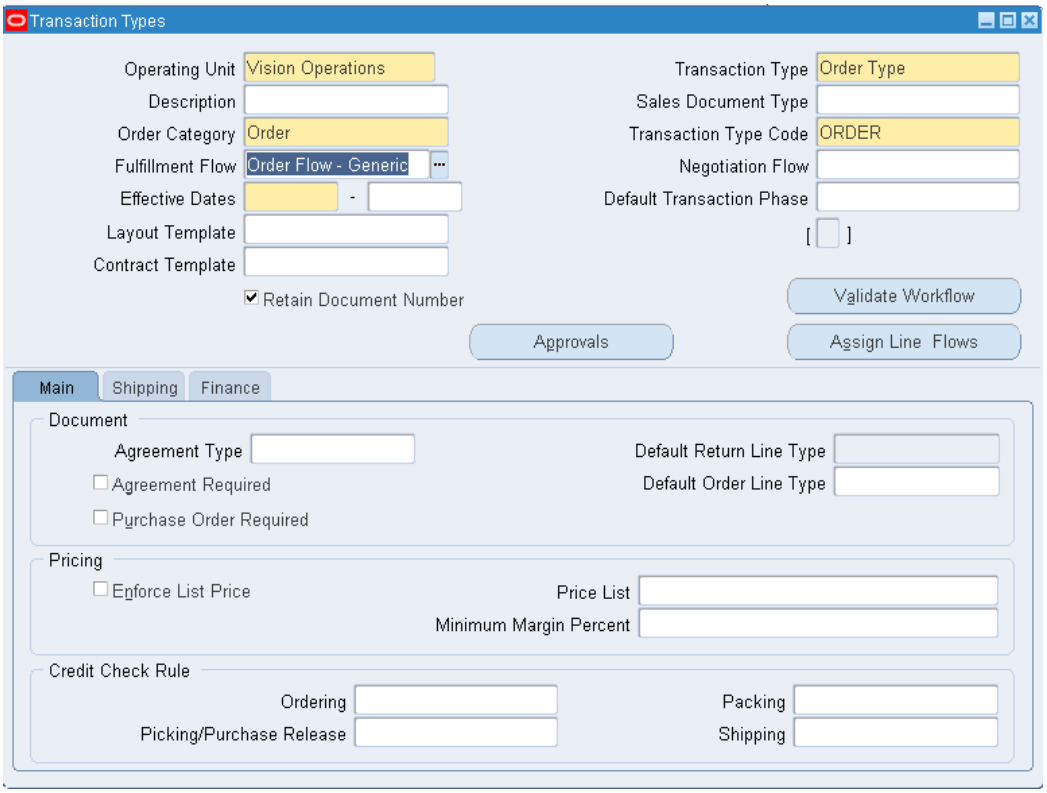
After the order is booked, you can verify the fulfillment base value on the Shipping Transactions window or on the sales order line (Sales Orders window > Line Items tab > Shipping subtab). The value will be Primary (P), Secondary (S), or null (always interpreted as Primary by all modules involved).

Related Topics

For detailed information on implementing advanced catch weight, see the following white paper on My Oracle Support: *Catch-Weight Solution in Oracle E-Business Suite Applications*, Document ID 1551171.1.

Assign Re-pricing Workflow to Order Type

For the order line to be re-priced based on the secondary quantity, the order actions must be explicitly configured for this. Otherwise, the line will not be re-priced, and instead it will keep the same price from the nominal conversion defined in the UOM conversions. This assignment is done via the Order Management Transaction Type setup.



Click Assign Line Flows button, and then select the Order Type for which this action should be assigned. Enter the line type for which the reprice action is required. You can optionally restrict this action to a specific item type or provide effectivity dates. Enter Line Flow – Generic, with Repricing at Fulfillment as the process name.

Related Topics

Main Attribute Group, *Oracle Inventory User's Guide*

Defining Unit of Measure Conversions, *Oracle Inventory User's Guide*

Transaction Types, *Oracle Order Management User's Guide*

Transaction Processing Modes

After the shipment confirmation is submitted, there are two process steps. First, the delivery status, delivery line status, and pickup stop status are immediately updated. This prevents the order from being shipped repeatedly. A concurrent request is spawned which is submitted to the Inventory / Order Management interface. This concurrent request updates the items' on-hand quantities, reservations, and LPN context, as well as the order line status. For this reason, transaction processing mode, set via profile options for other forms, is irrelevant to the shipping forms; shipping transactions are always processed as a combination of online and immediate concurrent

processes.

To process the inventory interface, the inventory concurrent manager the Inventory Remote Procedure Manager must be running.

Scale Integration for Weight

The delivery gross weight can be entered before ship confirmation. The weight can be entered manually, or can be captured by an integrated scale. To the mobile device, the scale would essentially appear as just another input device, triggered when the user enters the weight field.

Common Problems

1. Invalid material status message

   Shipping transactions honor material status: if any material status that disallows shipment confirmation applies to the material under shipment, the transaction cannot be completed. Material status can be assigned to a subinventory, locator, lot number, or serial number, so verify the material statuses of the staging lane and the subinventory of the staging lane, as well as all the lots and serials of the LPNs being shipped. With LPN Ship and Dock Door Ship, the material status check for the LPN is made immediately after the user exits the LPN field, and the LPN will not be accepted if the material status is invalid. With quick Ship, the material status check is made for all LPNs tied to the delivery immediately after the user exits the delivery field.

2. LPN not available to ship

   There are several reasons that an LPN may not be in the list of values when shipping.

   First, check that the status of the delivery line with which the LPN is associated is Staged; this can be verified on the Shipping Transactions form. If the line is Released to Warehouse, that indicates that the line has not yet been pick confirmed. It may only be pick loaded, for instance. Only staged LPNs are available for shipment.

   Next, verify that the LPN under consideration is assigned to the trip that was selected, if using Dock Door Ship. The form limits the operator to only loading LPNs associated with the selected trip. However, there may be multiple overlapping trips scheduled for the same dock door in which case the operator may mistakenly choose the incorrect trip.

   Verify that the delivery status is Open or Packed. This can also be checked on the Shipping Transactions form. Finally, make sure that the LPN is not already loaded or shipped by checking the LPN context. The LPN context can be verified on the desktop via the Material Workbench, or on the mobile via LPN Inquiry.

3. LPN not available to ship for Direct Ship.

   Only LPNs that reside in inventory are available to ship with Direct Ship. Furthermore, the LPN must be available. It cannot be allocated for a move order, nor can it be reserved to any demand other than the sales order for which it is about to be shipped.

4. Sales order or order line not available for Direct Ship

   Sales order or order line not available for Direct Ship Only booked and scheduled sales orders that have not yet been pick released are eligible for Direct Ship. That means that the associated delivery details must be in status "Ready to Release", and not "Released to Warehouse" or "Backordered". In addition, verify that the LPN being loaded contains the item on the sales order line you are trying to enter.

5. Unable to access Direct Ship page.

   Because Direct Ship transactions can be performed without any manager direction such as that required to trigger Pick Release for LPN Ship, and because shipment transactions are not easily reversed and trigger external events such as billing and invoicing, access to Direct Ship is restricted by an Organization Parameters flag that comes seeded disabled. Unless this flag is enabled, the Direct Ship mobile page cannot be accessed.

6. Delivery not in list of values for quick ship

   Verify that the delivery status is Open or Packed. This can also be checked on the Shipping Transactions form. Also verify that the delivery contains at least one line that which is staged, as deliveries which do not have any lines staged cannot be ship confirmed.

7. Dock door not in list of values for dock door ship

   The most common cause for this issue is that the current time is outside the appointment time window. The Dock Door Ship page limits the user to selecting only those trips for which the appointment is current. However, if an appointment was missed and the truck is arriving late, the appointment time can be revised on the desktop.

   Also verify that the trip status is open on the Shipping Transactions form.

8. Missing Item

   A missing item message indicates that an item that is on the trip or delivery has not yet been pick confirmed. It may still be loaded on an operator's equipment and not yet dropped, or it may have been backordered. Check the line status of the missing item in the Shipping Transactions form. Query by the trip or delivery in question, and check for any status other than Staged; these would be considered missing items. Missing items can be unassigned from the delivery or trip by the operator on the mobile or on the desktop.

Also, because a dock door can have multiple deliveries staged to it, the missing item message may refer to a different delivery that has been loaded but not yet shipped. Verify the delivery number displayed on the missing item page.

9. Missing LPN

   A missing LPN message indicates that an LPN that has been staged for a trip or delivery has not yet been loaded. The operator may simply have missed it on the staging lane, or it may have been staged to another staging lane. Note that even if the LPN has been staged to a different lane, it can still be loaded using the ship confirm process.

   Also, because a dock door can have multiple deliveries staged to it, the missing LPN message may refer to a different delivery that has been loaded but not yet shipped. Verify the delivery number displayed on the missing LPN page.

10. Unable to unload LPN from dock door from Unload page

    LPN load transactions can be reversed by using the LPN Unload transaction. However, there are two different Unload screens to access depending on the mode in which the LPN was loaded. If the LPN was loaded using Direct Ship, use the LPN Unload page available in the Direct Ship menu option. If the LPN was loaded using LPN Ship or Dock Ship, use the LPN Unload page available from the same menu where the load page was accessed.

Debugging Notes

All mobile shipping related Java files are in the same package oracle.apps.inv.wshtxn.server. The server side code is in INVPWSHS/B.pls and WMSPSHPS/B.pls. There are several ways to debug.

For Java code, there are several log files for the mobile transactions. See the mobile installations guide to find the log files. The log files will indicate where the error or exception occurs and the problem is. Then trace back to the Java files to find out what exactly the issue is.

For concurrent request to ship confirm, turn on the profile OE:DEBUG to view details in the request log files. The log file will indicate how many lines are inserted to the MTL_TRANSACTIONS_INTERFACE table and if the INV and OM interfaces are successful. If it fails in the inventory transaction manager, the message 'MTL_ONLINE_TRANSACTION_PUB.process_online returns false' will be logged in the log file. A detailed error message should also be displayed.

For Inventory Transaction Manager, set up all the following three profiles to see the log files:

Profile Options

Profile	Setting
INV:Debug Trace	Yes
INV: Debug file	provide the complete path for the log file
INV:Debug Level	set a value larger than 1

Trip Verification

This query the dock door appointment from the trip, the dock door id, dock door name, appointment time frame and pick up stop id and status can be gotten. The status of pick up stop should be OP (open) and the appointment time frame should fall into the current time. Then the trip can be loaded from the appointed dock door.

```
select distinct wda.dock_id,
  milk.concatenated_segments DOCK_DOOR_NAME,
  wda.start_time,
  wda.end_time,
  wda.trip_stop pickup_stop_id,
  wts.status_code pickup_stop_status
from wms_dock_appointments_b wda, mtl_item_locations_kfv milk,
  wsh_delivery_legs wdl, wsh_Trip_stops wts, mtl_parameters org
 where wda.dock_id = milk.inventory_location_id
  and wda.organization_id = milk.organization_id
  and wda.trip_stop = wdl.pick_up_stop_id
  and wdl.pick_up_stop_id = wts.stop_id
  and wts.trip_id = &TRIP_ID
  and org.organization_id = milk.organization_id
  and org.organization_code = &ORGANIZATION_CODE
```

All staged LPNs

This query returns all the LPNs in the current organization for a given pick up stop which are not yet loaded. The query can be used to check why one particular LPN can't be loaded. This query can be manipulated to fit your needs, for example the released_status and inv_interfaced_flag can be changed to different values to satisfy different requirements.

Display LPNs in Organization Staged but not Loaded

```
select distinct wlpn.license_plate_number Master_lpn_name,
nvl(wda.delivery_id,0)
from wsh_delivery_details wdd, wsh_delivery_assignments wda,
wms_license_plate_numbers lpn,
```

```
wsh_delivery_details wdd2, wms_license_plate_numbers wlpn
where wdd2.delivery_detail_id = wda.parent_delivery_detail_id
and wdd.delivery_detail_id = wda.delivery_detail_id
and wdd2.lpn_id = lpn.lpn_id
and lpn.outermost_lpn_id = wlpn.lpn_id
and wlpn.lpn_context <> 9
and lpn.organization_id = &ORGANIZATION_ID
wdd.released_status = 'Y'
and (wdd.inv_interfaced_flag <> 'Y' or wdd.inv_interfaced_flag is null )
```

Display LPNs in organization staged but not loaded for particular trip stop

```
select distinct wlpn.license_plate_number Master_lpn_name,
wnd.delivery_id,
wnd.name delivery_name
from wms_license_plate_numbers lpn, wms_license_plate_numbers
wlpn, wsh_new_deliveries wnd, wsh_delivery_legs wdl,
wsh_delivery_details wdd, wsh_delivery_assignments wda,
wsh_delivery_details wdd2
where wdl.pick_up_stop_id = &PICK_UP_STOP_ID
and wdl.delivery_id = wnd.delivery_id
and wnd.status_code in ('OP', 'PA')
and wnd.delivery_id = wda.delivery_id
and wdd.delivery_detail_id = wda.delivery_detail_id
and wdd2.delivery_detail_id = wda.parent_delivery_detail_id
and wdd2.lpn_id = lpn.lpn_id
and lpn.outermost_lpn_id = wlpn.lpn_id
and wlpn.lpn_context <> 9
and wdd.released_status = 'Y'
and (wdd.inv_interfaced_flag <> 'Y' or wdd.inv_interfaced_flag is null )
```

View Loaded LPNs

Query on what are loaded in a given dock door currently. Here we have two cases. One is for dock loading (based on dock door and trip) and the other is for LPN Ship (only based on dock door). All the related information will be retrieved from `WMS_SHIPPING_TRANSACTION_TEMP` which includes trip, delivery, delivery detail, and LPN information.

Display Loaded LPNs when Using Dock Ship

```
select milk.concatenated_segments DOCK_DOOR_NAME,
wstt.delivery_name,
wstt.delivery_detail_id,
wstt.parent_lpn innermost_lpn_name,
wstt.outermost_lpn master_lpn_name

from WMS_SHIPPING_TRANSACTION_TEMP wstt,

mtl_item_locations_kfv milk

where wstt.organization_id = &ORGANIZATION_ID

and wstt.trip_id = &TRIP_ID

and wstt.dock_door_id = milk.inventory_location_id

and wstt.organization_id = milk.organization_id
```

Display loaded LPNs when using LPN Ship

```
select wstt.trip_id,

wstt.delivery_name,

wstt.delivery_detail_id,

wstt.parent_lpn innermost_lpn_name,

wstt.outermost_lpn master_lpn_name

from WMS_SHIPPING_TRANSACTION_TEMP wstt,

mtl_item_locations_kfv milk

where wstt.organization_id = &ORGANIZATION_ID

and wstt.dock_appoint_flag = 'N'

and wstt.dock_door_id = milk.inventory_location_id

and wstt.organization_id = milk.organization_id

and milk.concatenated_segments = &DOCK_DOOR_NAME
```

Frequently Asked Questions

1. How does the auto-pick confirm option affect the shipping process?

   Auto-pick confirmation can be enabled for the organization, or it can be set at the time of pick release. When this option is enabled, the system automatically confirms all the suggested transactions without requiring individual confirmation from users.

   All tasks picked via the mobile device must be packed into LPNs as part of pick confirmation, but all tasks that are auto-pick confirmed will be staged loose without any LPN association. Ship confirmation using either LPN Ship or Dock Ship requires that staged lines be packed in LPNs, so auto-pick confirmed lines cannot use either of these shipment methods. However, the mobile Quick Ship process does not require any reference to LPN, and so the Quick Ship method can still be used when auto-pick confirm is used. Also, desktop shipping via the Shipping Transactions Form can also be used when auto-pick confirmation is used.

2. What documentation is generated during shipment confirmation?

   Shipment confirmation with WMS supports printing the same documents previously printed from the desktop. In addition, label printing is supported at shipment confirmation.

3. Exactly which of the loaded LPNs are shipped when the user selects Ship?

   Multiple users can be loading LPNs to a single dock door. The loaded LPNs remain staged at the dock door until all missing items, missing LPNs, as incomplete ship set problems have been either remedied or overridden. Therefore, it is possible for one operator to be tracking down missing LPNs for a delivery that has been loaded to a dock door, while another operator is loading a new delivery to the same dock door. Selecting Ship on the mobile attempts to ship all LPNs that were loaded using the method the operator is currently in.

   Specifically, if one user has loaded a dock using LPN Ship, and another user has loaded the same dock using LPN Ship, then if any user presses Ship from the LPN Ship page for that dock door, then the system will perform error checking for both deliveries and attempt to ship both deliveries. However, via the Dock Ship page, the dock door will appear empty.

   If, however, one user has loaded a dock using LPN Ship, and another user has loaded the same dock using Load Dock, then pressing Ship from the LPN Ship page will only affect the delivery loaded via LPN Ship, and similarly, pressing Ship from the Load Dock page will only affect the trip loaded via Load Dock.

4. How can I tell when a delivery or trip has been fully loaded?

   There are several ways to determine when a trip or delivery has been fully loaded. The simplest and quickest way is to select the Missing LPN or Missing Item button on the shipment page. Missing LPN will display any LPNs that have been pick confirmed and staged, but not yet loaded on the truck, for any deliveries or trips staged at that door, limited to deliveries or trips that have been staged with the same method. Missing Item will display any items that have not yet been pick-confirmed.

   Note that while these checks can be initiated manually, they are performed automatically when the user chooses Ship, so that selecting Ship is another way to verify that the delivery or trip has been fully loaded. If it is fully loaded, the shipment will be shipped, while if it is not fully loaded the appropriate missing messages will be displayed.

   Finally, a query can be performed on the Material Workbench on the desktop or via LPN inquiry on the mobile. However, to the list of LPNs that should be on a trip or delivery must be known to know which LPNs to perform the query on, and this in turn can be gathered from the Shipment Planning & Transactions form on the desktop.

5. Can a trip be shipped with LPN Ship?

A trip that does not have an appointment must be shipped via LPN Ship, while a trip that does have an appointment must be shipped via Load Dock.

6. Why can't an LPN be loaded to a particular dock?

   The system prevents users from loading LPNs of a single delivery or a single trip to multiple different docks. Doing so would present a deadlock situation, in which each dock cannot be ship confirmed because each dock has missing LPNs at the dock door.

18

Directed Put Away on WIP Completion

This chapter covers the following topics:

- Overview
- Prepack Request
- Completion Using Prepacked LPNs
- Generating New LPNs at Completion
- Setting Up Completion Windows
- Setting Up Putaway Windows
- Common Problems
- Frequently Asked Questions

Overview

Warehouse Management provides several features to enhance integration with Oracle Work In Process. One of these features is directed put away using the Rules Engine. Previously, on completion transactions, you entered the subinventory and locator to which the assembly was dropped. With warehouse management, the system can direct you to put away the material in a certain subinventory and locator based on criteria you define.

The system supports several additional features at WIP completion. The system can collect a material status and lot or serial attributes at transaction completion. The system performs completions into LPNs, so you only need to enter the lots and serials associated with the transaction once. The system can suggest the type and quantity of carton to pack the completed assembly into, based on rules you define. Crossdocking, exception handling, and other features, are integrated with the completion process when warehouse management and WIP are installed.

This chapter describes in detail the functionality of LPN-based WIP completion transactions. It contains a list of solutions to common problems and troubleshooting

information, as well as a list of frequently asked questions.

Supported Features

WIP completion is when you indicate an assembly is completed and considered a finished good available for inventory. Previously, the completion transaction was operator-directed, and completed instantly. With warehouse management installed and enabled for the organization, the completion process is system-directed and has many additional features. These features are described in the following sections.

> **Note:** All of these features are available only when using the mobile device, and are supported for discrete job flow work orderless completions.

Completion Into LPN

Work orders are completed into license plates, or LPNs. Any number of lots or serials of a given assembly can be completed into a single LPN. After the completion and packing transaction, you can enter a single number to transact the entire LPN, because the system associated the LPN with the contents (including lots and serials) and the location.

LPNs can be manually entered, generated on the fly with a user-defined hotkey, or pregenerated and preprinted. All three options are integrated with label printing.

When you create LPNs at the time of the completion transaction, you can print a label. However, if the LPNs are pregenerated, then the LPN labels are ready for use. Explaning License Plate Management, *Oracle Warehouse Management*

Prepacking

Rather than choosing the correct number and type of LPNs to pack for a given assembly, the system can select and prepack the LPNs prior to the completion transaction. Warehouse management uses grouping rules, physical attributes of the finished assembly, and box definitions, to make an intelligent suggestion of the containers to use. For instance, certain types of finished assemblies might require an insulated container or a container with certain hazardous material attributes. In this case, you use pregenerated and preprinted labels for the completion transaction. See: Warehouse Management Cartonization, page 12-1.

Directed Put Away

Warehouse management allows you to select the putaway locator, for a completed LPN, or allows the system to suggest the putaway location. If you suggest the location, you can choose to have the Rules Engine validate it. If system-directed, the Rules Engine is used to come up with the suggested locations. Some common processes that the rules are capable of modeling include:

- Minimizing item fragmentation

- Requiring no lot commingling in a locator
- Directing hazardous materials to a corresponding hazardous storage location
- Placing seasonal items in a subinventory dependent on time of year.

In addition, you can define a rule that suggests put away to the completion subinventory and locator defined in the job. See:Overview of Rules Setup, *Oracle Warehouse Management User's Guide*.

Exception Handling

When the system directs you to put away material in a locator, you may find that you cannot put away the material in the suggested locator. For instance, perhaps the location is full, or damaged. At the time of put away, you can override the Rules Engine suggestion. If you override the suggestion, you must select an exception reason. You define the exception reasons that can trigger an Oracle Workflow to take corrective action. For instance, perhaps a cycle count must be scheduled to understand why the material could not fit as expected, or the location must be put on hold and a warehouse manager needs to be notified via e-mail.

Multi-Step Process

With the completion integration, the process can be modeled as a one-step or a two-step process. The completion transaction can immediately direct you to the destination location, or can be a separate business process from the actual put away. For instance, if you perform the completion you do not have to perform the actual put away transaction. This is analogous to a standard receipt or a direct receipt with Oracle Purchasing. You make the decision of which option is available to the end user during initial menu setup. You can set the option different for different users.

Equipment Loading

You can load LPNs onto equipment before beginning drop off, or drop each LPN immediately. This decision is distinct from the one-step or two-step decision above, and is completely controlled by you. For instance, if the LPNs are pallets and you use a forklift, you can only drop one LPN at a time, so you would jump immediately to the drop part of a task for each LPN. However, if the LPNs are smaller boxes and you are using a using a cart, you can load multiple LPNs on the cart before you put them away.

Material Status

Material Status Control makes it possible to control the movement and usage for portions of on-hand that inventory have distinct differences due to grade, quality, or maturity level. Some of the most popular requirements for status control are to be able to control whether or not material can be picked or shipped on an internal order, picked or shipped to a customer, or issued for a production job. In addition, some material may need to be quarantined until some activity, such as inspection, is performed.

If an item is status controlled, you can assign a material status to lots and serials when they are initially created. When a lot or a serial of a finished good assembly is entered, the system prompts you to enter a material status. You can define put away rules to put the material away to different locations based on the material status. See: Describing Material Status, *Oracle Warehouse Management User's Guide*.

Lot and Serial Attributes

Some industries require tracking attributes of a particular lot or serial number. These attributes may include dates, such as manufactured date or best by date, numbers, such as weight or size, or text, such as country of manufacture, grade code, or color. These types of attributes do not warrant a separate part number, but are important to track for each individual lot or serial. Warehouse management provides facilities to define over 70 attributes for each lot and serial. The list of attributes can be different for each item as necessary, or can be the same for entire categories of items with minimal setup. Whenever a new lot number or serial number is used, the user will be prompted to enter those lot attributes or serial attributes that have been defined for that item. See:Setup Lot and Serial Attribute Entry, *Oracle Warehouse Management User's Guide*.

Label Printing

Label printing features integrate with the completion transaction. You can print five types of labels at the time of completion, Material, Serial, LPN, LPN Summary, and LPN Contents. Material labels include: assembly information, including the revision, quantity, lot details, or other data pertaining to the item. Serial labels include the information on the material label, and any serial details. LPN labels include the license plate number, LPN weight, type, volume, and any other information pertaining to the type of LPN. LPN Content labels include the LPN label information plus all information related to the contents of the LPN. LPN Summary labels are similar to LPN Content labels, with the difference that LPN Summary labels can list multiple items and the contents at inner levels for nested LPNs.

Warehouse management supports compliance labeling, so you can print different label formats for different types of items. You can use any number of criteria to determine what label format to print. Warehouse management also selects the appropriate printer for printing based on criteria you define.

Crossdocking

Warehouse management supports opportunistic crossdocking, if enabled, for the organization. This means that whenever backordered material exists and new supply arrives, from either a WIP completion or a PO receipt, the system directs you to stage the material for the appropriate order rather than put the material away in inventory. See: Describing the Crossdocking Putaway Process, *Oracle Warehouse Management User's Guide*..

Cost Group Assignment

A cost group is assigned to the completed material as soon as it is put away in inventory. You can use cost groups to keep different material in different material valuation accounts. In warehouse management organizations, material is not always given the valuation accounts of the subinventory in which it resides. You can assign a cost group to the material based on attributes of the job, or any other decision criteria relevant to the organization.

Assemble to Order Reservations

Assemble to Order (ATO) jobs are automatically reserved to sales orders when created. You can manually associate a job to one or more sales orders. When material from these jobs is completed, the reservation is automatically transferred from the job to the

on-hand assemblies. If LPN-based completions are used and the job is completed into an LPN-controlled subinventory, then the reservation is created at the LPN detail level.

This allows the system to track the particular LPN marked for a particular sales order, rather than marking just a subinventory / locator, and as applicable, lot or revision. This level of detail on the reservation ensures the exact completed material from the job is picked for the sales order, in that the reserved LPN is allocated by the system when the sales order is picking released.

You can use subinventory transfers to transfer reserved LPNs. This automatically transfers the reservations to the destination subinventory. The system prevents transfers of reserved LPNs to non-LPN controlled or non-reservable subinventories so LPN reservation can be maintained.

Standard Features

Standard features of the LPN-based completion pages include support for revision control, expiration date control, and automatic backflush of assembly pull components. Furthermore, the LPN-based completion is optional, in that the standard Mobile supply chain applications completion without LPNs or Warehouse management features can be used instead, regardless of whether Warehouse management is installed at a site or enabled for an organization, so that these additional features need not be used if they are not necessary for your organization.

Prepack Request

Prepacked LPNs remove the decision of which carton to pack from you. Cartonization enables the system to best determine which type and how many cartons should be used for a given quantity of a finished assembly, and to pre-print the labels for those LPNs. A prepack request is generated on the desktop by a concurrent request. The following notes will help ensure the prepack requests are successful.

When a revision controlled item is prepacked, you must indicate the revision on the request; it is not derived from the current effective revision. When a lot controlled item is prepacked, you can enter an existing lot if the lot field is left blank. The system uses the prefix and sequence numbers defined at the item level to generate a new lot. You can print the Lot number and revision on the labels generated by the prepack.

Individual serial items, however, are not prepacked because the serial numbers may be generated at the time of completion. Unlike a lot number for which there is generally only one per completion transaction, multiple serial numbers per a completion transaction are unavoidable. A prepack of serial control items specifies only the quantity of that item and relies on you to enter the serial numbers at the time of completion.

The container field on the prepack request is an optional field. If no container item is entered, then the system uses cartonization to determine the type and number of containers. If, however, the request specifies a container item here, then the system uses that container to prepack. If no container load relationship is setup, then the system assumes the entire quantity can be packed into a single container. Otherwise, the

system uses the quantity on the container load relationship to determine the appropriate quantity to pack.

Completion Using Prepacked LPNs

You can enter prepacked LPNs at completion. The LPN list-of-values in the WIP Completion form contains the following: all pregenerated LPNs, all LPNs with context Resides in WIP, and LPNs prepacked with the assembly entered or on the job or schedule. You can also create new LPNs. You cannot use a prepacked LPN with a different assembly then the current completion transaction.

The system automatically enters the quantity after you choose the prepacked LPN. If over completions are not allowed, then you cannot use an LPN prepacked with a greater quantity than is available to complete for a particular job. The system automatically uses the revision number of the contents. The system automatically enters the lot number that was prepacked. This cannot be changed. If the lot number is new, then you must enter lot attributes and lot status, but if the lot number exists, the system does not prompt you to enter a lot number. You must enter all serial numbers, including any applicable attributes or status, for a serial controlled assembly.

You cannot change the lot, quantity, revision, and item number of a prepacked LPN. However, as there is no tie between the prepacked LPNs and the job prior to the completion transaction, there is no need to use the prepacked LPNs for a particular job. You can generate new LPNs on the fly. The original prepacked LPN can remain unused and does not impact any current or future transactions.

Generating New LPNs at Completion

LPN prepack or LPN pregeneration is not required to use directed put away functionality at WIP Completion. You can generate a new LPN in the WIP Completion pages LPN field using the generation hotkey. You can then enter the completion details and the assembly is completed and packed into the new LPN.

Setting Up Completion Windows

The LPN-based completion pages have two modes. One mode allows the completion transaction to be distinct from the put away operation. In this mode, the completion transaction is committed, pulling all the assembly pull material and decrementing the available-to-complete quantity on the work order, but not does increment the inventory. The LPN Resides in WIP. This is an interim state that corresponds to material received on the receiving dock but not put away. Then, as a second transaction, a different employee can put away the packed LPN. The other mode integrates the completion transaction and the put away transaction into one business process that cannot be separated.

These modes are established by using a form function parameter, TXNTYPE. The value

DROP integrates the completion and put away transactions, while the value STOP makes the two operations distinct. The user-interface for the two modes is identical; the form function parameter only controls which buttons (<Load> and <Drop>, or <Save>) are displayed. If STOP is used, you can still use the directed put away features by entering the put away form and scanning the newly completed LPN to be put away.

> **Note:** You can only access the consolidated drop features when you use the two-step putaway mode. When you use the single-step putaway mode, when you select the `<Load>` or `<Drop>` directory from the WIP Completion page, only the system direction option without consolidation is available.

Setting Up Putaway Windows

The putaway process has several modes in which a putaway can be performed. These modes are configured by form function parameters set on the putaway page, and are as follows:

- User-directed rules validated putaway
- User-directed putaway without rules validation
- System-directed putaway with consolidation
- System-directed putaway without consolidation

The term consolidation refers to the system merging all the putaway suggestions into a single drop transaction if the rules happen to suggest that the entire LPN can be put away to a single location. If the consolidation mode is used but the Rules Engine suggests multiple locations for the LPN, the system automatically splits the putaway so you can confirm each destination individually. Only in this case, or in the case where the system-directed putaway without consolidation is used, is the operator able to enter quantity discrepancies for a putaway; in all other cases, the entire LPN is putaway to a locator by entering only the subinventory & locator to minimize data entry. Thus, if quantity discrepancies occur during putaway processes, use the system-directed putaway without consolidation.

Regardless of the mode, the system does the following: validates the destination locator and allows the transaction by material status subinventory or locator, honors item restrictions defined on the organization, ensures LPNs created for reserved jobs are putaway to reserveable subinventories, and ensures cost group commingling does not occur. Beyond these checks, the rules validation mode is the only mode in which the rule restrictions are enforced. In the rules suggested modes, you can override the Rules Engine suggestion (after entering a reason code).

The form function is controlled by two form function parameters. Suggestion can be set to one of the following four values:

- USER: Enter the destination subinventory & locator. The window displays the <USER DROP> button.

- RULES: The Rules Engine decides the destination subinventory & locator, and consolidates the entire putaway if it is to be dropped to a single location. The window displays only the <Load> and <Drop> buttons.

- BOTH: The window allows you to choose between the above two modes by displaying the three buttons <User Drop>, <Load>, and <Drop>. This is the default value if none is specified for the window.

- LINES: The Rules Engine decides the destination subinventory & locator, and you confirm each item / revision / lot individually, even if they are to be dropped in the same location. This makes putaway of mixed load LPNs cumbersome, but is the only option available if quantity discrepancies are required.

In addition, there is the additional dimension of whether the value entered by the user is validated by the Rules Engine. Currently, this option is only supported in the user-suggested modes. That is, this parameter is only applicable when the users elects <User Drop>, and <User Drop> is only available if `Suggestion` is `Both` or `User`.

- YES: Validate the destination on locator field exit against all the items in the LPN, verifying that the item can be stored in that locator and that capacity is available. Note that this does not validate that the selected locator is the preferred locator, only that it is a valid locator.

- NO: Do not perform any rules validation on the locator.

Common Problems

1. Unable to allocate space for put away.

   The Rules engine may fail to allocate space in inventory for the LPN for several reasons. First, the selected strategy may not be able to allocate any space using any of the rules. Warehouse management must be enabled for the organization for the new put away features to be available, and all subinventories in the warehouse management organization must be locator controlled. The Rules engine can help you determine why a rule fails.

2. Putaway fails.

   Put away may fail for several reasons. The destination subinventory must be locator controlled; while locator control is enforced when new subinventories are created, migration of an existing inventory organization to warehouse management may allow subinventories without locators to be used. Putaway may also fail based on cost group commingling if the destination subinventory is non-LPN controlled and there is already material in that locator of the same item but different cost group

that is not physically distinguishable by revision, lot, or serial. Or putaway may fail if the system tries to create a reservation to the completed material because the job was reserved to a sales order, yet the putaway was attempted into a non-reservable subinventory.

3. Employee not defined error.

   Mobile users must be associated with an HR employee to access any of the put away screens, including the completion with drop options. This is necessary because when an LPN is loaded onto an operator's equipment, the LPN is tied to the employee. Therefore, if no employee is defined for a user, then the possibility to corrupt data exists. Note that users without employees assigned can access the two-step put away pages, and that this same limitation applies to the WMS Task menu as well as the Completion with drop WIP pages.

Frequently Asked Questions

1. How are lots prepacked?

   The lot number must be known when an LPN is prepacked. You can enter an existing lot number, if the assemblies are to be completed into an existing lot. However, as is more likely the case, the assembly will be of a new lot. In this case, the lot number can be left blank on the prepack request and the system automatically generates a new lot number using the item's lot generation prefix and starting number. The lot number can then be printed on the label. Only a single lot can be prepacked in each request.

2. How are serials prepacked?

   Individual serial numbers are not prepacked. This is because the system has no way to indicate to the user which serials are expected in each LPN short of printing a detailed LPN listing, which may not be set up. Therefore, a request is made to pack a particular quantity (and potentially lot and revision) of a serial controlled item, but the serials are only entered (and potentially created) at the completion.

3. Can the prepacked item, quantity, or lot be overridden?

   No, the prepacked item, quantity, or lot cannot be overridden at time of completion. Nor can the revision or container item (type of container) be changed. For instance, an LPN with 25 of an item prepacked in it cannot be used for a completion of a job with only 24 remaining to complete, and LPNs prepacked with one item cannot be used for a completion transaction of another item.

   However, as there is no tie between the prepacked LPNs and the job prior to the completion transaction, there is no need to use the prepacked LPNs; new LPNs can be generated on the fly. The original prepacked LPN can remain unused and will not impact any current or future transactions.

4. Why is the prepacked LPN not available or in the list?

   There are two reasons why a prepacked LPN cannot be used. An LPN prepacked with one item cannot be used for a completion transaction of a different item. Also, as indicated above, as the quantity cannot be overridden so an LPN prepacked with a quantity greater than the available to complete quantity cannot be used for a discrete job completion.

5. Why was I not prompted to enter lot attributes?

   You should be prompted to enter lot attributes, expiration date, and status (as applicable) whenever a new lot is created. If, however, an existing lot was entered - either selected from the list at time of completion, or entered on the LPN prepack request - then you will not be prompted to enter the lot attributes as they were entered when the lot was initially created.

6. Why was the LPN unpacked when I dropped it?

   Subinventories have an attribute called LPN Controlled. Subinventories that are not LPN controlled do not allow LPNs in them: LPNs cannot be packed or created in them, and any LPN that is moved into them is automatically unpacked. Verify this setting on your subinventory.

7. At what point is the cost group assigned?

   The cost group is assigned at put away, because as soon as the material is in inventory, the cost group ascertains its financial ownership.

8. At what point is the WIP completion transaction triggered?

   The WIP completion transaction is triggered when the transaction is committed to the database. The point at which this occurs depends on the mode of use. When the Stop mode i used, the completion is posted when the user selects <Save>. When the Drop mode is used, the completion is posted when the user either selects <Load> from the Completion page, or <Done> from the Drop page. Therefore, not that if the drop transaction fails due to cost group commingling error or some other error, no completion transaction is posted.

19

Warehouse Management-Project Manufacturing Integration

This chapter covers the following topics:

- Overview
- Implementation Setup
- Inbound Logistics
- Cross Docking
- Outbound Logistics
- Shipping
- Manufacturing
- Transactions
- LPN transactions: Commingling
- Common Problems
- Frequently Asked Questions
- Debugging Tips

Overview

Oracle Warehouse Management System provides integration with Oracle Project Manufacturing. This integration enables you to use the warehouse management functions such as, warehouse resource management, license plate numbers (LPN), warehouse configuration, task scheduling, advanced pick methodologies, value added services and the rules engine for put away, picking, task assignment and label printing. You can now receive, move, manufacture, pick and ship material owned by a project. When a Project Manufacturing Organization is warehouse management enabled – transactions performed in the organization ask for references to project and/or task. As a result, warehouse management transactions provide support for these project and/or

task references related to them.

Project Locator

A Project Locator is a locator with a project or project and task reference. It is also a logical partition of a physical location. Project Inventory is stocked in a Project Locator and is transacted in and out of a Project Locator. Since you can create locators dynamically you do not need to predefine all Project Locators.

Common Locator

A Common Locator is a locator without a project or project and task reference. It is also a real, physical location. Project Locators, unlike common locators, contain values in the Project and Task segments in the flexfield definition of the Locator. *Example*: BULK.1.1.PJM01.1.0 for project PJM01 and task 1.0. In Project Manufacturing Organizations, you can store material in common locators if it does not belong to a project.

Project Manufacturing

In a project manufacturing environment projects drive the production requirements. You can plan, schedule, process, and cost against a specific project or a group of projects. If Oracle Project Manufacturing is installed, Project References Enabled and Project Control Level parameters are set in the PJM Organization Parameters window, you can assign project and task references to sales orders, planned orders, jobs, requisitions, purchase orders, and other entities within Oracle Manufacturing. If you enable Project Cost Collection Enabled parameter on the Inventory Organization parameters window, you can collect and transfer manufacturing cost to Oracle Projects.

Related Topics

Defining Cost Information, *Oracle Inventory User's Guide*

Defining Stock Locators, *Oracle Inventory User's Guide*

Implementation Setup

Organization Setup

The following parameters govern the way transactions work and details the implications to a Project Manufacturing-Warehouse Management enabled Organization.

Project Reference Enabled

When an organization is Project Reference Enabled, you can associate projects and tasks, with jobs, stock locators, sales orders, demand and production schedule entries,

supply items, requisitions and purchase order distributions.

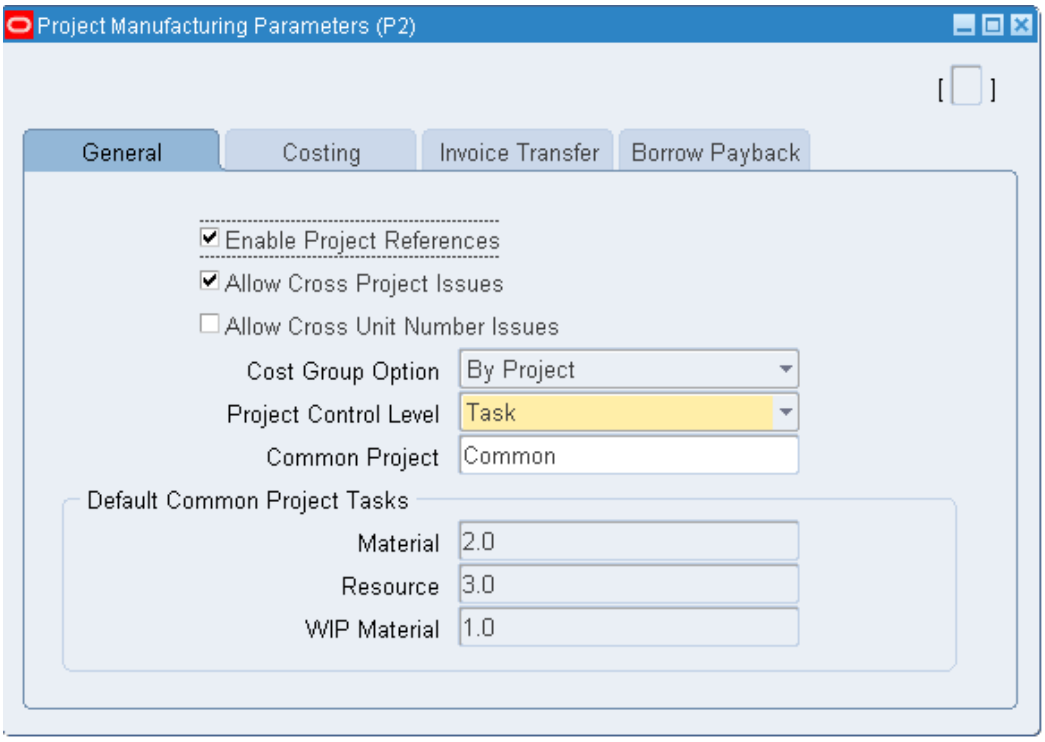
Allow Cross Project Issues

Allow Cross Project Issues governs allocation in a Project Manufacturing Warehouse Management enabled organization. If you do not enable Allow Cross Project Issues, the system only allocates material from the same project and task as the sales order or WIP job/schedule with the exception of soft pegged items. If the sales order or WIP job is common, the system allocates only common material. This restriction is enforced regardless of picking rules. If you enable Allow Cross Project issues, you can source material from any project and task regardless of the project on the sales order or WIP job/schedule. However, this is subject to warehouse management picking rules.

Allow Cross Unit Issues

Use this parameter to allocate serial numbers for an item under unit effectivity control. If the box is unchecked, the system allocates only serials with the same end item unit number specified on the sales order or WIP job/schedule. This restriction is enforced regardless of the picking. If the box is checked, the system allocates any serial number for the order based on the rules provided.

> **Note:** The allocation flexibility described above is unique to warehouse management enables organizations. For organizations that do not use Oracle Warehouse Management, allocations always behave as though the cross unit number and cross project issue boxes are unchecked.



Project Control Level: Project or Task

If Project References is enabled, you can choose the Project Control Level, and associate projects and tasks with supply and demand entities. The following is a list of supply and demand entities:

- **Supply Entities**
- Jobs
- Production schedule entries
- purchase requisitions

  Demand Entities
- Sales Orders
- Demand Schedules

If you enable Project References and choose the Task Control Level, when you associate projects with supply and demand entities then you must also associate tasks.

Subinventories and Locators

Oracle Project Manufacturing reserves segment19 and segment20 of the Stock Locator key flexfield to store the project and task numbers. Do not modify these two segments.

If you install Oracle Project Manufacturing as part of an Oracle Applications installation, create an inventory organization, and check the Project Reference Enabled checkbox, the system automatically enables segment19 and segment20 of the Stock Locator key flexfield for project and task references.

If you install Oracle Project Manufacturing in an existing Oracle Applications installation and currently use segment19 and segment20 of the Stock Locator key flexfield, you must change the current flexfield schema and use other segments for the physical stock location layout. The system does not support automatic conversion.

Physical Locators vs. Logical Stock Locators

The same definition of stock locators used in Oracle Inventory is used in Oracle Warehouse Management, but it may not be feasible for you to affix multiple location labels to the same physical warehouse shelf for each project and task combination. If the material in the location is not labeled with the project and task, you may inadvertently scan the wrong location label and pick material from an incorrect project. Oracle warehouse management removes the project and task segments from the locator field in all mobile user interfaces. Whenever possible warehouse management derives the project and task from the context of the current transaction or the transacted document when this information is not available. You may enter or scan the project and task in separate fields on each mobile page. You must enter or scan the project and task in separate fields on each mobile page. The system converts the physical locator scanned to the logical project and task locator in the background. The transactions in Oracle Inventory are posted with the appropriate project and task locator.

Oracle Warehouse Management differentiates the actual locator in Oracle Inventory from the locator you scan by using logical locators. Logical locators indicate the stock locator, including project and task. Physical locators indicate the stock locator without the project and task. One physical locator may have multiple corresponding logical locators if you store material for more than one project and task combination in a location. When you create a logical locator the system also creates a corresponding physical locator is one does not already exist.

Defining Stock Locators with Project Manufacturing

You can define Physical Stock Locators to receive project material. When the system performs a receipt for a project into inventory, it generates a corresponding logical locator with project and task information in the background. You can view logical locators in the Stock Locators window.

All capacity (weight, volume and Units) and occupancy of the locators are calculated at the physical locator level. No Locator capacity is stored at the logical locator level except for the on hand quantity.

Example

Example

In a subinventory BULK, physical locator PB1.1.1 exists with defined Maximum Capacity: *Units*: 1000, *Volume*: 1000 Cubic Foot and *Weight*: 1000 Pounds.

Material (Quantity=100, Unit Weight =1 pound, Unit Volume = 1 Cubic foot) is received

for Project: PANPJM01 and Task: 1.0 in Locator: PB1.1.1– At the time of receipt a Project Locator is created: PB1.1.1.PANPJM01.1.0 with on hand quantity for the item as 100.

After receipt the physical locator capacity is updated with Units: Current Units=100 Available= 900, Volume: Current =100 and Available = 900, and Current Weight as 100 pounds and available = 900 pounds.

Related Topics

Locators in Project Manufacturing, *Oracle Project Manufacturing User's Guide*

Defining Stock Locators, *Oracle Inventory User's Guide*

Inventory Attribute Group, *Oracle Inventory User's Guide*

Inbound Logistics

You can setup rules to suggest putaway locations for purchase order receipts. You can use the rules engine to optionally setup put away rules based on the source project and task. For example you can setup rules to put away items into the particular subinventories and / or locators based on the projects and tasks on the purchase order distribution lines. See: Rules Engine Setup, *Oracle Warehouse Management User's Guide*

You enter purchase orders and returns on the desktop. Projects setup on the project manufacturing parameters in the receiving organization can be entered on the PO distribution lines. Distribution lines for project and non-project (common) material can be entered on the same PO.

Receiving Purchase Orders

When you receive a Purchase Order, RMA or Internal Requisition in a Project enabled organization, the project and task fields appear on the receipt page. Those fields have a list of values containing all projects on the PO distributions for that item. If a distribution exists without a project, one of the values in the list is "No Project.

You can receive more than one item into an LPN but the contents of any LPN must all belong to the same project and task or they must all be common.

If the receipt routing on the purchase order shipment is direct, the system prompts you for the destination sub inventory and locator in the receipt page. This is the common locator (there will be no project and task segments in the locator). The system creates the corresponding logical locator based on the project and task provided in order to post the receipt to Inventory.

In inspection or standard receipt routings, the LPN will carry the project and task of its contents. This information will be shown to the user in the inspection and put away pages and the user will not be required to enter it again.

Receiving into Common Locators

If the purchase order does not contain project references, during receiving there are no validations done and you receive the material into a common locator.

In the previous example if you receive against "No Project", there are no appropriations of material against shipment that have distributions with project and/or task references. The Purchase Order shipment matching logic consumes the quantity to be received only against those shipments, which do not have any distributions with projects and /or tasks. If you enter the project/task, receiving occurs against the shipment/distribution with that specific project/task.

Returns

When you perform a Purchase Order Return/Correction transaction, the system defaults the project and task from the purchase order distribution line to the source locator. If the user updates the project and task segments of a source locator on a purchase order return, they must match the project and task exactly on the purchase order distribution line.

Putaway Rules

The put away rules execution process in warehouse management determines an appropriate common locator based on the rules defined and the capacity carried at the physical locator level. It then creates a corresponding logical locator based on that common locator and the project and task of the LPN.

During receiving the system recognizes capacity utilization against the physical Locator. For Put away, you can use the rules engine to setup put away rules that contain the source project and source project task as objects to enforce business restrictions, for put away of material based on the project and/or task components.

Cross Docking

Warehouse management only suggests cross-docks within a project and task. This means that if an LPN is received from a purchase order or WIP job/schedule, only backordered sales order lines or WIP jobs & schedules with the same project and task are eligible for cross docking. You cannot using cross-docking to perform a project transfer.

Outbound Logistics

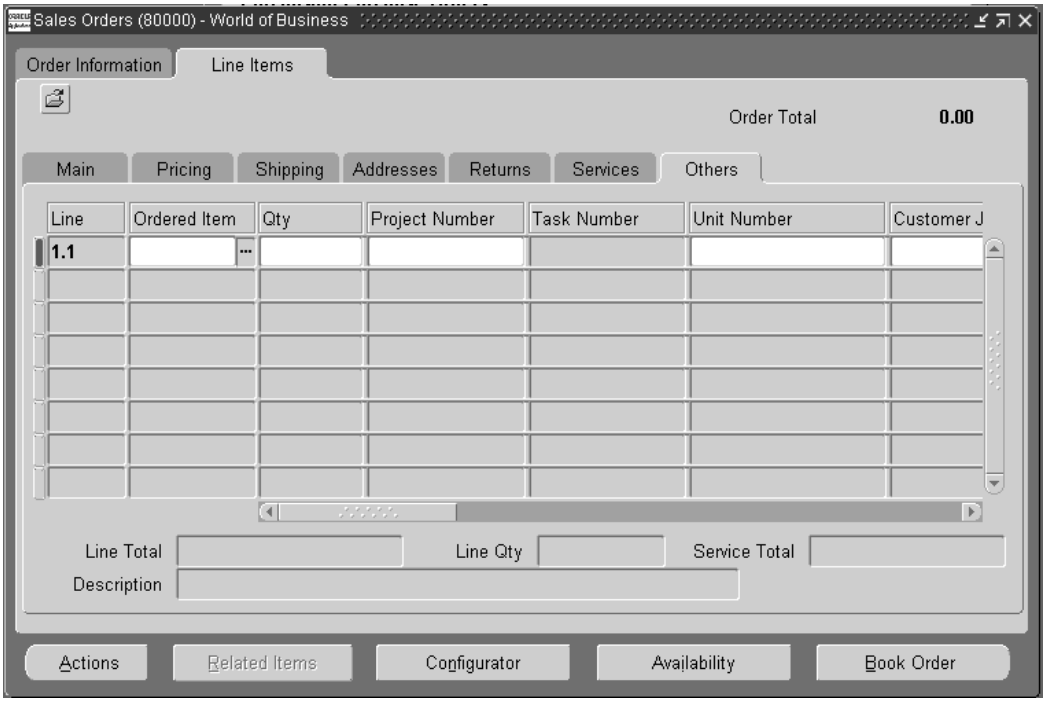
Setup

Sales Orders, RMAs, and Pick Release are entered on the Desktop. You can enable sales

orders and RMAs for project and task by referencing the project and task information in the Sales Order Lines Others tabbed regions.

At pick release, depending on the cross project issue flag and the picking rules defined, the system may or may not allocate material from the project and task on the sales order line. Regardless of where the material comes from, the destination locator created by the put away rules executed at pick release to select a staging locator will always have the project and task of the sales order. Therefore an implicit project transfer takes place at sales order pick.

In a project manufacturing warehouse management enabled organization, there is a seeded pick strategy defined/enabled for picking. You can define pick rules or modify and use the changed seeded rules to suit your business needs. Enable this seeded strategy or setup their own business strategy in the Rules Workbench as part of the implementation. In the absence of a strategy, the system allocates any material for project and non-project sales orders. When the seeded project manufacturing pick strategy is used during pick release, the system tries to allocate from the project and task on the sales order or job, transferring from other projects or tasks if necessary. However, if cross project issues are not allowed, as defined on the project manufacturing parameters form, then the Rules Engine will not transfer from other projects or tasks. The project and task allocated by the Rules Engine cannot be changed during task execution.



Seeded Pick Strategy for Project Manufacturing

When you enable warehouse management in an existing Project Manufacturing organization, a seeded picking strategy is assigned to the organization. This strategy is

most useful where cross project allocations are allowed in the Project Manufacturing organization parameters as it adds preferences to the material allocated for project sales orders and WIP jobs/schedules. This strategy uses five seeded picking rules to model common requirements of a project manufacturing-warehouse management enabled organization. The strategy is automatically assigned to the organization when an organization is enabled for both warehouse management and project manufacturing. The strategy attempts to allocate first the most specific material for a particular project and task, gradually loosening the restrictions, finally allocating any material if necessary. It behaves as follows:

1. Allocate material from the same project and task as that on the job/schedule or sales order

2. Allocate material from the same project without respect to task

3. Allocate material that is not stocked for any particular project (Pick from the " Common" stock)

4. Allocate material from the same planning group

5. Allocate any material.

Strategy Project Manufacturing Allocation Preferences
Strategy Description Prefer same project, then task, then planning group, then common, then anything

Rule Name: Same Project, Same Task (Always)

R		Source Locator	Project Identifier	=	Source Project	Project Identifier		
R	AND	Source Locator	Task Identifier	=	Source Project	Task Identifier		

Rule Name: Same Project (Always)

R		Source Locator	Project Identifier	=	Source Project	Project Identifier		

Rule Name: Pick Common Stock (Always)

R		Source Locator	Project Identifier	IS NULL				

Rule Name: Same Planning Group (Always)

R		Source Project	Planning Group	=	Project Stock on-hand	Planning Group		

Rule Name: Seeded Default Pick Rules (Always)

The last rules may be too generic for some organizations, but a copy of the strategy can be made, and then that copy modified by removing or modifying the last rule. The rules are defined as follows. If you elect to change the seeded strategy, remember that you will have to disable the seeded strategy assignment and create a new assignment for the new strategy you are defining in the Rules Workbench.

You can build rules for Project Manufacturing-Warehouse Management organizations with project related rules engine objects. Some objects that may be useful in rules set up in a Project Manufacturing organization are as follows:

- Source Project-Project Information

- Source Project Task- Project Task Information

- Project Stock on-hand- Project Details of on-hand material.

  Note: Only if you check the PJM Organization Parameter Allow Cross Project Issue do all the rules in the seeded strategy become relevant. If this flag is unchecked, the Rules Engine will not be able to allocate common material or allow cross project allocations

Listing of Relevant Business Object Parameters

The following table lists the relevant business object parameters.

Business Object Parameters

Parameter	Object	Description
Project Names	Source Project	Project Description
Project Number	Source Projects	Project Number
Inventory Organization Identifier	Source Project	The organization ID
Cost Group Identifier	Source Project	The system generated number for the cost group
Planning Group	Source Project	The Planning Group-Groups one or more
Project Identifer	Source Project	The system generate Number which uniquely identifiers the project.
Description	Source Project Task	Description of the task
Project Identifier	Source Project Task	The identifier of the Project for which the task is a unit of work
Task Number	Source Project Task	The user defined number which uniquely identifiers the task within a project

Parameter	Object	Description
Task Identifier	Source Project Task	The system generate number which uniquely identifiers the task
Planning Group	Project Stock on-hand	The planning groups-Groups one or more projects

Note: Rules that reference the concatenated segments parameter of the locator object should be avoided in project manufacturing organizations as they interfere with the rules engine's ability to check capacity at the physical locator level and create the appropriate logical locator.

Related Topics

WMS Rules Engine, *Oracle Warehouse Management User's Guide*

Describing the WMS Rules Window, *Oracle Warehouse Management User's Guide*

Shipping

In standard picking and shipping flows, the picking process associates the LPN to the delivery lines and the appropriate project and task on that delivery line. Therefore you do not need to enter any project and task data in the LPN ship or dock door ship forms.

Direct Shipping

You can direct ship project and task material against a booked project and task sales order. During direct shipment the shipped LPN should contain material that belongs to the same project and task defined in the sales order. However, if the Organization parameter Allow Cross-Project issue is enabled – then any project and task material can be direct shipped against a project Sales Order. In case of serial numbers having unit numbers, the same check is performed depending upon the setting of the Organization parameter Allow Cross Unit numbers issue. If the project sales order contains unit numbers then the serial having that unit number can only be shipped. However if the Organization parameter Allow Cross-Unit numbers is enabled, then serial with any unit number can be shipped

Manufacturing

Discrete Jobs and Component Pick Release are entered on the Desktop. Projects that have been setup on the PJM Project Parameters window in the organization performing the job can be entered on the Work Order window. When a Discrete Job is created with Project and task references, the subsequent transactions like Work in Process Issues, Return and Work in process Assembly Completion and Return seek project and task references. However, the behavior of these transactions varies with the setting of the Organization parameter: Allow Cross Project Issues Enabled check box.

Project Discrete Job: Component Pick Release

The Component Pick Release for Project Discrete Job is similar to a Project Sales Order. You can use the default seeded Pick strategy, for WIP component allocation.

The transactions created for component picking differ slightly from sales order picking depending on the pegging attribute on the item definition

If the components are *hard pegged*, the system pulls material from any locator based on the rules defined and the destination locator (in the case of moves to a WIP supply locator) is a logical locator with the project and task of the job or schedules

If the components are *soft pegged*, the system pulls from any locator based on the rules setup but the destination locator is a common locator in the case of a move to a supply location. This is because WIP backflushes from common locators for soft pegged items.

Project Discrete Job Completion

When you create a project discrete job, the system defaults the project and task from the project discrete job to the project and task segments of the completion locator. If you assigned a completion locator to the routing, the system concatenates the common locator segments with the project and task to create a project locator.

Project Work Order-less Completion

When you perform a project work order-less completion, you must specify the assembly, quantity, project, or project and task, and other information. When the transaction is saved, the system defaults the project and task from the transaction to the completion locator. The dynamic creation of locator is allowed.

Work order-less completion automatically backflushes all operation pull, assembly pull, and push components.

Transactions

Subinventory Transfer

A subinventory transfer changes the physical location of inventory within an organization but does not change the project and/or task information. When you perform a mobile subinventory transfer of an LPN, the project and task are taken from the LPN's current logical locator. You must indicate the destination physical locator and the system creates a logical locator so the transaction does not perform an implicit project transfer. If you perform a subinventory transfer of loose material, the system prompts you for the project and task. This project and task appends to both the source and the destination physical locator you enter.

> **Note:** This document refers to user interface enhancements made to warehouse management and mobile supply chain application windows to support project manufacturing. No desktop user interfaces have been changes to support this functionality. All desktop locator fields still display and require entry by logical locators.

Inter-Organization Transfers

You can perform a direct inter organization transfer to move project inventory to a different organization. You can perform the following types of transfers:

- Project to Common
- Common to Project
- One Project to another
- Common to Common

The direct inter-organization transfer verifies that the item, project, and task are valid in the destination organization. If the destination organization allows dynamic creation of locators, the inter-organization transfer creates a locator with the project and/or task references in the locator segment

Miscellaneous Transactions

In the Mobile Pages, you can optionally enter a project and task when doing a miscellaneous transaction. If you enter a project and task on a miscellaneous transaction, the material is received into the physical locator with the Project and task appended to the last two segments, forming the project locator.

If you do a miscellaneous receipt of an LPN into a project locator, the LPN resides within the project locator. If you do a miscellaneous issue from an LPN, the entire

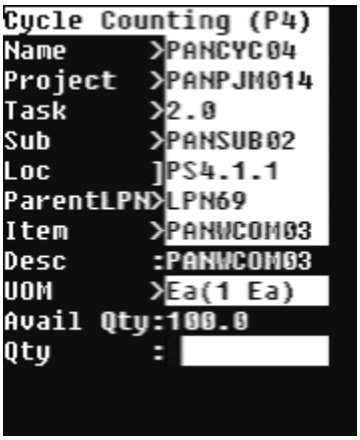
contents of the LPN belonging to the project and task are issued out.

There are no mobile user interfaces for project transfer or borrow payback transactions. You must perform those transactions on the desktop. These transactions are available only for loose material. There also exists within inventory the ability to project enable a miscellaneous receipt or issue transaction. This can be done in non project manufacturing enabled transactions and it allows inventory users to reference a project and task on miscellaneous receipts and issues for project cost collection. There is no mobile user interface support for project enabled transactions

Cycle Counting

Counting in an Oracle Project Manufacturing and Oracle Warehouse Management enabled organization are supported as follows:

Project and task details serve as part of the unique identification of a storable unit of inventory, in a similar manner to lot, revision, serial number, or LPN. This unique identification is carried through the entire counting process. A separate cycle count request or physical inventory tag is generated for each unique combination of item, lot, revision, serial number, LPN, locator, project, and task.



You can identify the Locator by scanning the physical bar code, followed by the Project/Task label that was prepared when the inventory was introduced

Count reporting is performed for each Storable Unit, which carries a unique Project / Task.

For a project manufacturing-warehouse management enabled organization, on navigating through the regular cycle count page, the List of Values field for project and task is displayed.

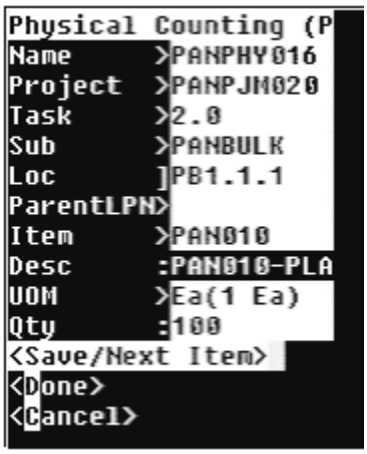
For unscheduled count entries not allowed cycle count, project/task is restricted to only those locators that have been defined in the schedule request. (Example: Suppose a subinventory has Projects P1 P2 P3 defined. The material for which the counting is to be performed is in project P1 and P3 only. Then the Project LOV shows only Projects P1 and P3).

For unscheduled count entries Allowed cycle count, all projects/tasks defined in that Organization are available (Example: Suppose a Organization has Projects P1 P2 P3. the material for which the counting is to be performed is in project P1, then the Project LOV shows all the Projects i.e. P1, P2 and P3)

Physical Counting

You perform physical inventory through mobile device, you must define physical inventory and generated tags using desktop windows.

Log into the mobile device and navigate to the Pphysical counting window.



When the Allow Dynamic check box is unchecked in the physical inventory, project an task is restricted to the locators you defined in the Physical Count header. (Example: Suppose a subinventory has Projects P1, P2, P3 defined. The material for which the counting is to be performed is in project P1 and P3 only. Then the Project LOV will show only Projects P1 and P3).

When the Allow Dynamic tags is checked, all projects and tasks defined for the organization are available for selection (Example: Suppose a Organization has Projects P1 P2 P3. the material for which the counting is to be performed is in project P1, then the Project LOV shows all the Projects i.e. P1, P2 and P3).

Lot Split, Merge, and Translate Transactions

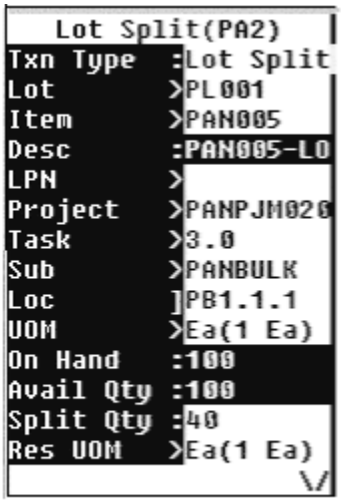
Lot Split functionality allows you to split a lot using a Mobile Device. For a project manufacturing organization, Project and Task fields are displayed on the start Lot and resultant lot windows. The resultant lot from lot split have same project and task as original lot and are not editable. project and task are editable for the first start lot only.

- In the result page, the Project, Task, Sub-inventory and Locator fields are defaulted from the start lot page. The defaulted values can be changed for all except for the Project and Task fields.

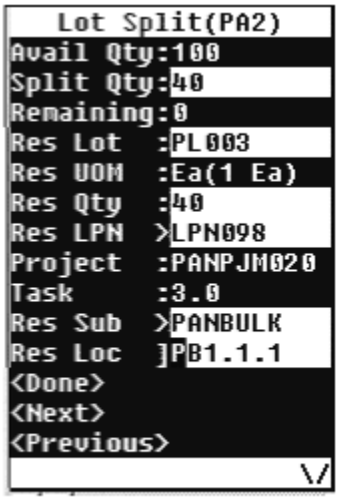
- In the start lot page, if LPN is entered, the project, task, sub-inventory, locator, on

hand and available quantity defaults from the LPN, but Project and Task fields are non-editable

- If Start Project and Task fields are not entered, Result Project and Result Task fields do not display.
- If there are any lot attributes for the item, Lot Attribute page is displayed after entering the Result Lot.

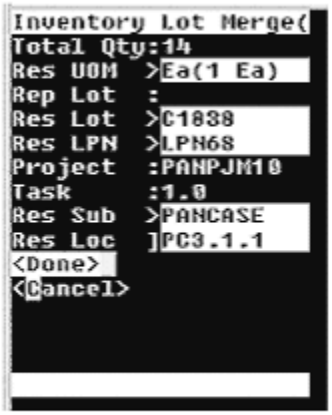


Lot Split: Project and Task enterable for First Lot.



Lot Split: Project and task non-editable for Result Lot

Lot Merge functionality allows you to merge lots using a mobile device. The Resultant Lot from Lot Merge have same project and task as Merged Lots and are not editable. Project and task are editable for the first start Lot only. With the project manufacturing integration, Project and Task field are displayed on the start and result windows. At least two or more lots can be merged into one resultant lot.



Lot Merge - Project and Task non-editable for Result Lot

- Lots can be merged only from the same project and/or task.
- If for Start lot, Project and Task fields are not entered, Result Project and Result Task fields will not be displayed (Non-Project Lot Material)
- If LPN is entered, the project, task, subinventory, locator, on hand and available quantity are defaulted from the LPN but, the result project and/or task are non-editable.
- Project and Task fields are only editable for the start lot. The following lots defaults the values of Project and Task fields, from the start lot and Project and/or Task are non-editable.
- If there are any lot attributes for the item, Lot Attribute page will be displayed after entering the Result Lot.

Lot Translate functionality enables you to use a mobile device to translate a lot. In a project manufacturing organization, the Project and Task fields are displayed on the Start Lot and Resultant Lot pages. The resultant lot has the same project and task as the original lot. You cannot edit the project and task information. You can only edit the Project and Task fields in the Starting Lot page.

The project, task, subinventory, and locator fields default automatically in the result page from the starting lot page. You can modify all of the fields except Project and Task fields.

If you enter an LPN on the starting lot page, then the project, task, subinventory, and locator fields default automatically. You can modify all of the fields except Project and Task fields

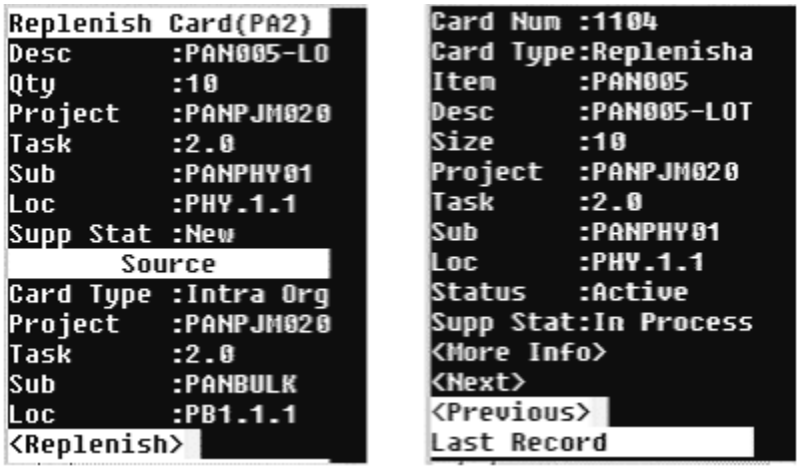
If you do not enter the project and task fields in the starting page, they do not display

on the results page.

If lot attributes exist, for the item, then the system displays the lot attributes page after you enter the resulting lot.

Kanban Replenishment

The Kanban Replenish pages and Kanban Move Order show Project and Task information for project manufacturing organizations. Kanban Pull Sequence can be created for source and destination locators, which are associated with same Project and task. However, once the Project and task is defined, it is non-editable on the mobile page.



Note: If project inventory resides in an LPN, only material or LPNs with the same project and task can be packed to that LPN.

Related Topics

Performing Cycle and Physical Counting with Warehouse Management, *Oracle Warehouse Management User's Guide*

Explaining How to Use Warehouse Management Kanban Features, *Oracle Warehouse Management User's Guide*

Describing Lot Split, Merge and Genealogy, *Oracle Warehouse Management User's Guide*

LPN transactions: Commingling

The Project co-mingling check differs from the Cost Group co-mingling check with regards to co-mingling in an LPN. For project Material the logical locator is the only mechanism currently available to reflect the Project and Task of the inventory. Also for project material, the on hand balances are stored at the logical locator level and an LPN does reside at the logical locator level and it can reside in no more than one logical

locator at a time.

Different projects and tasks have different logical locators. This logic ensures that no more than one Project/Task can be carried at any level of nesting within any LPN.

If Project inventory resides in an LPN, additional Storable Units belonging to the same Project/Task may be added. These Storable Units may be the same Item/Rev/Lot, or may differ in any identifying characteristic, except Project/Task. Other LPNs containing inventory of the same Project/Task may only nest within the LPN.

If any non-Project inventory resides anywhere within an LPN, the addition of any Project inventory is restricted/prevented.

> **Note:** If Project inventory resides in an LPN, additional Storable Units belonging to the same Project/Task may only be added.

Cost Groups Overview

Within any Project Organization, each Cost Group is defined as either a Project or inventory Cost Group, and each Project is associated with a specific Cost Group. More than one Project may be associated with a single Cost Group.

Warehouse management Cost Group Rules excludes all Project Cost Groups. That is, only Inventory Cost Groups are available for assignment by a Cost Group Rule.

If warehouse management is enabled in a project manufacturing organization, any material received that has a project associated with it, is placed into the cost group of the project. Cost Group Assignment rules are not used or called.

The transaction Cost Group Update enables the costs associated with one item to be transferred to another, without physically moving the item. In organizations with both project manufacturing and warehouse management enabled, the Cost Group Update transaction prevents inventory belonging to a Project from being selected for Cost Group Update. The Cost Group Update is used only to change ownership between one non-Project Cost Group and another non-Project Cost Group. A Project Transfer window is used to change ownership between two Projects, or in either direction between a Project and a non-Project Cost Group.

> **Note:** Cost group transfers are not allowed for locators, LPNs or items that belong to a project.

Common Problems

Common problems and their causes and solutions, including debugging scripts are discussed below.

1. Can I do replenishment by Min-Max Planning using project Locators?

Replenishments can only pull from non-project controlled locators and put away to non-project controlled locators. If you received material into non-project locators, and enabled non-project locators in the min.-max sub, the replenishments would work.

2. No Valid PO/Document available during receiving?

   Check whether your mobile responsibility is tied to the correct operating unit.

3. In Mobile transactions Project, Task fields – sometimes when you enter the project details and press <ctrl-l> the system gives "No Result is found". What happens?

   If everything is correct including the correct operating unit, ask the system administrator to bounce the mobile server, log out & check to see if it works.

4. Though I have created a Project referenced purchase order with some Distribution lines without having any Project references – why do I get to see the value "No Project" in the Mobile Receipt page in the Project List of Values? What does this signify?

   In a project referenced Purchase order, if there are some Purchase Order Distributions – created with no Project and/ or task referencing – then you can select "No Project" value in the Project Field to receive material explicitly in a common locator. In a Project referenced Purchase Order (even if one line Distributions line contain a project reference) – the user cannot skip the Project field without entering any value. The user is mandated to enter the project mentioned in the Purchase order distributions or select "No Project" for receiving against shipments with Purchase Order Distributions line in that Purchase order without any Project and/or Task reference.

5. Where do I check for Locator capacity in a Project Manufacturing-WMS enabled Organization?

   Locator capacity is always maintained in the physical locator only.

Frequently Asked Questions

1. Can you have the same project number for two different organizations?

   Project numbers must be unique within an operating unit.

Debugging Tips

Use the Rules Execution trace to check how the rules engine behaves for transactions.

Verify in table MTL_ITEMS_LOCATIONS the records are updated with project and Task ID.

For more debugging, set the following profiles and generate trace output:

```
Do the following query to find out the valid log directories

select * from v$parameter where name = 'utl_file_dir';


Log on as your user in desktop

Select from the menu Edit->Profiles.

Enter Query 'INV%DEBUG%' .

The following profiles will be retrieved, enter User values for each

INV_DEBUG_TRACE = Yes

INV_DEBUG_FILE = <path and name of file where debug information will be
written>
INV_DEBUG_LEVEL = 9.
```

If you upgrade to this patch / release on their current system, what is necessary to activate each of the new features delivered by this patch / release, in terms of set up, initialization, etc.

1. PJM organization should be warehouse management enabled to utilize warehouse management functionality.

2. In the PJM Organization Parameters window, Tab enable relevant warehouse management functionality like Cartonization, Cross-docking etc. required.

3. Project subinventory Locator Control should be Dynamic.

4. In Project Manufacturing Parameters (Organization level) – Field Project_Control_Level should be Task enabled if the Project, Task details need to be captured during mobile transactions. If this is set to Project, the Task field is not mandatory and does not appear in the mobile windows.

5. Allow Cross Project Issues Check Box should be enabled, if warehouse management must allocate material from same project or another project or from common locator for Project Sales orders. This feature available in Project Parameters form for Project manufacturing organizations.

6. Allow cross unit number issues check box should be enabled, if warehouse management must allocate serials with unit number listed on Project sales orders. This feature available in Project Parameters form for Project manufacturing organizations. Verify the warehouse management mobile responsibility points to the correct operating unit. If not, it prevents mobile users from visibility to source documents created in desktop.

20

Labor Management

This chapter covers the following topics:

- Overview of Labor Management
- Labor Management Prerequisites
- Labor Management Setup
- Setting Up Labor Management Parameters
- Managing Non-Tracked Users
- Defining Labor Standards
- Implementation Considerations
- Troubleshooting

Overview of Labor Management

The labor used in a warehouse accounts for a significant portion of warehouse operating expenses. Warehouse managers constantly try to optimize the amount of staff they employ and ensure that employees are productive. If warehouse managers have too many employees, and not enough work, then they have to pay employees to wait for work. If too much work exists and not enough employees are available, customer orders are not shipped on time, or warehouse accuracy suffers. Labor Management enables warehouse managers to track the amount of time each user takes to complete a set of tasks. It records this information at both specific and generic levels. It records the task type, material transacted, and source and destination locations.

After Labor Management records the information, it analyzes it for two primary purposes, resource planning and employee evaluation. Because the system knows the amount of time and expected work required to complete each task, it can predict how much time or staff is necessary to complete the work in the warehouse.

Labor Management can also assist in employee evaluation. It compares the time performance of employees against their colleagues or engineered standards for labor

productivity, and rates employees on their performance level. The performance rating enables the warehouse manager to make decisions about staffing, compensation, training, and work assignment.

Labor Management Prerequisites

Before you can set up Labor Management, you must configure certain parameters and define certain information in Oracle Applications. The following sections explain the prerequisites.

Organization Parameters

Before you can set up Labor Management, you must enable Oracle Warehouse Management and Labor Management for your organization. You enable Oracle Warehouse Management and Labor Management in the Organization Parameters window. See Warehouse Organization Setup, page 1-4 andDefining Default Inventory Parameters, *Oracle Inventory User's Guide*.

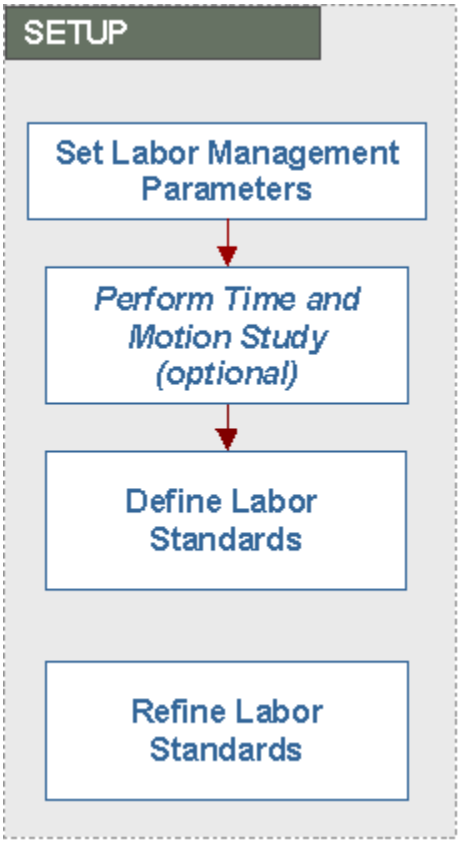
Warehouse Management Setup

Before you can define Labor Management parameters, you must perform the following setup steps in Oracle Inventory, Oracle Bills of Material, Oracle Human Resources Management System, and Oracle Warehouse Management:

- Define Employees, *Oracle Human Resource Management System User's Guide*
- Warehouse Setup
  - Define Subinventories, *Oracle Inventory User's Guide*
  - Define Stock Locators, *Oracle Inventory User's Guide*
  - Set up Locator Zones, page 1-19 (optional)
  - Set up Operation Plans, *Oracle Warehouse Management User's Guide* (optional)
- Material Setup, page 1-25
  - Define Items, *Oracle Inventory User's Guide*
- Task Management Setup, page 9-14
  - Define Employee and Equipment Resources, *Oracle Bills of Material User's Guide*
  - Set up Warehouse Task Types, page 9-15
  - Set up Departments, page 9-16

Labor Management Setup

After you set up the required Oracle Warehouse Management parameters, you can configure the Labor Management parameters. You can then optionally perform a time and motion study to determine the labor standards to use. If you do not want to invest in a time and motion study, you can continue to run normal warehouse operations, and then import existing transaction data in to Labor Management to use as labor standards. After you define labor standards, you must continue to refine them to ensure accurate and useful reporting.



Labor Management Parameters

The Labor Management parameters are:

- Resource Information: These are the standards values to use for work outstanding and resource allocation.
- Ratings Algorithm: This is a grading rubric the system uses to assign scores and performance ratings to employees.
- Standard Time Windows: These are the time windows the system uses for various

reports that rely on periods of time.

- Non-Tracked Users: These are uses who should not be counted when you are collecting Labor Management data.

Time and Motion Study

You can optionally commission a time and motion study for your warehouse. A time and motion study will help you to evaluate the productivity of your warehouse and break down the different motions of tasks that your operators perform. You can then break down the task motions into measurable elements from which you can create labor standards.

Define Labor Standards

After you optionally complete the time and motion study, you can define labor standards. Labor standards are the standards that you establish for a specific work unit. You can import all existing tasks as labor standards, or you can add labor standards directly into Labor Management.

You may not want to invest in a formal time and labor study. If this is the case, then you can use the existing transaction history data to define labor standards. Before you can use existing transaction history data, you must enable Labor Management for the organization. Once this is done, you should execute transactions in the organization for a significant period of time to gather an adequate amount of data from which to determine labor standards. This time period should be from one to six months depending on the level of activity in your organization.

Once you have enough data, you can run the concurrent request Standardize Non-Standardizes Lines. This request takes all existing transaction data, groups it according to Labor Management conventions, and creates new labor standards out of the transaction history. The system creates labor standards only for the types of work performed during the time period that you collected data. You can run the concurrent request again to add additional labor standards based on new transaction records, or create new labor standards directly in Labor Management.

Standardize Nonstandard Lines

A nonstandard line is a transaction that is not associated with a labor standard. You can review the nonstandard line and make it a labor standard or delete it from the nonstandard lines page.

Refine Labor Standards

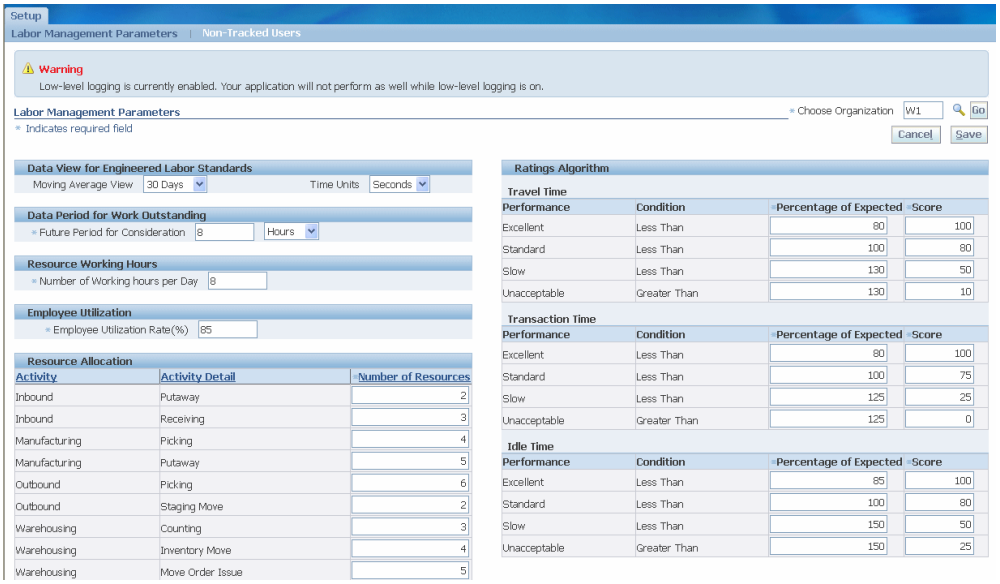
As you use Labor Management, you should continue to refine labor standards to ensure accuracy and reasonability.

Setting Up Labor Management Parameters

Complete the following steps to define Labor Management parameters.

1. Navigate to the Labor Management Parameters page.

2. Enter an organization for which to define parameters, and click Go.



3. Enter the moving average view. The available values are 30 days, 6 months, and all. The moving average view period controls the period the system considers when it calculates the average actual time for a particular labor standard. This average time is listed on the Labor Standard view window so that you can determine whether the labor standard is appropriate.

4. Enter the time units. The available values are seconds, minutes, and hours. This controls how you view time within the Labor Management standards and reports. Setup is always performed in seconds.

5. Enter the future period for consideration in hours, days, or months. The future period for consideration controls the work the system considers work outstanding. The system includes tasks scheduled within the time window that you set in this parameter in the work outstanding listing, and factors those tasks into the resource requirements analysis reports.

6. Enter the number of working hours per day. This is the number of hours in each day the operators in your organization work.

7. Enter the employee utilization rate %. The utilization rate % is the percentage of

time you that expect your operators to perform tasks during the day. If you enter 85% as the utilization rate, then you expect the employee to perform tasks 6.8 hours of an 8-hour day. This is due to breaks, pauses in the work schedule, and other administrative duties.

8. Enter the number of resources for each activity in your warehouse. This tells the system how many employee resources are available for each type of warehouse activity.

   The total number of resources should equal the total number of employees working. If some users perform multiple activities, divide the users according to the amount of time they spend completing each activity. This list is not the list of qualified people for each activity, but how many operators you expect to perform each activity. You can modify this after you perform resource planning to balance the resource allocation with the necessary work outstanding.

   > **Note:** In the first stages of setting up Labor Management, having the total number of resources accurate is more important than driving them up properly amongst functional areas.

9. Enter the percentage of expected and score for the travel, transaction, and idle times. Transaction time is the time the user takes to scan the appropriate fields and physically perform the work. It is measured from when the user first receives the task on the mobile device screen to when the user presses `<Done>` on the transaction page. Travel time is the amount of time the user takes to travel from one location to another during a transaction.

   Idle time is the time in between tasks when the user is not performing work within the system. For system dispatched tasks, it is measured from the time when the user completes one task to the time when the first scan or entry is made on the second task. For manual tasks, the system uses a travel time threshold to differentiate between travel time and idle time.

   The ratings algorithm gives the system a grading rubric to use when it assigns scores and performance levels to individuals. Each work unit in the warehouse has an expected time taken to complete within the Labor Management system. Ratings of excellent, standard, slow, and unacceptable correspond to how close to the expected time each activity takes to complete. The percentage of expected shows how close the user needs to be to the expected time in order to achieve a certain score.

   For example a user must perform a transaction in 80% of the expected time to receive an excellent rating; between 80% and 100% of the expected time to receive a standard rating; between 100% and 130% of the expected time to receive a slow rating; and slower than 130% of the expected time to receive an unacceptable rating. The score allows the manager to assign a numeric value to each performance as well to show greater granularity within each performance.

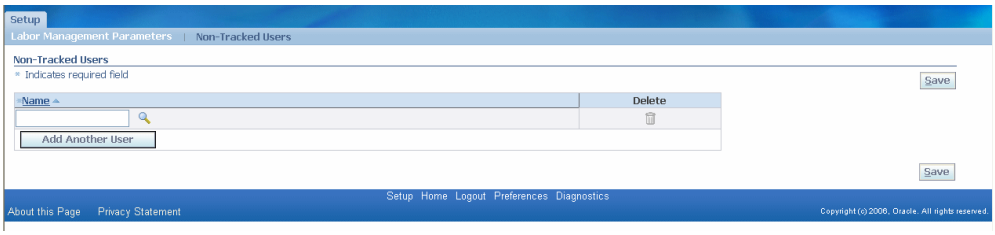
10. Save your work.

Managing Non-Tracked Users

Some users within the warehouse may be ineligible for tracking through the Labor Management system. This may include supervisors or other special classes of employees. You can add these users to the system as non-tracked users. This ensures that Labor Management does not include their performance information in productivity reports or resource planning reports.

To Add Non-Tracked Users:

1. Navigate to the Non-Tracked Users page.
2. Click Add Another User.



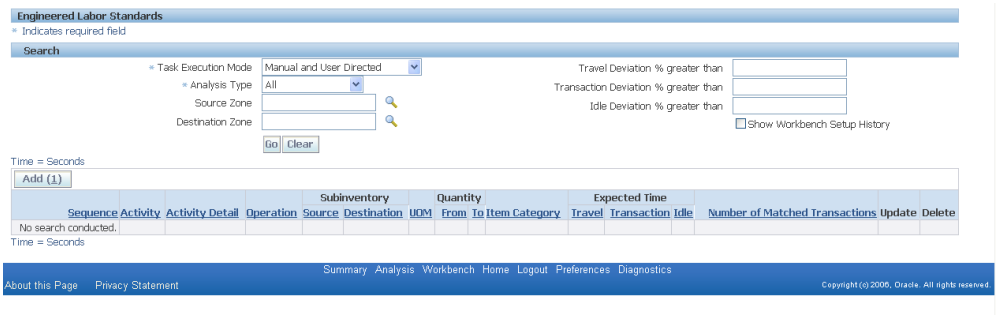
3. Enter a user in the Name field.
4. Click Add Another User to add an additional user, or Save to save your work.

To Delete Non-Tracked Users:

1. Navigate to the Non-Tracked Users Page.
2. Click Delete next to the user you want to remove.
3. Save your work.

Defining Labor Standards

1. Navigate to the Labor Management Workbench.



2. Select a task execution mode from the drop-down list. The available choices are:

   - Manual and User-Directed: Tasks the user initiates and completes to a location he or she specifies. These include all receipts, putaway load tasks, and manual drop tasks.

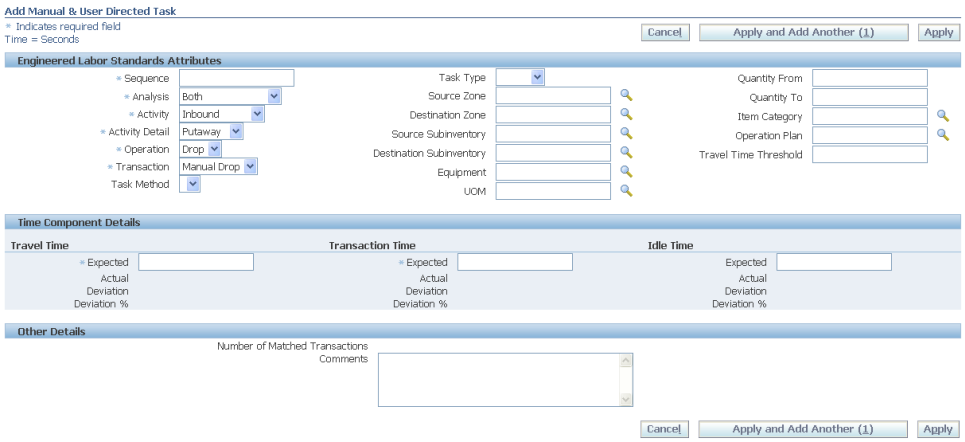
   - Manual and System-Directed: Tasks the user initiates and completes to a location he or she specifies. These include most drop tasks (except for manual drop) and user-initiated pick load tasks (pick by label or manual pick)

   - Individual and System-Directed Tasks: Tasks the system dispatches individually and completed to a location that the system chooses. These include most pick load tasks, counting tasks, and replenishment load tasks.

   - Grouped and System-Directed Tasks: Tasks that are dispatched as part of an execution group of tasks by the system and completed to a location that the system chooses. These labor standards only include travel time and are used to compare task grouping methodologies.

3. Click Go.

4. Click Add to add a new labor standard.



5. Add a sequence number for the labor standard. Labor Management uses this sequence number when it looks for a standard with which to match a particular match. Each task execution mode has a different group of sequences.

6. Enter the analysis type. You can create labor standards to be used for labor productivity, work outstanding, or both.

7. Select the activity type. The available choices are inbound, outbound, manufacturing, and warehousing.

8. Select the activity detail. This is the activity to perform, such as putaway or staging move.

9. Select the operation. This is the type of operation to perform within an activity such as receiving receipt or staging move drop.

10. Select the transaction. This is the actual transaction you perform.

11. Optionally, select the task type.

12. Optionally, select the source and destination subinventory zones.

13. Optionally, select the source and destination subinventories.

14. Optionally, select the equipment to use for a task.

15. Optionally, select the transaction UOM.

16. Optionally, enter a quantity from and quantity to amount.

17. Optionally, select an item category.

18. Optionally, enter an operation plan.

19. Optionally, enter a travel time threshold.

20. Enter the expected travel, transaction, and idle times for the task.

21. Optionally, enter a comment about the labor standard.

22. Click Cancel to cancel the labor standard creation, click Apply to create the labor standard, or click Apply and Add Another to continue creating labor standards.

Implementation Considerations

Implementing Labor Standards on a Trial Basis

You can use Labor Management on a trial basis to determine whether the functionality meets your organization business needs. Because Labor Management is a reporting tool, enabling it for an organization and running the reports to analyze data does not affect any of your transaction processing or normal business operations. Disabling Labor Management prevents the system from recording timestamps during task execution; however, this activity has little effect on task execution performance.

To investigate whether Labor Management is useful for your organization, enable Labor Management and configure the Labor Management setup parameters. After a few months of activity, run the Standardize Lines concurrent request. You must then modify the resulting labor standards to fit your business needs. You can now use and evaluate Labor Management for your business needs.

Labor Standards

Creating and maintaining labor standards is the most important configuration for Labor Management. You should assign specific labor standards with a lower sequence number, and assign generic labor standards with a higher sequence number. You should create general labor standards for as many of your task activities as possible so that you can minimize the occurrence of nonstandardized transactions. Labor Management reports are only as accurate as your labor standards. You should review labor standards the system creates labor standards through an automatic report, or through the Standardize Non-Standardized Transactions window, and re-sequence all labor standards as appropriate.

Most tasks that are tracked within Labor Management are individual tasks. They refer to work done to load, drop, or move material from one location to another; however, you may choose to group some tasks into execution groups and dispatch these tasks together during picking. You can compare groups of work that are dispatched together with each other to determine the optimal method of picking multiple tasks. This enables you to compare the average travel times for different cluster picking and order picking in the same zone.

Grouped task labor standards specify only the travel time that is measured during the

execution of that group of tasks. Based on the performance of travel time for different grouped task standards, you can determine the optimal picking strategy during warehouse task execution. For instance, if travel time is much lower for order picking within a zone than cluster picking, then you may want to use order picking in that zone.

Labor Management also tracks each task within the group of tasks individually and compares the transaction time, individual travel time, and idle time against other matching labor standards. Labor Management uses grouped task labor standards that are only used for measuring and comparing travel times for grouped task execution.

Running Reports

The two primary reports that Labor Management uses are the Expected Resource Requirements Analysis Report and the Labor Productivity Report. You should schedule these reports to run at regular intervals to ensure that labor management data is accurate and up to date. The frequency with which you use Labor Management reports determines how frequently you should schedule the reports to run. If you use Labor Management to make resource and staffing decisions on a daily basis, then you should run the reports daily. If you use Labor Management reports less frequently, then you should run the reports weekly or monthly.

Troubleshooting

- Problem: I cannot select my organization from the Labor Management windows.

  Solution: Verify that your organization is enabled for Labor Management on the Organization Parameters window.

- Problem: Transactions that I perform on the desktop windows do not show up in Labor Management.

  Solution: Labor Management records task information only for transactions that you perform with a mobile device.

- Problem: My employee productivity scores are inaccurate.

  Solution: Verify that your labor standards are reasonable. You can run the Calculate Average of Actual Times concurrent request to populate each labor standard with the average actual time that the transaction took to perform. Then review each labor standard or search for labor standards with a high deviation percent. If you find labor standards that use unreasonable estimated times, then adjust those standards. Rerun the Labor Productivity Analysis concurrent request and verify the employee productivity data.

- Problem: I have non-standardized transactions.

  Solution: Create more generic labor standards so that they cover more of the transactions performed in the warehouse. If your standards are too specific, they

will not match many transactions.

- How do I exclude employees from Labor Productivity Reporting?

  Enter a user on the Non-Tracked Users page. This page enables you to exclude specific employees from Labor Productivity reporting.

21

Mobile Personalization

This chapter covers the following topics:

- Overview
- Personalization Framework Architecture
- Personalizing Mobile Pages

Overview

Mobile personalization enables you to customize Oracle Warehouse Management pages without making code changes. You can hide fields and provide default field values to reduce the amount of information a user must enter on a page. These changes reduce the number of scans and improve overall efficiency and execution. You can also set additional fields as required if these fields are essential to your business.

Capabilities

With mobile personalization you can:

- Hide fields and buttons
- Provide default field values

  Note: If you do not provide a default value, then the system attempts to retrieve a default value from a custom java class.

- Copy the value of a field to another field
- Set editable fields as read only
- Set non-required fields as required

- Enable, disable, and set as read only, the LPN descriptive flex field

Restrictions

You can hide any field on a page if:

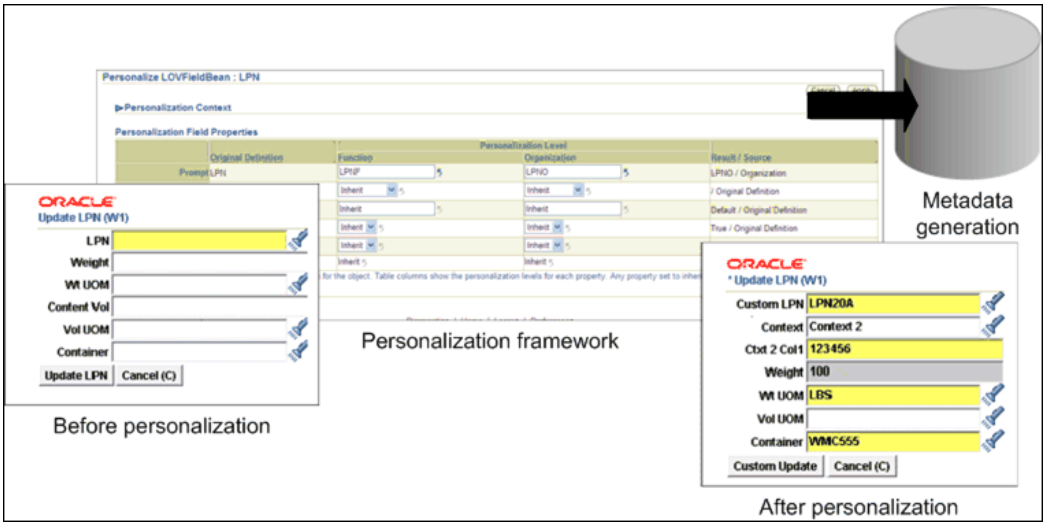
- The field is not required.
- The field is required, but you provide a default value.
- The field is a display only field.

You can set an editable field as read only if:

- The field is not required.
- The field is required, but you provide a default value.

Personalization Framework Architecture

The following diagram displays the MWA personalization architecture.



Personalizing Mobile Pages

Before you can perform mobile personalization you must set the following profile options:

- MWA: Enable Personalization: This profile option can be set at the application, responsibility, and user levels. Controls whether or not personalization is enabled for the user.

    - No: Personalization is not enabled.
    - Yes: Personalization is enabled.

- MWA: Cache Personalized Metadata: This profile option is set at the site level and controls whether or not you need to restart ("bounce") the MWA server.
    - No: You do not need to restart the MWA server.
    - Yes: You must restart the mobile server for personalization to take effect. Caching is recommended in a production environment to enhance performance.

      Important: Some mobile page fields that are marked as hidden at the code level (and do not appear on the mobile UI) are still available for personalization using the MWA personalization framework; for example, the field *From CG* (internal name INV.FROMCOSTGROUP) for the mobile page Mobile Org Transfer.

Supported Pages

You can personalize the following mobile pages:

- Assembly Completion By LPN
- GME Mobile Backflush
- GME Mobile Complete Product
- GME Mobile Create Pending Lot
- GME Mobile Issue Ingredients
- Lot Attributes Page - PO Receipt
- Mobile Alias Issue
- Mobile Alias Receipt
- Mobile ASN Receipt
- Mobile Cycle Count
- Mobile Inspect LPN
- Mobile Item Inquiry
- Mobile LPN Inquiry

- Mobile LPN Ship
- Mobile LPN Ship - Ship Confirm
- Mobile Move Order Replenishment
- Mobile Org Transfer
- Mobile Physical Count
- Mobile Pick Drop - Mobile WMS Drop Loaded LPNs
- Mobile Pick Load - Mobile WMS Manual Picking
- Mobile PO Receipt
- Mobile Replenish Kanban
- Mobile Sub Transfer
- Mobile WMS Inbound Manual Load

  Note: Mobile personalization for this page comes into effect only if the form function parameter PAGE_TYPE is set to MANUAL_LOAD..

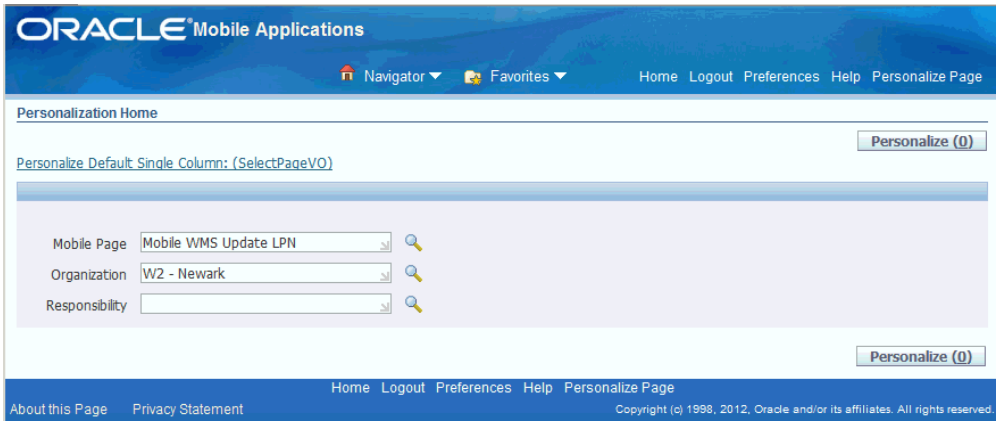
- Mobile WMS Inbound Manual Load - Select Contents
- Mobile WMS LPN Split
- Mobile WMS Manual Picking
- Mobile WMS Move Any LPN

  Note: Mobile personalization for this page comes into effect only if the form function parameter PAGE_TYPE is set to SYTEM_DROP..

- Mobile WMS Move Any LPN (Select Item)
- Mobile WMS Pack
- Mobile WMS Unpack
- Mobile WMS Update LPN

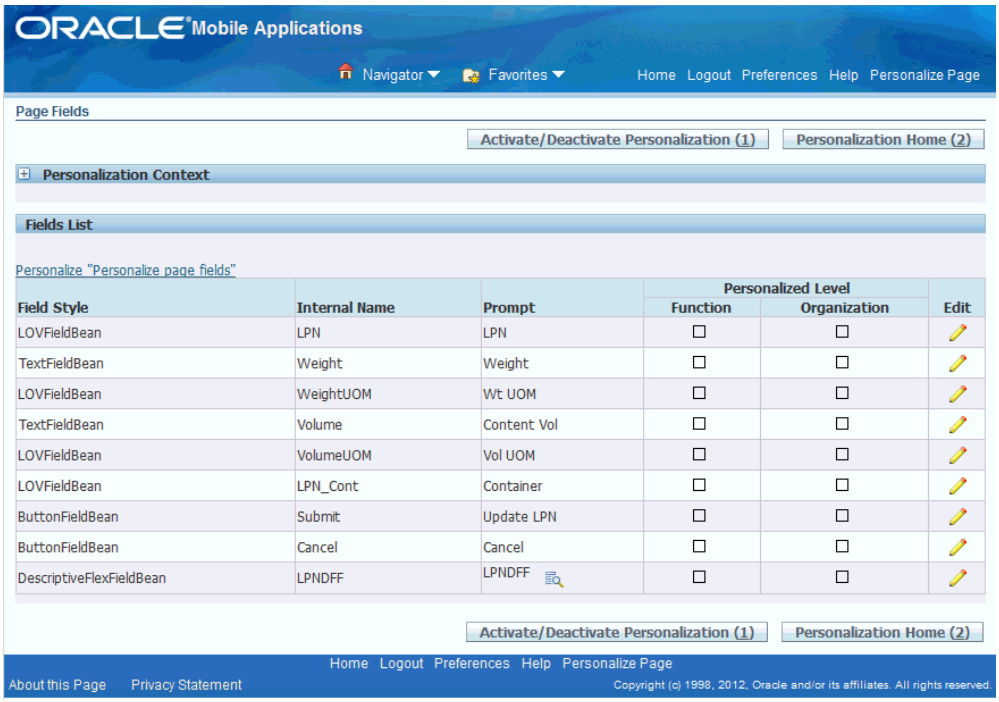
To personalize mobile pages:

1. Navigate to the Personalization Home page.



2. Search for the desired mobile page to personalize. You can personalize mobile pages at the following responsibility levels: responsibility, organization, and function.

3. Click Personalize.



4. Select the field to be personalized and click Edit.

5. Make the desired personalizations and click Apply. The personalization options are:

   - Prompt: Changes the field or button prompt

   - Copy From: Adds the value of a field by copying the value from another field on the same page.

     Important: Normally, the system does not restrict or limit the values available in the Copy From drop-down list, even though the values may not be relevant to the field you are editing. The Copy From feature simply copies values from the specified field; however, the system validates these values later in the code.

   - Default Value: Adds a fixed value to a mobile page.

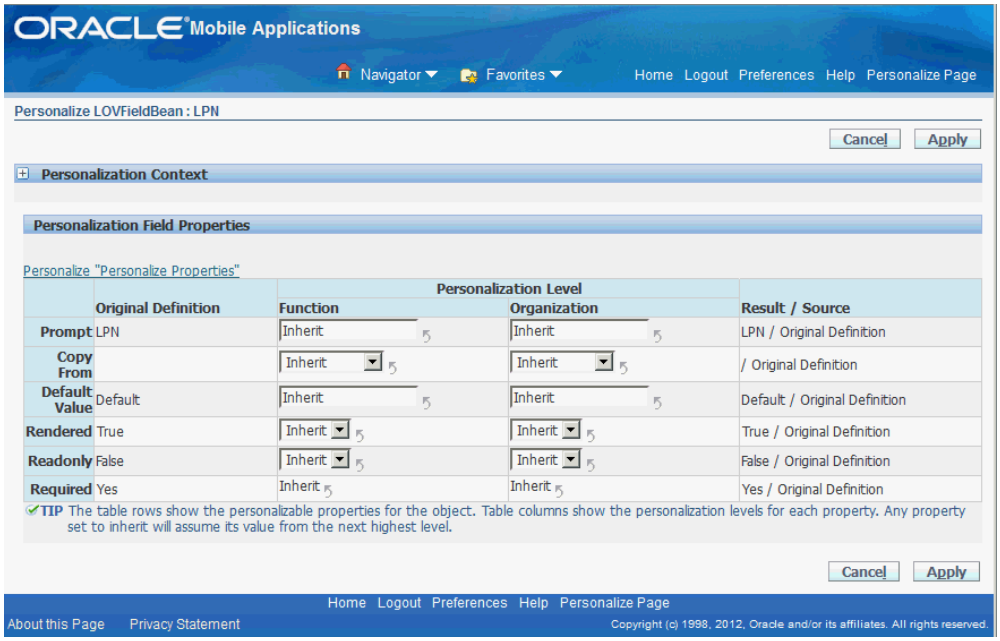
     Note: If you do not provide a default value, then the system attempts to retrieve a default value from custom java class.

   - Rendered: Hides or displays a field on a mobile page.

- Readonly: Changes the field to a display-only field on a mobile page. A user cannot enter a value in this field.

- Required: Changes the field to a mandatory field.

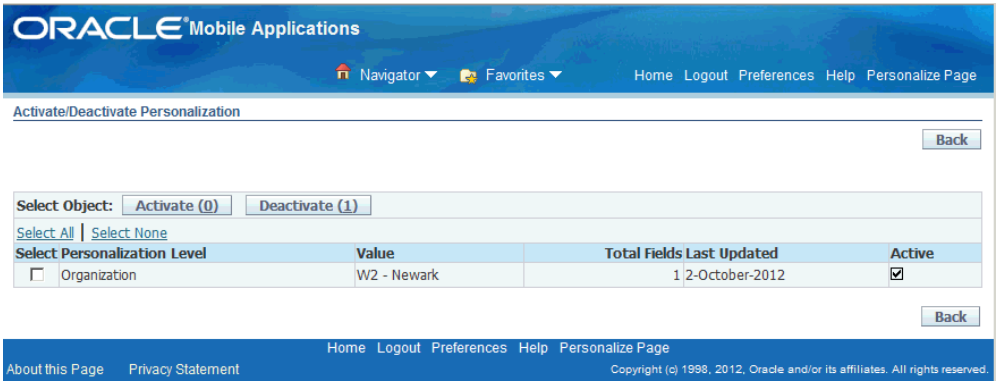
  Note: If a field is required, in a business context, then the system prompts the user to enter the field regardless of this parameter in the personalization framework.

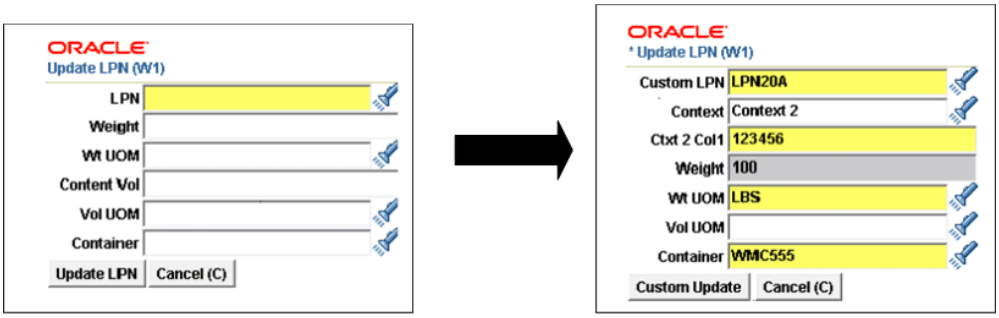


6. Optionally, repeat the steps to personalize the desired pages.

   Note: If you set the profile option MWA: Cache Personalized Metadata to Yes, then you must bounce the mobile server for personalization to take effect. Caching is recommended in a production environment to enhance performance.

7. Click Activate/Deactivate Personalization, and select the Personalization Level to apply the changes to the mobile environment.





Before Personalization

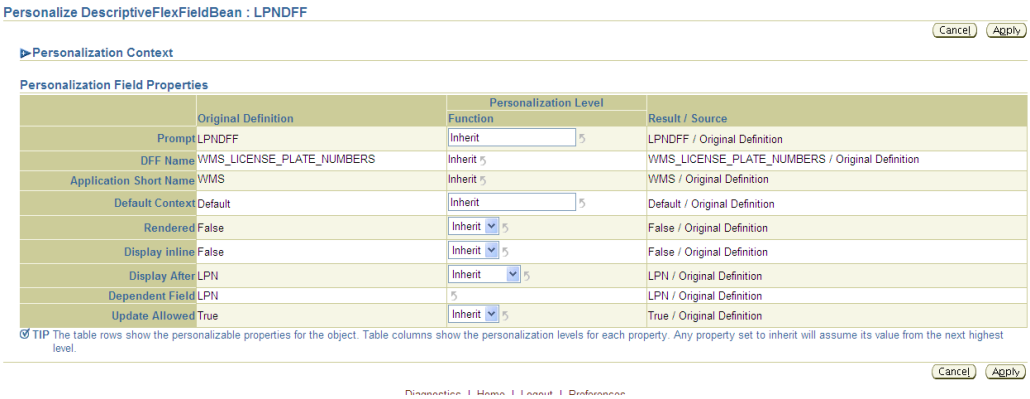
After Personalization

To enable descriptive flexfields for mobile pages:

You can use mobile personalization to display descriptive flexfields on mobile pages. The LPN descriptive flexfield is WMS: License Plate Numbers. You can choose to enable users to update the descriptive flexfield, or display it as a read-only field on the mobile page. How the field appears, depends on the choices you select in the Personalization Field Properties page. To personalize descriptive flexfields on mobile pages, follow the procedure for personalizing mobile pages. The personalization options for descriptive flexfields are:

- Display Inline: If you set the field to yes, then the descriptive flexfields are displayed on the same page. If you set the field to no, then the user enter the descriptive flexfield values on a separate page.

- Default Context: If you set the field to yes, then the user can enter a default context for the descriptive flexfield.



Related Topics

Planning and Defining Your Descriptive Flexfields, *Oracle Applications Flexfields Guide*.

22

Using Bar Code Standards with Oracle Mobile Applications

This chapter covers the following topics:

- Overview
- Oracle Mobile Applications DFI Flow
- Customized Bar Code Scanning

Overview

This document discusses the implementation and use of different bar-code standards within Oracle Mobile Applications. Topics include: overview standards, support within Oracle Mobile applications, configuration, setup and usage. The setup section includes the setup steps for the hardware devices, the mobile server, and the setup within Oracle Applications.

Bar Code Standards

Warehouse applications use labels that comply with Bar coding standards for Automatic identification and data collection (AIDC). Bar code for data collection eliminates manual data collection, improves data collection accuracy, and reduces time and labor. Bar coding standards enable companies to encode, in bar code form, more information than basic product identification. Use this type of supplementary information (such as, Lot Number, Serial Number, License Plate Number, Quantity, etc.) to improve the management of the supply chain. Common application standards for bar coding are ANSI/FACT, EAN/UCC, SPEC2000, HIBCC, EIAJ, etc. Use the following features in Oracle Mobile applications to support bar-coding standards:

- Data Field Identifiers (DFIs)
- Customized Bar Code Scanning

Data Field Identifiers

You use Data Field Identifiers (DFIs) to identify the type of data embedded within a barcode. A DFI usually consists of one to three characters added to the beginning of the data encoded in the barcode. For example, a DFI for a Part Number might be 'P+.' If the part number encoded in a given barcode is 'AS54888', the barcode encodes the value 'P+AS54888' to indicate the barcode is for a part number and the part number is 'AS54888'.

DFIs help reduce errors caused by scanning the wrong barcode into a field on a mobile device. They also allow fields to be scanned out of order and values to be placed into the appropriate fields.

Oracle DFI Functionality

Oracle Mobile Applications provides DFI support for recognition of barcodes that contain DFIs and out-of-order scanning. You can use DFIs to effectively map ANSI/FACT data identifiers. You can also use DFIs to map Application Identifiers used in UCC/EAN-128 bar code standards.

Field Recognition

Oracle Mobile Applications recognizes a DFI included in a barcode and validates it in the proper field. If the DFI is required, a failed DFI validation results in an error message.

You can validate each field on the mobile application against one or more DFIs. If needed, you can optionally flag each field to require a DFI. If a DFI is required, a barcode you scan into this field must have at least one assigned DFI. If the system does not find a DFI, you receive an error message. If a DFI is not required, Oracle validates against a DFI if it is found, but if no DFI is found, the entire value of the barcode is inserted into the field.

Out of Order Scanning

Oracle also supports Out-of-Order scanning through DFIs. If you scan a field containing a DFI that corresponds to a field other than current field, the system enters the value of the barcode into the appropriate field. You can then scan the barcode that corresponds to the current field, or scan another DFI identified barcode.

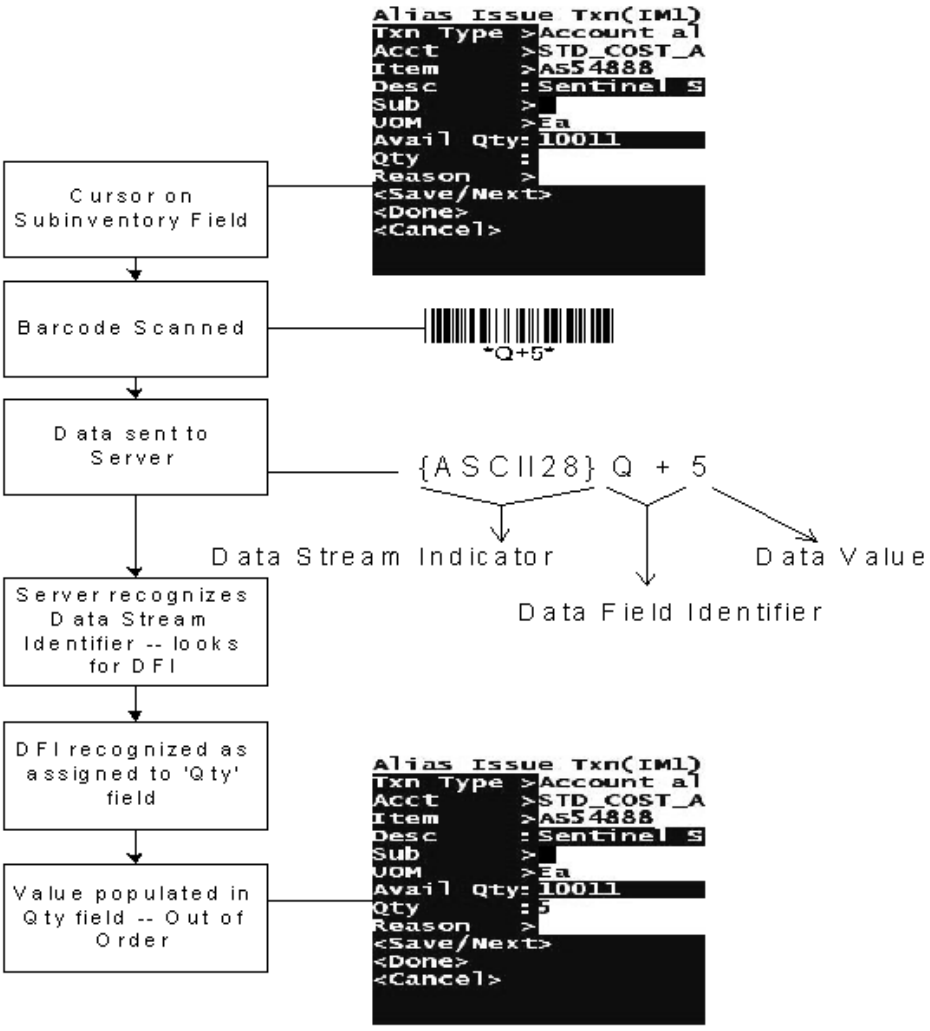
The system validates the value inserted into the Out-of-Order field when you advance to the next field. Because field level validation generally depends on previous fields for validation to occur, you continue on the normal navigation path through the field to complete the transaction.

For example, if you use a mobile device to perform a Miscellaneous Issue of material, first you must scan the issued Part Number. The system validates the scan against a DFI of 'P+' for the part number. The next scan is a barcode with the value 'Q+10'. The system determines there is a field on the current page that uses 'Q+' as a DFI, and places a value '10' in the quantity field. You must then scan the issuing subinventory and locator. Then

you advance through the quantity field and the quantity validates against the available quantity in the subinventory and locator scanned earlier.

Oracle Mobile Applications DFI Flow

When you scan a barcode, the mobile device prefixes an ASCII control character (the Data Stream Indicator) to the data that transmits to the server. The Oracle Mobile Server recognizes the Data Stream Indicator and searches for a recognizable Data Field Indentifier in the barcode data. The system recognizes a DFI is assigned to a field on the current page. It extracts the value from the barcode and inserts it into the field the DFI represents. The following diagram displays the flow behind Oracle DFI support.



Necessary Elements for DFI Support

To support DFI, the mobile device must support automatically pre-pending of an arbitrary character to any scanned entry. All the mobile devices certified for use with Oracle Mobile Applications support this functionality. You must configure the Oracle Mobile Server to support DFI scanning.

Finally, the specific Oracle Application the mobile device uses must support DFI functionality. Oracle Mobile Supply Chain Applications, Oracle Inventory Management and Oracle Warehouse Management provide full support for DFI functionality. Check with the specific product user's guide if you are unsure if DFIs are supported.

Setup for DFI Support

The setup to enable DFI support involves the following three steps:

1. Configure the mobile device to prefix an ASCII control character to every scan.
2. Configure the mobile server to recognize the proper ASCII control character as indicating a scanned entry.
3. Set up the Applications to recognize DFIs for each field on the mobile windows.

Hardware Setup

First, configure the mobile device to prefix the Data Stream Indicator to every scan. The Data Stream Indicator must be an ASCII control character (non-printable character). All certified Oracle Mobile Applications devices support this type of configuration. You can configure most scanners by scanning configuration barcodes, navigating to a configuration menu through the device keypad, or by using a remote configuration tool. Refer to the User's guide for the mobile device to determine configuration.

The default Data Stream Indicator is ASCII 28 – File Separator. Use this ASCII control character as the Data Stream Indicator unless there is a reason you cannot use it. You can use any ASCII as the Data Stream Indicator except for the following:

- Backspace (8)
- Horizontal Tab (9)
- Line Feed (10)
- Vertical Tab (11)
- Form Feed (12)
- Carriage Return (13)
- Shift Out (14)
- Shift In (15)
- Escape (27)

Mobile Server Setup

After you configure the device to prepend the Data Stream Indicator, you must configure the mobile server to recognize the appropriate Data Stream Indicator. Each device configuration can have a different Data Stream Indicator to support the capabilities of different mobile devices. The configuration setting is located in the device configuration file. The default device configuration setting (default_key.ini) that ships with the mobile server has the Data Stream Indicator set to the default: ASCII 28.

The character the device prepends to a scanned entry must match the entry in the.ini file for the device configuration in order for DFIs to be fully supported.

For more information on mobile device configurations and the configuration.ini file

refer to the *Oracle Mobile Server User's Guide*.

Applications Setup

The AK Dictionary stores DFI information as well as the field labels for the mobile windows. If necessary, you can also make changes in the AK Dictionary to the field labels that appear on the mobile windows. To access the AK Dictionary, log on to Oracle Applications on the desktop and access the responsibility AK Developer. Contact your system administrator if you do not have this responsibility.

Navigating the AK Dictionary

DFIs may be registered at two different levels – the Attributes level or the Region Items level within the AK Developer Responsibility. Region Items are Attributes assigned to a Region. DFIs registered at the Region Items level take precedence over DFIs registered at the Attribute level.

To register DFIs at the Attributes level, open the Define Attributes window. From that window, you can access the mobile windows fields. You can query attributes by Attribute Name or Label. Enter the DFI string in the Default Varchar2 Value field. The details on the format of the DFI string are as follows: To register DFIs at the Region Items level, you must know the Resource table the specific mobile applications uses (for Oracle Inventory and Oracle Warehouse Management it is *INVRESOURCETABLE*). You can query the Resource table in the Define Regions window. For example, to query the Oracle Inventory Resource table, query on Region ID = 'INVRESOURCETABLE.'

Once you find the appropriate Resource table, select Region Items. On the Region Items window, you can view all the AK Region Items used for mobile applications within the table. Locate the field that corresponds to the proper field on the mobile page, and enter the DFI string into the field Default Varchar2 Value.

Entering the DFI String

The DFI String should be entered into the field "Default Varchar2 Value" either on the Attributes level, or the Region Items level. Enter the text in the following format:

```
"DFI=Q+,q+,Q,q REQ=N"
```

The above text indicates you can use four DFIs for this field: the characters 'Q+', 'q+', 'Q', and 'q'. It also indicates this field does not require a DFI. To set the field to required, use the text "REQ=Y" after the DFI list. List DFIs in the proper validation order.

> **Note:** Include DFIs that are subsets of other DFIs after the original DFI. For example, if the DFI 'Q' is listed before the DFI 'Q+' and you scan a barcode that uses the DFI 'Q+', the 'Q' is removed from the barcode, but the '+' remains as part of the field value and an error occurs.

Seeded Data Field Identifiers

The following chart lists the seeded Data Field Identifiers (DFI) in Oracle Inventory and Oracle Warehouse Management. The seeded identifiers are from the ANSI Data Identifier Standard, document reference ANSI MH10.8.2-1995.

Seeded Data Field Identifiers

Mobile Prompt	Data Field Information
Card Num	DFI=15K REQ=N
SO Num	DFI=1K REQ=N
Sales Order	DFI=1K REQ=N
From Sub	DFI=1L,20L REQ=N
Src Sub	DFI=1L,20L REQ=N
To Sub	DFI=1L,20L REQ=N
Sub	DFI=1L,20L REQ=N
Res Sub	DFI=1L,20L REQ=N
RMA Num	DFI=1R REQ=N
RMA	DFI=1R REQ=N
From Loc	DFI=21L REQ=N
Src Loc	DFI=21L REQ=N
To Loc	DFI=21L REQ=N
Locator	DFI=21L REQ=N
Res Loc	DFI=21L REQ=N
Location	DFI=2L REQ=N

Mobile Prompt	Data Field Information
Rev	DFI=2P REQ=N
ASN Num	DFI=2S REQ=N
ASN	DFI=2S REQ=N
Deliv UOM	DFI=3Q REQ=N
Rcpt UOM	DFI=3Q REQ=N
UOM	DFI=3Q REQ=N
Res UOM	DFI=3Q REQ=N
Line Num	DFI=4K REQ=N
Release	DFI=5K REQ=N
Rel Num	DFI=5K REQ=N
LPN	DFI=J REQ=N
ParentLPN	DFI=J REQ=N
&Create LPN	DFI=J REQ=N
Inner LPN	DFI=J REQ=N
Outer LPN	DFI=J REQ=N
LPN	DFI=J REQ=N
Acc LPN	DFI=J REQ=N
Rej LPN	DFI=J REQ=N
From LPN	DFI=J REQ=N
To LPN	DFI=J REQ=N

Mobile Prompt	Data Field Information
Drop LPN	DFI=J REQ=N
Res LPN	DFI=J REQ=N
Child LPN	DFI=J REQ=N
PO Num	DFI=K REQ=N
Item	DFI=P REQ=N
Alloc Qty	DFI=Q REQ=N
Deliv Qty	DFI=Q REQ=N
Insp Qty	DFI=Q REQ=N
Lot Qty	DFI=Q REQ=N
Miss Qty	DFI=Q REQ=N
Rcpt Qty	DFI=Q REQ=N
Req Qty	DFI=Q REQ=N
Ship Qty	DFI=Q REQ=N
Total Qty	DFI=Q REQ=N
Ship Qty	DFI=Q REQ=N
Acc Qty	DFI=Q REQ=N
Rej Qty	DFI=Q REQ=N
Ea Lot Qty	DFI=Q REQ=N
Qty	DFI=Q REQ=N
Res Qty	DFI=Q REQ=N

Mobile Prompt	Data Field Information
Split Qty	DFI=Q REQ=N
Ret Qty	DFI=Q REQ=N
From SN	DFI=S REQ=N
To SN	DFI=S REQ=N
SN	DFI=S REQ=N
Serial	DFI=S REQ=N
SN	DFI=S REQ=N
From Lot	DFI=T REQ=N
To Lot	DFI=T REQ=N
Lot	DFI=T REQ=N
Res Lot	DFI=T REQ=N
Loc	DFI=Z REQ=N

Customized Bar Code Scanning

Customized bar code scanning imbeds user-defined logic to handle scanned input from a bar code scanner. It supports the following scenarios:

- Bar coding standards not explicitly supported: These standards could be HIBCC, EIAJ, SPEC2000 etc. You can use the customized bar code scanning feature to write custom logic to handle scanned data when you scan a barcode that complies with one of these standards.

- Scanning of concantenated bar code symbol: Most bar coding standards including ANSI/FACT and UCC/EAN-128 allow concatenation of multiple fields to from concatenated bar code symbols. The concatenated bar code symbol may consist of multiple DFIs or AIS, and variable values. If you use customized bar code scanning features, you can write custom logic to handle scanned data from a concatenated bar code symbol. You can encode the customer logic to parse data from the

concatenated bar code symbol on populate individual fields on a mobile applications window.

There are two ways to implement user-defined logic to handle scanned input. Customized bar code scanning functionality enables a scanned input to make either a PL/SQL or a java custom class callout. The java custom class is more scaleable and performs better. You must set up the hardware and the mobile server in order to use customized bar code scanning.

- Java Call Out: This option involves creation of a java class with embedded user defined logic. Verify this class is compiled with Oracle apps.zip in the classpath. After compilation verify that a file CustomScanManager.class is created. Move this file to `$CUSTOM_DIRECTORY/xxx/custom` and add `$CUSTOM_DIRECTORY` to the classpath of your mobile server. `$CUSTOM_DIRECTORY`, can be any directory on the file system.

- PL/SQL Call Out: This option involves modifying the package `INV_PREPROCESS_SCAN`. This package also takes in the `current_page_name` and the value scanned and should return the value to replace the scanned value with. However, unlike the java example, this package does not have access to any fields but the current field. It is not possible to modify the values of any other field other than the current field based on the scanned input. It lacks the flexibility provided with the implementation of the above java class file.

The following figure shows a sample concatenated UCC-128 bar code symbol. A single scan of concatenated bar code yields values for multiple data fields and should populate multiple field values in the form. In the following example a single scan of the following bar code should populate the Item, Lot Number, Quantity and Unit of Measure as Kilograms. Standard DFI functionality in Oracle Warehouse Management does not handle this requirement.

Concatenated UCC-128 Bar Code Symbol

Data Field Identifier String Setup for UCC/EAN-128 Application Identifiers

The following identifiers are taken from the UCC/EAN-128 application identifiers standards, document reference ANSI/UCC4-1995.

UCC/EAN-128 Identifiers

Mobile Prompt	EAN/UCC 128 AI	Data Field Identifier String
LPN	00	DFI=00 REQ=N
ParentLPN	00	DFI=00 REQ=N
Create LPN	00	DFI=00 REQ=N
Inner LPN	00	DFI=00 REQ=N
Outer LPN	00	DFI=00 REQ=N
LPN	00	DFI=00 REQ=N
ACC LPN	00	DFI=00 REQ=N
Rej LPN	00	DFI=00 REQ=N
From LPN	00	DFI=00 REQ=N
To LPN	00	DFI=00 REQ=N
Drop LPN	00	DFI=00 REQ=N
Res LPN	00	DFI=00 REQ=N
Child LPN	00	DFI=00 REQ=N
PO Number	400	DFI=400 REQ=N
Item	01	DFI=01 REQ=N
Alloc Qty	30	DFI=30 REQ=N
Deliv Qty	30	DFI=30 REQ=N
Insp. Qty	30	DFI=30 REQ=N
Lot Qty	30	DFI=30 REQ=N

Mobile Prompt	EAN/UCC 128 AI	Data Field Identifier String
Miss Qty	30	DFI=30 REQ=N
Rcpt Qty	30	DFI=30 REQ=N
Req Qty	30	DFI=30 REQ=N
Ship Qty	30	DFI=30 REQ=N
Total Qty	30	DFI=30 REQ=N
Ship Qty	30	DFI=30 REQ=N
Acc Qty	30	DFI=30 REQ=N
Rej Qty	30	DFI=30 REQ=N
Ea Lot Qty	30	DFI=30 REQ=N
Qty	30	DFI=30 REQ=N
Res Qty	30	DFI=30 REQ=N
Split Qty	30	DFI=30 REQ=N
Ret Qty	30	DFI=30 REQ=N
From SN	21	DFI=21 REQ=N
To SN	21	DFI=21 REQ=N
SN	21	DFI=21 REQ=N
Serial	21	DFI=21 REQ=N
SN	21	DFI=21 REQ=N
From Lot	10	DFI=10 REQ=N
To Lot	10	DFI=10 REQ=N

Mobile Prompt	EAN/UCC 128 AI	Data Field Identifier String
Res Lot	10	DFI=10 REQ=N

Sample Java Code

The following is sample Java Code for handling scanned input from a concatenated UCC-128 bar code symbol. Please note the following code has been provided to demonstrate the customizable bar code scanning functionality. Oracle is not responsible for maintaining it. The following code can be modified and distributed without permission from Oracle.

```
|+=======================================================+
|  FILENA
ME |
| ScanManager.java |
| DESCRIPTION |
|Class to manage the scans. It will pre-process the | scans. |
|  |
|  NOTES
|

|  DEPENDENCIES
|

|  HISTORY
|

|       10-Oct-02 Karun Jain     created.
|
+=======================================================*/
package xxx.custom;
import oracle.apps.mwa.container.*;
import oracle.apps.mwa.beans.*;
import java.util.*;
import java.sql.*;
/**
* <code>CustomScanManager</code> is the customizable
* call out to pre-process a scanned barcode.
* It has reference to the current MWA Session, and the
* page the scan was performed on. One can access the
```

```
* database session using the MWA
* session passed in. Please refer to the MWA API
* documentation or the WMS Customization document for
* more information and ways to customize the class.
**/
public class CustomScanManager {
private void CustomScanManager() {};
public static boolean isInputableField(FieldBean f) {
if ((f instanceof InputableFieldBean) && (((InputableFieldBean)
f).isEditable()))
return true;
else
return false;
}
/**
* This is a customizable method.

**/
/**
* In this example we have scanned a concatenated UCC128
* barcode which has Item, quantity, lot_number and
* lot_quantity.
* With one scan we want to populate all the above fields
* on the PO Receipt page.
* It returns the value to be set for the current field:
* in our example is item.
**/
// curtPage passes the current MWA Page
// curtSession passes the java session
// val has the value that was scanned
public static String processScan(oracle.apps.mwa.container.Session
curtSession,
oracle.apps.mwa.beans.PageBean curtPage,
java.lang.String val) {
// This will log a message in the server trace file if // you have the
MWA server running in the trace mode.
// Pleade preceede your messages with CTM.
FileLogger.getSystemLogger().trace("CTM: Pre-preocessing the scan");
FieldBean curtBean = curtPage.getCurrentFieldBean();
if (curtBean instanceof oracle.apps.inv.lov.server.ItemLOV) {
```

```
int itemFieldIndex = curtPage.getCurrentFieldIndex();
String itemValue = val;
String [] curtFieldDFIs = null;
int intemDFILength = 0;
if (isInputableField(curtBean)) {
curtFieldDFIs = ((InputableFieldBean)curtBean).getDFIs();
int itemDFILength = 0;
if (curtFieldDFIs != null) {
// if prefix of value is in curt field DFI, strip it,
// and setFieldValue
for (int i=0; i < curtFieldDFIs.length; i++) {
int x = itemValue.indexOf(curtFieldDFIs[i]);
if (x == 0) {
// found a DFI in the value, let's strip it
itemDFILength = curtFieldDFIs[i].length();
FileLogger.getSystemLogger().trace("CTM: found matching Item DFI "+
curtFieldDFIs[i]);
FileLogger.getSystemLogger().trace("CTM: Item DFI Length: "+
itemDFILength);
break;
}
}
// After stripping the DFI only the first 14 characters // are for item
Process the remaining characters for the // remaining fields
if (itemValue.length() > (14+itemDFILength)) {
Vector fieldBeanList = curtPage.getFieldBeanList();
int qtyFieldIndex = 0;
int lotNumFieldIndex = 0;
int lotQtyFieldIndex = 0;
// Get the index for the other three fields from the
// list of fields
for (int i=itemFieldIndex; i<fieldBeanList.size(); i++) {
String name = ((FieldBean)fieldBeanList.elementAt(i)).getName();
if (name != null && name.equals("INV.QTY"))
qtyFieldIndex = i;
if (name != null && name.equals("INV.LOT"))
lotNumFieldIndex = i;
if (name != null && name.equals("INV.LOT_QTY"))
lotQtyFieldIndex = i;
}
```

```
// Get the value for the item field
String remainingValue = itemValue.substring(14+itemDFILength);
itemValue = itemValue.substring(0,(14+itemDFILength));
FileLogger.getSystemLogger().trace("CTM: Item value: "+ itemValue);
FileLogger.getSystemLogger().trace("CTM: Remaining value: "+
remainingValue);
String qtyValue = "";
// Found qty field so set the value for the quantity
if (qtyFieldIndex > 0) {
FileLogger.getSystemLogger().trace("CTM: Found the qty field");
boolean doneQty = false;
String [] qtyFieldDFIs = null;
FieldBean qtyField =
((FieldBean)(fieldBeanList.elementAt(qtyFieldIndex)));
if (isInputableField(qtyField)) {
qtyFieldDFIs = ((InputableFieldBean)qtyField).getDFIs();
if (qtyFieldDFIs != null) {
// if prefix of value is in curt field DFI, strip it,
// and setFieldValue
FileLogger.getSystemLogger().trace("CTM: Got the dfi for qty fld");
for (int j=0; j < qtyFieldDFIs.length; j++) {
int x = remainingValue.indexOf(qtyFieldDFIs[j]);
FileLogger.getSystemLogger().trace("CTM: "+j+"th DFI:"+qtyFieldDFIs[j]);
if (x == 0) {
// found a DFI in the value, let's strip it
qtyValue =
remainingValue.substring(x+qtyFieldDFIs[j].length(),
x+qtyFieldDFIs[j].length()+6);
((InputableFieldBean)qtyField).setValue(qtyValue);
FileLogger.getSystemLogger().trace("CTM: Qty value:"+qtyValue);
if (remainingValue.length() >
(qtyFieldDFIs[j].length()+6)) {
doneQty = true;
remainingValue =
remainingValue.substring(x+qtyFieldDFIs[j].length()+6);
FileLogger.getSystemLogger().trace("CTM: Remaining
value:"+remainingValue);
} else remainingValue = "";
break;
}
```

```
}
}
}
// Set the value for the lot number and lot qty field
if (doneQty && lotNumFieldIndex > 0) {
FileLogger.getSystemLogger().trace("CTM: Found the lot Num field");
((InputableFieldBean)(fieldBeanList.elementAt(lotQtyFieldIndex))).setVal
ue(qtyValue);
FieldBean lotNumField =
((FieldBean)(fieldBeanList.elementAt(lotNumFieldIndex)));
String [] lotNumFieldDFIs = null;
if (isInputableField(lotNumField)) {
lotNumFieldDFIs = ((InputableFieldBean)lotNumField).getDFIs();
if (lotNumFieldDFIs != null) {
// if prefix of value is in curt field DFI, strip it,
// and setFieldValue
for (int j=0; j < qtyFieldDFIs.length; j++) {
int x = remainingValue.indexOf(lotNumFieldDFIs[j]);
if (x == 0) {
// found a DFI in the value, let's strip it
String lotNumValue =
remainingValue.substring(x+lotNumFieldDFIs[j].length());
((InputableFieldBean)lotNumField).setValue(lotNumValue);
FileLogger.getSystemLogger().trace("CTM: Lot value:"+lotNumValue);
}
}
}
}
}
}
}
}
return itemValue;
} else {
return val;
}
}
}
```

23

Oracle EDI Inbound ASN Enhancement for Warehouse Management

This chapter covers the following topics:

- Overview
- ASNI Record Hierarchy
- Necessary e-Commerce Gateway Setup Steps for Warehouse Management Enhancement
- EDI Import Process
- Interface Table Definition
- Process Trace
- Troubleshooting Tips

Overview

Oracle Warehouse Management enhances existing Oracle EDI Inbound ASN transactions to enable a supplier to send License Plate Number (LPN), Lot Number, and Serial Number data on an inbound ASN. A new interface file level, Line Detail, has been added to ASNI transaction map defined by Oracle EDI. This new level of data maps to 4000 records on an inbound ASN flat file. Each record in this level is a child for an interface transaction line record. It may contain LPN, Quantity, UOM Code, Lot Number, or Serial Number data.

The following is a list of the Oracle Warehouse Management required fields, if your Oracle Warehouse Management is licensed, and wish to receive LPN data on the ASN. If the required data is not provided in the transaction, or the validation for the data fails, the Oracle Warehouse Management import process will fail to preprocess the LPN data from the ASN. The remainder of the import process may succeed without LPN data. As a result this ASN cannot be express-received. A Confirmed Receipt must be performed.

Oracle Warehouse Management Required Fields

Column Name	Record No.	Position No.	Note
LICENSE_PLATE_NUMBER	4000	10	LPN Number
LOT_NUMBER	4000	20	NULL for non-lot controlled
FROM_SERIAL_NUMBER	4000	30	NULL for non-serial controlled
TO_SERIAL_NUMBER	4000	40	NULL for non-serial controlled
QUANTITY	4000	50	Quantity on LPN
UOM_CODE_INT	4000	60	Internal UOM Code
UOM_CODE_EXT1	4000	70	External UOM Code if code conversion defined

Related Topics

Explaining License Plate Management, *Oracle Warehouse Management User's Guide*

License Plate Data (Line Detail)

LICENSE_PLATE_NUMBER

This column identifies the License Plate Number that identifies the container for this line of material. To be successfully processed, this number must be a new LPN number, not previously defined in Oracle Warehouse Management. If the number already exists, Oracle Warehouse Management import will fail and the ASN will be processed without LPN data. In that case, a Confirmed Receipt must be performed. One ASN can be packed in to more than one LPN. But one LPN cannot contain more than one ASN.

LOT_NUMBER

This column identifies the lot number of the material shipped. If this number violates the lot uniqueness constraints, Oracle Warehouse Management import will fail and a Confirmed Receipt must be performed. Note that lot expiration date is not sent with the ASN. If the lot expiration date for the item is shelf life based, the lot expiration date will

be the current date/time of importing, incremented by the shelf life days. If the lot expiration date is pre-defined, the current date/time of importing will be used as the expiration date. You need to modify the lot expiration date through the Lot Number Maintenance form after a receipt has been performed against this ASN. The above discussion about the lot expiration date only applies to a new lot number.

FROM_SERIAL_NUMBER_TO_SERIAL_NUMBER

The two columns identify the serial numbers shipped. If the serial numbers violate the serial uniqueness constraints, Oracle Warehouse Management import will fail and a Confirmed Receipt must be performed.

QUANTITY

This column represents the quantity of material packed on this LPN. It is possible for more than one line detail record to exist for one interface transaction record. The total quantity of the line detail records that belong to one interface transaction line record has to match the quantity of that interface transaction line record. If the quantity does not match, Oracle Warehouse Management import will fail and a Confirmed Receipt must be performed. Detail of the quantity relationship will be presented below in an example.

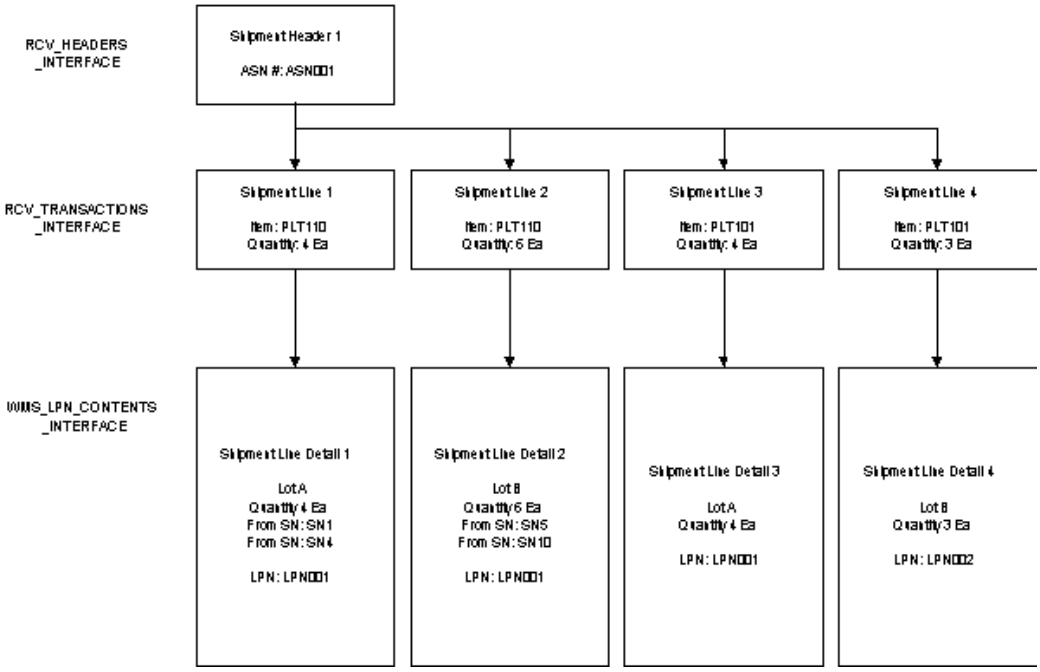
UOM_CODE_INT

This column represents the internal UOM code defined in Oracle Applications. If the UOM code is left blank, UOM code will be derived from an external UOM code based on the UOM conversion definition. If the external UOM code is not populated, the UOM at the transaction interface line level will be used to derive it. If this UOM code is populated, it has to match the UOM of the parent interface transaction line record. If they do not match, Oracle Warehouse Management import will fail and a Confirmed Receipt must be performed.

OUM_CODE_EXT1...EXT5

These columns represent the external UOM code found in the transaction if code conversion is defined as such. If this external UOM code is populated, it has to match that of the parent interface transaction line record. If they do not match, Oracle Warehouse Management import will fail and a Confirmed Receipt must be performed.

ASNI Record Hierarchy



AUTO_TRANSACT_CODE

This column is defined at the interface transaction line level (table name RCV_TRANSACTIONS_INTERFACE). It is addressed here because the value in this column identifies the type of incoming data and effects the behavior of the import process, in particular Receiving Open Interface. The valid values are:

- SHIP - tells the Receiving Open Interface to process the inbound ship notice as a ship notice only. You will need to execute the PO receipt process in Purchasing when the physical goods arrive at your dock. Use this setting if the physical goods are scheduled to arrive after the ship notice.

- RECEIVE (default) - tells the Receiving Open Interface to process the inbound ship notice as a ship notice and a PO receipt. Use this setting if the physical goods are scheduled to arrive with the ship notice or this is a service PO that does not require a physical receipt.

- DELIVER - tells the Receiving Open Interface to process the inbound ship notice as a ship notice, a PO receipt, and delivery. Use this setting to receive and deliver the physical goods to the requester or to inventory. This option assumes you do not want to inspect the goods.

Oracle Warehouse Management currently only supports SHIP. Existing Oracle ASNI

transactions support all three AUTO_TRANSACT_CODE for NON- lot, NON-serial controlled items only.

Necessary e-Commerce Gateway Setup Steps for Warehouse Management Enhancement

You should consult the *Oracle e-Commerce Gateway User's Guide* and implementation guide for complete instructions on setting up the e-Commerce Gateway. This section highlights the steps that usually cause problems if not properly performed.

Seed Date Reconciliation

Verify the Line Detail level has been created for the ASNI map

Responsibility: Manufacturing & Distribution Manager or e-Commerce Gateway

Navigation: EDI > Setup > Interface File Definition

To verify:

1. Query for ASNI in the Transaction field.
2. Choose the down arrow while cursor is in the master block.

   You should see three master level records: Header, Line, and Line Detail.

   For the Line Detail master record, the detail block should show Oracle Warehouse Management related fields, such as License_plate_number.

Run the Seed Data Reconciliation Concurrent Request

If only two master levels have been seen, you must submit the Seed Data Reconciliation concurrent request as follows:

Navigation: EDI > Process > Seed Data Reconciliation

To submit the Seed Data Reconciliation concurrent request:

1. Choose Single request, then OK.
2. Invoke LOV in the Name field, that leads you to the Parameters window.

   Transaction Type: ASNI

   Reserve Layout: No

   Rest of the fields: Yes
3. Choose OK.
4. Submit the request.

Verify that the concurrent request completes normally, then go back to verify the line detail level.

If the concurrent request completes with an error or warning, view the log file and consult the e-commerce Gateway relevant document for a solution. Usually there is an issue with staged ASNI documents. Navigate to the EDI >Process >View Staged Documents form to delete the skipped documents for IN: Ship Notice/Manifest (856/DESADV).

EDI Import Process

There are two concurrent programs executed in sequence:

- IN: Ship Notice/Manifest (856/DESADV) - imports the inbound ASN into the Oracle Application open interface tables from a flat file
- Receiving Transaction Processor - optionally invoked by the first one, populates actual application tables.

IN Ship Notice / Manifest (856/DESADV):

1. Navigate to EDI > Process > Import Program
2. Choose Single Request
3. Choose Ok
4. Enter IN: Ship Notice/ Manifest (856/DESADV) in the Name field.

   When you exit the field the parameter window opens
5. Enter the file name in the Inbound Datafile name field.
6. Choose Yes or No to determine if the Receiving transaction processor is called in the Execute Open Interface Field
7. Enter EC_ANSI_FF as the Map Code
8. Enter 0,1,2,3 as the Debug mode.
9. Choose Ok.
10. Submit the Request.

    Note the request ID and verify the request completes properly.

Receiving Transaction Processor

The Receiving Transaction Processor can be automatically invoked by the previous concurrent program. A different request ID is giving for this concurrent request. It is recommended to us the All My Requests option in the Find Requests window to very

both requests completed without error.

You can invoke the Receiving Transaction Processor manually after importing the tables by completing the following steps:

To Invoke the Receiving Transaction Processor Manually

1. Navigate to the Requests window.
2. Choose Single Request
3. Choose Ok.
4. Enter Receiving Transaction Processor in the Name field
5. Submit the request

Interface Table Definition

Oracle Warehouse Management uses the interface table *WMS_LPN_CONTENTS_INTERFACE* to temporarily store LPN content data imported through EDI. The LPN content processing program (WMSASNIB.pls) processes and validates records from this table, then populates the appropriate Oracle Application tables. The following is a summary of all the columns in this table.

WMS_LPN_CONTENTS_INTERFACE

Name	Type
LICENSE_PLATE_NUMBER	VARCHAR2(30)
INTERFACE_TRANSACTION_ID	NOT NULL NUMBER
GROUP_ID	NUMBER
LAST_UPDATE_DATE	NOT NULL DATE
LAST_UPDATED_BY	NOT NULL NUMBER
CREATION_DATE	NOT NULL DATE
CREATED_BY	NOT NULL NUMBER
LAST_UPDATE_LOGIN	NUMBER

Name	Type
REQUEST_ID	NUMBER
PROGRAM_APPLICATION_ID	NUMBER
PROGRAM_ID	NUMBER
PROGRAM_UPDATE_DATE	DATE
ITEM_NUM	VARCHAR2(81)
ITEM_DESCRIPTION	VARCHAR2(240)
ITEM_REVISION	VARCHAR2(3)
VENDOR_ITEM_NUM	VARCHAR2(25)
LOT_NUMBER	VARCHAR2(30)
QUANTITY	NUMBER
UOM_CODE	VARCHAR2(3)
FROM_SERIAL_NUMBER	VARCHAR2(30)
TO_SERIAL_NUMBER	VARCHAR2(30)
DOCUMENT_NUM	VARCHAR2(30)
DOCUMENT_LINE_NUM	NUMBER
SHIP_TO_ORGANIZATION_CODE	VARCHAR2(3)
SHIPMENT_NUM	VARCHAR2(30)
INTERFACE_TRANSACTION_ID	NOT NULL NUMBER

Process Trace

IN: Ship Notice/Manifest (856/DESADV) Trace

Different debug levels (0 to 3) can be set for IN: Ship Notice/Manifest (856/DESADV). The higher the debug level, more messages you will see in the current request log. Process trace can be viewed within the concurrent request log by clicking View Log from the Requests form.

Oracle Warehouse Management LPN Content Import Process Trace

The Oracle Warehouse Management LPN content import process trace can be found in the concurrent request log for the Receiving Transaction Processor. The following two profile options need to be set to view the process trace for Oracle Warehouse Management LPN content import process:

- INV: Debug Trace - Yes
- INV:Debug Level - 9

After setting these profiles, the process trace for Oracle Warehouse Management LPN content import can be viewed within the concurrent request log for the Receiving Transaction Processor. The reason why certain validations have failed for importing LPN, lot number, or serial number data can be found from the trace.

Note that Receiving Transaction Processor will have a different request ID than IN: Ship Notice/Manifest (856/DESADV).

Troubleshooting Tips

It is recommended that you run IN: Ship Notice/Manifest (856/DESADV) and the Receiving Transaction Processor separately for troubleshooting purposes.

After the first concurrent program is executed you should verify the following interface tables are populated:

- RCV_HEADERS_INTERFACE, RCV_TRANSACTIONS_INTERFACE
- WMS_LPN_CONTENTS_INTERFACE

After the second concurrent program is executed you should verify that the following application tables are populated:

- RCV_SHIPMENT_HEADERS
- RCV_SHIPMENT_LINES
- WMS_LICENSE_PLATE_NUMBERS

- WMS_LPN_CONTENTS

Optionally the following tables may be populated:

- MTL_LOT_NUMBERS
- MTL_SERIAL_NUMBERS

If necessary view the process trace for any validation or other failures.

24

Material Handling Device Integration

This chapter covers the following topics:

- Overview
- Functional Process Overview
- Defining Devices
- Assigning Devices to Business Events
- Device Sign On
- Response Messages
- Carousel Bridge
- PL/SQL API Specification
- Table Structure
- Device Response API Support
- Using the Device History Window to Simulate API Responses
- Debug Mode
- Debugging Notes
- Frequently Asked Questions

Overview

The Oracle Warehouse Management Material Handling Device Integration Kit enables you to integrate Oracle Warehouse Management with various types of material handling equipment. The integration kit includes several different integration modes, can be used with several different types of devices, and is designed to grow as Oracle Warehouse Management adds integration capabilities.

Definition of Terms

The following terms are used in this document.

- Device: An individual piece of material handling equipment. Each device has a unique definition within Oracle Warehouse Management. A device is something that either stores or processes material, but does not assist in picking material. The following are examples of devices within Oracle Warehouse Management: carousels, conveyors, ASRS systems, pick-to-light systems, scales, and dimensioning systems.

- Carousel Bridge: Acts as a transport layer for device request messages and device response messages between the database tier of the Oracle E-Business Suite and the programmable logic controller.

- Automatic Storage and Retrieval System (ASRS): Automated robotic system for storing and retrieving items in a warehouse.

- Device Directive: A string of commands that Oracle Warehouse Management sends to make the device perform a specific task.

- Device Request Message: A command directive triggered by a business event that Oracle Warehouse Management sends to the device to make the device perform a specific task.

- Device Response Message: A character string that a device returns to Oracle Warehouse Management as a response to a device request. The device can respond with a success or failure message.

- Equipment: Machinery that assists you in picking or transferring material. Equipment may be necessary to perform certain picking tasks. Forklifts and pallet jacks are examples of equipment.

Warehouse Control System

The Warehouse Control System provides a bridge between Oracle Warehouse Management and material handling devices. It provides a framework for managing complex systems such as:

- Carousels

- Scales

- Conveyors

- Pick-to-light systems

- Pick-to-audio (or pick-to-voice)
- Automated storage and retrieval systems (ASRS)

Each device must have one of the following components to communicate with the Warehouse Control System:

- A programmable logic controller (PLC) configured with a network interface controller (NIC) card
- A personal computer controller with an NIC card for socket communication, which brokers serial connect to the device or PLC.
- A hardware bridge controller with an NIC card for socket communication, which brokers serial connect to the device or PLC.

To enable the Warehouse Control System for your organization, you must set the WCS Enabled parameter on the Inventory tab of the Organization Parameters window. For more information, seeWarehouse Organization Setup, page 1-4 and Defining Default Inventory Parameters, *Oracle Inventory User's Guide*.

Functional Process Overview

Oracle Warehouse Management enables you to export data through several different methods of material handling equipment. For example, to integrate with a carousel, you can set up Oracle Warehouse Management to export task data to a carousel each time that you perform a pick using a mobile handheld device. As soon as the system displays the task to pick, the carousel rotates to the appropriate slot.

To use material handling devices, you must perform the following steps:

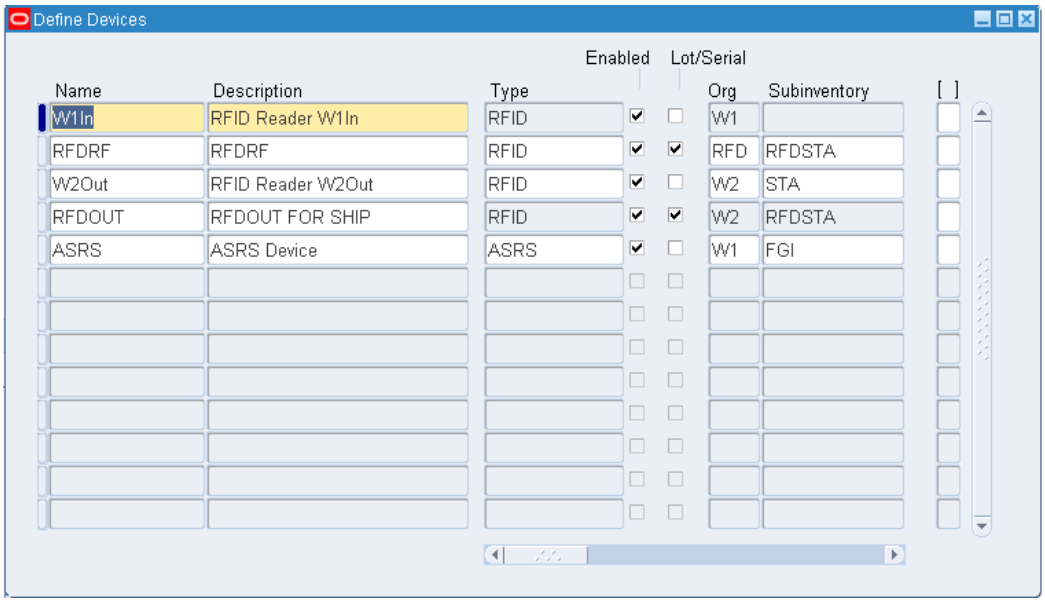
- Define material handling devices.
- Assign material handling devices.
- Initiate a business event.
- Export task information to the material handling device.

If you are using bidirectional functionality, the material handling device informs the system of any task completion. When you use material handling, you can sign on to a device prior to accepting tasks. This limits the tasks the system assigns to you to the subinventory associated with the current device. You can also sign on to multiple devices simultaneously in order to accept tasks from multiple devices.

> **Note:** Only one user may sign on to a device at a time, and you can configure the device to require a user to sign on prior to task dispatch.

Defining Devices

When you define devices, you specify the device name and integration method that Oracle Warehouse Management uses. You set up devices in the Define Devices window. See Defining Devices, *Oracle Warehouse Management User's Guide*



When you define a device, you must associate it with a device type. Oracle Warehouse Management supports the following devices types: carousel, scale, conveyer, pick-to-light, pick-to-audio, ASRS, manufacturing equipment, and RFID. The device type manufacturing equipment is associated with the device type ASRS. You cannot dispatch a task to this device; however, you must sign on to this type of device before you sign on to an ASRS device to perform tasks. You may also assign a model to refer to the device model. This information is available during device integration. It enables the integration layer to correctly identify the device syntax to use for sending commands to the device.

You can optionally identify devices that require you to export lot and serial information. In general, material handling devices do not need information about specific lots or serials associated to a task, but if necessary you can include this information.

> **Note:** Lot and serial export is fully supported when exporting task information. The exception, when exporting information directly from mobile pages (such as Misc Receipt), lot and serial export may not be supported.

You must associate a device to a particular organization, and optionally associate it with a subinventory. You can sign on to a device associated with a subinventory to limit the

tasks that you receive to that subinventory.

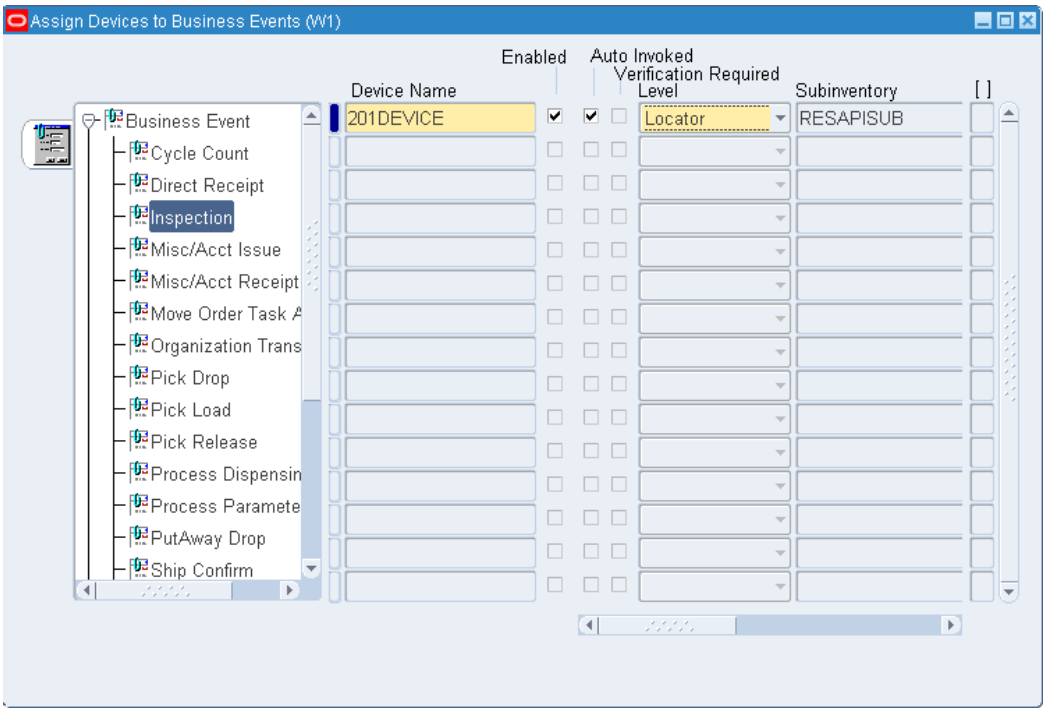
You can use the Notify on Task Completion parameter to notify Oracle Warehouse Management when a task is created and completed. Oracle Warehouse Management sends a task completion notification directly to the device, and the material handling device sends a task confirmation back to Oracle Warehouse Management when it completes the task.

The Force Sign on check box controls how the system dispatches tasks to the device. If the check box is selected, the system dispatches tasks from this subinventory only to the user who is signed on to the device. If the check box is clear, any user who is eligible to receive a task from that subinventory may receive a task.

The Employee column shows the user currently signed on to the device. If a user forgets to sign off of a device, an administrator can use the Sign Off option from the Tools menu to sign an employee off of the device. This enables another user to sign on to the device.

Assigning Devices to Business Events

The Assign Devices to Business Events window enables you to create associations between material handling devices and business events. The tree structure lists all supported business events. You can use the fields in the window to make assignments for individual devices and business events on the tree.



You can make device assignments at the following levels:

- Organization

  Note: A single device defined at the organization level cannot be assigned to both the Pick Load and Pick Drop business events at the same time. Two different devices must be assigned separately for both events.

- Subinventory
- Locator
- User

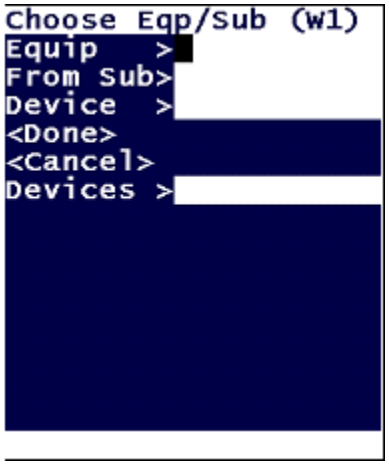
The Auto Invoked check box enables an automatically invoked device to communicate with Oracle Warehouse Management. For devices that are invoked automatically, the system sends the integration information when you open the mobile page for the task. The auto-invoked option works only for business events associated with a task you perform, such as put away drop, pick load, and pick drop. This parameter is also used if the device is invoked when you press a hot key. For devices that are invoked when you press a hot key, the system sends the integration information when you press the hot key assigned to invoke the device.

Related Topics

Material Handling Devices and Business Events, page 24-5

Device Sign On

Oracle Warehouse Management enables you to sign on to a particular device in order to restrict the tasks that you receive. When you initially navigate to the Tasks page, you can sign on to a device. You can use the Choose Eqp/Sub window to change devices if necessary. You can sign on to only those devices that are associated with subinventories. When you sign on to a device, you receive only tasks from the subinventory associated with the device.



Multiple Device Sign-On and Carousel Pods

Oracle Warehouse Management enables you to sign on to more than one device at a time. When you sign on to multiple devices, you receive tasks only from the subinventories associated to those devices. You receive tasks from the devices in the order in which you signed on to the devices. In addition, Oracle Warehouse Management dispatches tasks directly into your queue. The system sends the device integration information at task dispatch.

Example

For instance, suppose you sign on to devices Carousel1, Carousel2, and Carousel3, in that order. When you attempt to accept the next task, you receive one task from each carousel dispatched into your queue (assuming there are available tasks from each carousel). At that time, the integration information is sent so that all three carousels may begin rotating for the first series of picks. The mobile interface displays the task information for the task from Carousel1 and prompts you to confirm the pick. Once you complete that task, the system asks you to confirm the pick for the task from Carousel 2. At the same time, the system dispatches you another task for Carousel1 and integration information for that task is sent in order for Carousel1 to continue rotating while you

confirm the tasks for Carousel2 and Carousel3.

Response Messages

You can use the Warehouse Control System to create response messages that different devices can send. You can define the response messages to include various pieces of information, as well as to determine the information sequence. You create message templates and add components to the templates to create the response messages. The information that you can include in a message is provided as a list of seeded components. You can create three types of message templates: XML, message with delimiter, and message without delimiter. A message with delimiter uses a character such as a comma or semi colon to separate the components of the message. In a message without delimiter, the component length separates each component in the message.

Related Topics

Defining Response Messages, *Oracle Warehouse Management User's Guide*

Carousel Bridge

The carousel bridge functions as a transport layer between the Warehouse Control System and material handling devices. A one-to-one mapping exists between each device that you define in Oracle Warehouse Management and an instance of the carousel bridge on the middle tier. The configuration file `carbri.xml` controls the behavior of the carousel bridge.

To set up the device bridge, you must perform the following steps:

- Create a directory structure.
- Create a `carbri.xml`.
- Create a startup script for the device simulator.
- Create a startup script for the carousel bridge.

Directory Structure

You must create a directory structure for the carousel bridge with a subdirectory for each instance of the carousel bridge. You must create the directory under $APPL_TOP/cabri. In each subdirectory, create the following three files:

- `carbri.xml`
- `startDDS.sh`
- `startCarBri.sh`

Carbri.xml File

The carbri.xml file controls the behavior of the carousel bridge. The following is a sample carbri.xml file:

```
<?xml version='1.0' encoding='windows-1252'?>

<CarBriSetup>
<!-- Protocol 1 is for Serial Port and Protocol 2 is for Socket -->
 <Device>
   <ID>12</12>
  <Protocol>2</Protocol>

<JDBCURL>jdbc:oracle:thin:@ap619sdb.us.oracle.com:3909:logx4dv1</JDBCURL
>
   <Simulate>No</Simulate>
 </Device>

 <SocketInfo>
  <socketHostName>152.69.201.82</socketHostName>
  <socketPortNumber>4444</socketPortNumber>
   <!-- This is the Trusted Client Port Number-->
   <socketLocalPort>5170</socketLocalPort>
 </SocketInfo>

 <SerialPortInfo>
  <portName>COM2</portName>
  <serialPortTimeOutMillis>5000</serialPortTimeOutMillis>
  <baudRate>9600</baudRate>>
  <dataBits>8</dataBits>
  <stopBits>1</stopBits>
  <parity>0</parity>
 </SerialPortInfo>

 <AppsInfo>

<dbcfile>D:\work\R12\MHP\CarBri\CarBri\dbc\ap619sdb_logx4dv1.dbc</dbcfil
e>
  <appsuser>MFG</appsuser>
  <password>WELCOME</password>
  <applicationshortname>WMS</applicationshortname>
  <responsibilitykey>WMS_WCS_USER</responsibilitykey>WMS_WCS_USER>
 </AppsInfo>

</CarBriSetup>
```

Device Simulator Startup file

The device simulator enables you to test the Warehouse Control System without using a real device. It simulates:

- Running as a TCP/IP server
- Listening on a specified port number
- Allowing a trusted client IP address to connect from a trusted client port number

- Being configured with an ASCII character to denote the end of a request message
- Sending a configured response at the end of a request message

The following is a sample simulator startup file. It is configured to listen on port number 4444. The only that client it connects to is 140.87.204.121 on port 5170.

```
##############################Sample
startDS.sh##############################
#Param 1: TCP Socket Port number on which the DS is listening
#Param 2: Trusted Client IP Address
#Param 3: Trusted Client IP Port Number
#Param 4: ASCII value, which the DS interprets as end of message from
carbri
#Param 5: Message sent back by DS on receiving end of message identifier

 java oracle.apps.wms.wcs.device.server.DummyDeviceServer 4444
140.87.204.121 5170 3 DONE
 ##############################Sample
startDS.sh##############################
```

Carousel Bridge Startup Script

The following is a sample startup script for the carousel bridge:

```
##############################Sample
startCarBri.sh##############################
#Enter the directory where the config file carbri.xml is stored
#setenv WCS_TOP /home/simran/junk/logutr12_CarBri
#In order to see the images correctly on the login screen
#ensure that in the same directory as WCS_TOP, there is a sub-directory
#called 'images'
#with a soft link to the files mentioned below
#You can create a soft link in $WCS_TOP/images by the following commands

#ln -s $FND_TOP/media/appslogo.gif
#ln -s $FND_TOP/media/logo.gif

CLASSPATH=/tmp/patch/wmsspprj_CarBri:$CLASSPATH
java oracle.apps.wms.wcs.carbri.client.CarBriUI
##############################Sample
startCarBri.sh##############################
```

PL/SQL API Specification

When the device output method is API, then Oracle Warehouse Management calls the following PL/SQL package procedure:

```
WMS_DEVICE_INTEGRATION_PUB.SYNC_DEVICE_REQUEST(
      p_request_id            IN  NUMBER,
      p_device_id             IN  NUMBER,
      p_resubmit_flag         IN  VARCHAR2,
      x_status_code          OUT  VARCHAR2,
      x_status_msg           OUT  VARCHAR2,
      x_device_status        OUT  VARCHAR2
```

Input Parameters

- p_request_id: Request ID
- p_device_id: Device ID for which the request is initiated
- p_resubmit_flag:

  N: Invoked in conjunction with processing transaction

  Y: Invoked to resubmit a request to device

Output Parameters

- x_status_code: Status of request. (S = Success, E = Error)
- x_status_msg: Optional status message related to the specific request
- x_device_status: Optional status message related to the device

The main source of input for this procedure is the Global temporary table WMS_DEVICE_REQUESTS. This API references a particular device. The system reads all records from the temporary table that reference the device. After the system calls the API, it deletes the records from the temporary table, and archives the records in the history table.

Table Structure

The WMS_DEVICE_REQUESTS global temporary table holds transaction records associated with a device request. The WMS_DEVICE_REQUESTS_HIST table contains transaction records associated with all device requests.

Name	Datatype	Length	Optional	Comment
REQUEST_ID	NUMBER	-	NOT NULL	Request identified
TASK_ID	NUMBER	-	-	Task associated with request
RELATION_ID	NUMBER	-	-	Group ID associated with request

Name	Datatype	Length	Optional	Comment
SEQUENCE_ID	NUMBER	-	-	-
TASK_SUMMARY	VARCHAR2	1	-	If this is a summary or detail record
TASK_TYPE_ID	NUMBER	-	-	
BUSINESS_EVENT_ID	NUMBER	-	NOT NULL	Business Event Identifier
ORGANIZATION_ID	NUMBER	-	NOT NULL	-
SUBINVENTORY_CODE	VARCHAR2	30	-	-
LOCATOR_ID	NUMBER	-	-	-
TRANSFER_ORG_ID	NUMBER	-	-	-
TRANSFER_SUB_CODE	VARCHAR2	30	--	-
TRANSFER_LOC_ID	NUMBER	-	-	-
INVENTORY_ITEM_ID	NUMBER	-	-	-
REVISION	VARCHAR2	10	-	-
UOM	VARCHAR2	3	-	-
LOT_NUMBER	VARCHAR2	30	-	-
LOT_QTY	NUMBER	-	-	-
SERIAL_NUMBER	VARCHAR2	30	-	-

Name	Datatype	Length	Optional	Comment
LPN_ID	NUMBER	-	-	-
TRANSACTION_QUANTITY	NUMBER	-	-	-
DEVICE-ID	NUMBER	-	NOT NULL	-
STATUS_CODE	VARCHAR2	1	NOT NULL	-
STATUS_MSG	VARCHAR2	240	-	-
OUTFILE_NAME	VARCHAR2	255	-	Output file name generated for the request
REQUEST_DATE	DATE	-	NOT NULL	-
RESUBMIT_DATE	DATE	-	-	-

Device Response API Support

The Device Response API supports notification of task completion for outbound sales order picking tasks. You must use the pick release business event with the device integration toolkit to export tasks that you complete with the Device Response API. SeeAssign Devices to Business Events, page 24-5 for more information about business events. In addition, the following restrictions exist:

- Material picked must be loose (not packed into an LPN).
- Material cannot be serial controlled.
- Material must be picked into an LPN.

PL/SQL Specification

The system calls this API for device confirmation after it inserts records into wms_device_requests table with business_event_id = 54 (for Task Confirmation) and device_status = S (for success). This API takes all the records from the wms_device_requests (WDR) temporary table for device_confimation

business_event_id = 54 and device_status = S, processes them, and then transfers them to the wms_device_requests_hist (WDRH) table. If any records fail, the failed records are transferred to WDRH with the STATUS_CODE = E and the appropriate error message.

> **Note:** This API should be called for single delivery_lines in a batch. You should not process picking lines from multiple deliveries simultaneously.

You can change only the following fields in the WMS_DEVICE_REQUESTS table from the suggested value:

- TRANSACTION_QUANTITY
- XFER_SUB
- XFER_LOC
- XFER_LPN_ID
- REASON_ID (In the case of a discrepancy only: reason_id is used to fire the appropriate work flow.)

There are no input parameters for the API.

The following list contains the output parameters for the API:

- o x_return_status: Status of the API
- x_msg_count: Message count
- x_msg_data: Status message
- x_successful_row_cnt: Number of successful rows after processing

The following program listing contains the API specifications:

```
wms_device_confirmation_pub.device_confirmation(
         x_return_status OUT NOCOPY VARCHAR2
         ,x_msg_count OUT NOCOPY NUMBER
         ,x_msg_data  OUT NOCOPY VARCHAR2
         ,p_request_id IN NUMBER DEFAULT NULL
         ,x_successful_row_cnt OUT nocopy number
         );
```

Process Flow for Calling the Device Response API

- You can insert records into the WMS_DEVICE_REQUESTS (WDR) temp table with the business_event_id = 54 and the device_status = S. You can also insert other transaction details as necessary. If all suggested items are picked, then there is no

need to pass information about child records having lot information. If there is a quantity discrepancy and the user picks less than suggested, then you must pass in a child record all information about the lot.

- Call API wms_device_confirmation_pub.device_confirmation with no ID because the API processes inserted records with device_status = S. Do not pass any value for p_request_id.
- View the results in the Device History window.

API Exceptions

You must populate The following fields in the WMS_DEVICE_REQUESTS temp table before you call the Device Response API:

- RELATION_ID
- TASK_ID
- ORG_ID
- BUSINESS_EVENT_ID
- TASK_SUMMARY
- DEVICE_STATUS
- XFER_LPN_ID

Data Exceptions

For exceptions in this category, the records in the history table are populated with the Status = E and the appropriate message is populated in the Error field of the Device History window. Some common errors are Invalid LPN, Invalid Lot, and Missing Child Record.

Exception Processing

For all exceptions in this category, the records in the history table are populated with Status = E and the appropriate message is populated in the Error field of the Device History window.

Error Records Re-submission

You can resubmit error records from the View Device Requests window. Once you resubmit the concurrent request, you can use the request ID to view the record details. After the concurrent processing completes, the record appears with a success or error message.

Transaction Discrepancies

When you use the API to return information that differs from the original task, (picking short or dropping to a different locator), you must enter a reason code to indicate the reason for the discrepancy in the REASON_ID column of the WMS_DEVICE_REQUESTS table. You can manage reason types in Oracle Warehouse Management. Use the Picking reason_type when you define a value for the Reason Code field.

Related Topics

Defining Transaction Reasons, *Oracle Inventory User's Guide*

For more information about the Warehouse Control System integration, see the white paper *(WCS)/Material Handling Equipment (MHE)* [Document ID 387006.1] on *My Oracle Support*.

Using the Device History Window to Simulate API Responses

You can use the Device History window to submit test requests through the Device Response API for testing and simulation purposes. You can use the Device History window in normal and debug modes. You define a mode as a form function parameter in the Device History window. Normal mode is the default value, and debug mode is used mainly for testing. In Normal mode, you can query for all records in the WMS_DEVICE_REQUEST_HIST table, and change only restricted columns of a record for error correction. You can also resubmit the record for processing, as well as delete the complete record.

In debug mode, you can change all columns in the Device History window. You can also insert a new record and submit it. In addition you can delete a record.

> **Note:** You can submit and delete only one record at a time.

The following procedure lists the steps necessary to complete task records exported through the device integration at pick release:

1. Identify the record with a business event that you want to use the Device Response API to complete.
2. Enter the following fields in the View Device Requests window.
   - Request ID = Request ID of original record
   - Business Event = Task Confirm
   - Device = Original Device
   - Organization = Original Organization

- Quantity = Picked Quantity
- Device Type = Original Device Type
- Parent Request ID = Request ID of original record
- Status = "E" to allow submission through form
- Device Status = S
- Transfer LPN = LPN to pick into
- Task ID = Original Task ID being confirmed

3. Click Resubmit.

> **Note:** The system submits a concurrent request with the transaction.

Debug Mode

The following table gives an example of an exported and completed task using the Device History window in Debug mode. The table shows the values that appear in the window for both the original task and the completed task:

Field	Original From Value	Original To Value	Completion Value
Request ID	1	1	1
Business Event	Pick Release	Pick Release	Task Confirm
Device	PLT_ASRS	PLT_ASRS	PLT_ASRS
Task Type	Pick	Putaway	-
Item	PLT100	PLT100	-
Organization	W1	W1	W1
Subinventory	PLT_ASRS	-	-
Transfer Organization	W1	W1	-

Field	Original From Value	Original To Value	Completion Value
Transfer Subinventory	-	STA	-
Transfer Locator	-	L.1.1	-
LPN	-	-	-
Rev	-	-	-
Quantity	5	5	5
UOM	Ea	Ea	-
Device Type	ASRS	ASRS	-
Parent Request ID	-	-	1
Status	S	S	E
Request Date	16-JUN-2003 9:44	16-JUN-2003 9:44	17-JUN-2003
Resubmit Date	-	-	-
Resubmit Request ID	-	-	-
Device Status	-	-	S
Transfer LPN	-	-	LPN16A
Reason	-	-	-
Task ID	5790889	5790889	5790889

If you entered the values properly, pressing Resubmit submits the record. If the information that you entered is correct, then you will receive the following message: `Number of records resubmitted is 1.`

Debugging Notes

This log file has information about each step of the device integration execution. From this information, you can find out whether each step ran successfully or if errors

occurred. The following is a sample the log file created during device integration:

```
WMS_DEVICE_INTEGRATION_PVT: ******* Device Request 15-01-02:12.35.48
*********
WMS_DEVICE_INTEGRATION_PVT:
busev=5,callctx=U,task=,org=1990,sub=BULK,loc=4001
WMS_DEVICE_INTEGRATION_PVT: Task ID is null, retrieve_Bus_Event_Details
WMS_DEVICE_INTEGRATION_PVT: Select device for each request
WMS_DEVICE_INTEGRATION_PVT: in select device, org, sub, user,
autoenable, bus:
WMS_DEVICE_INTEGRATION_PVT: 1990,BULK,3330,N,5
WMS_DEVICE_INTEGRATION_PVT: SelectDev: UserLevel not found
WMS_DEVICE_INTEGRATION_PVT: SelectDev: LocatorLevel not found
WMS_DEVICE_INTEGRATION_PVT: SelectDev: Deviceid=61
WMS_DEVICE_INTEGRATION_PVT: ### Submit request per device group
WMS_DEVICE_INTEGRATION_PVT: !----Device_ID: 61, got iotype 4
WMS_DEVICE_INTEGRATION_PVT: going to call generate_xml_csv
WMS_DEVICE_INTEGRATION_PVT: In generate xml/csv, device_id = 61
WMS_DEVICE_INTEGRATION_PVT: Getting output dir, file name, lot/serial
enabled, device name
WMS_DEVICE_INTEGRATION_PVT: Device supports lot/serial ? N
WMS_DEVICE_INTEGRATION_PVT: After checking device and detail info,
l_task_sum=Y
WMS_DEVICE_INTEGRATION_PVT: Result will be saved in /sqlcom/out/logx4dv1
CONV_2_5224_61.csv
WMS_DEVICE_INTEGRATION_PVT: Opening csv cursor with dev_id=61,task_sum=Y
WMS_DEVICE_INTEGRATION_PVT:  File created
WMS_DEVICE_INTEGRATION_PVT: update outfile_name CONV_2_5224_61.csv61Y
WMS_DEVICE_INTEGRATION_PVT:  Done with generate xml , retval 0
status_code: S
WMS_DEVICE_INTEGRATION_PVT: get message stack, count=0
WMS_DEVICE_INTEGRATION_PVT: Populate Request History
WMS_DEVICE_INTEGRATION_PVT: outfile_name=CONV_2_5224_61.csv
WMS_DEVICE_INTEGRATION_PVT:  Delete request rows
```

Frequently Asked Questions

1. What is the average size of the XML file created by Oracle Warehouse Management?

   The XML files that Oracle XML generates range in size from 300 bytes to 1 Kbyte. The size depends on the number of tasks on a single request. For a single request that contains a single task, the file is approximately 600 bytes.

2. What must I do to ensure that the third-party label printing software can read the XML files that Oracle Warehouse Management produces?

   - Specify the directory for the XML files in the device definition setup. The database must also have write capability to the directory. The directory must be on a file system that is accessible to the database, and the directory must be included in the `v$parameter` list for `utl_file_dir` on the database.

   - Set the permissions on the file directory so that the software has access to both read and delete the XML file after processing.

25

RFID Implementation

This chapter covers the following topics:

- Overview
- RFID Platform Architecture
- Functional Process
- Setting Up RFID
- Business Flow Description
- Debugging Tips
- Frequently Asked Questions

Overview

Radio Frequency Identification (RFID) is an automated data collection technology that enables equipment to read tags attached to the objects without contact or line of sight. RFID uses radio frequency (RF) waves to transfer data between a reader and an item to identify, track or locate the item. The RFID system consists of a tag, which is made up of a microchip with a coiled antenna, and an interrogator or reader with an antenna. The reader sends out electromagnetic waves that form a magnetic field when they "couple" with the antenna on the RFID tag. A passive RFID tag draws power from this magnetic field and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data and sends to a server for processing.

In a warehouse when a material is received, the RFID reader can read the contents in a RFID tag attached to the LPN and record a receipt automatically. Similarly, during the outbound shipment process, the RFID reader can read the contents in the RFID tag attached to the LPN and automatically confirm the shipment. This eliminates the task of manual confirmation of receipt and shipment.

Definitions

The following section lists definition associated with RFID.

- RFID: Radio frequency identification, is a generic term for technologies that use radio waves to automatically identify physical objects. There are several methods of identifying objects using RFID, but the most common is to store a serial number that identifies a product, and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag). The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves returned from the RFID tag into a form that can then be passed on to computers that can make use of it.

- RFID Reader: The reader that communicates with the RFID tag via radio waves and passes the information in digital form to a computer system.

- Response Device: A Response device is an output device, you can configure so warehouse management sends a response message after every RFID event.

RFID Platform Architecture

Warehouse management uses the Oracle RFID platform with a warehouse control system layer (WCS) to implement RFID. This platform supports the following:

- Hardware integration for data filtering

- Even driven architecture for business process management

- Database for event storage and retrieval

- Development platform for RFID-enabling applications

Oracle RFID solution is part of the Oracle Sensor-Based Services messaging solution. Specifically, RFID is one of the many sensors and devices you can use.

The application server in the middle tier can do further filtering before passing data to warehouse management. Warehouse management is configured one of the clients of the Oracle Application Server.

Functional Process

Warehouse management supports RFID-enabled receiving and shipping transactions. All of these flows require the RFID tag be applied to the outermost LPN, and the only other data on the RFID tag other than the manufacturers tag identifier is the license plate number. Warehouse management ignores reads of inner LPNs. There is no

cross-reference between the data on the tag and the LPN, so the tag data and the LPN must match exactly.

Warehouse management supports all receipt routings for a receipt from an internal sales order or ASN receipt. If the receipt routing is direct, a read of the tag will automatically receive the LPN into the inventory locator associated with the reader. If the receipt routing is standard or inspection, a read of the tag will automatically receive the LPN into the optional receiving locator associated with the reader.

You can implement a RFID solution for outbound process. Warehouse management confirms a shipment automatically whenever

- Truck is loaded
- Truck is loaded and shipped

The key for RFID implementation is the RFID tag should carry the LPN number. Based on the LPN number, warehouse management detects the Internal Order / Purchase Order for which a receipt needs to be confirmed. Based on LPN number, the system detects the Sales Order(s) which needs to be confirmed for shipment.

Setting Up RFID

This section describes the RFID setup steps performed within warehouse management.

1. Define the RFID device in Oracle Warehouse Management.
2. Assign device to a WMS business event.
3. Define the profile WMS: RFID user.
4. Set up the Warehouse Control System (WCS) layer

Define the RFID device in Oracle Warehouse Management:

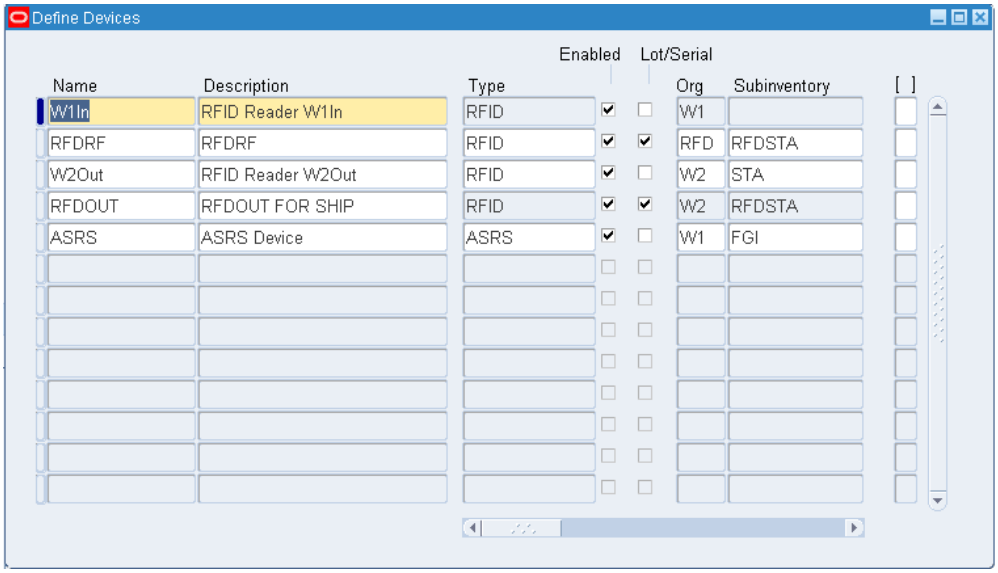
1. RFID readers placed in warehouse are modeled as devices. When defining readers, specify the device name for the reader within Oracle Applications as well as the integration method to be used for this particular reader.
2. You need to enter a device name and device type for each RFID reader. The device associated with the RFID reader should be `RFID`. Only those devices whose device type is RFID are used for integration. Unlike material handling devices, you must assign RFID devices to a particular locator in a sub-inventory. However, you can skip this assignment if the receipt routing is either Inspection or Standard.

   The only input method for integration of warehouse and RFID devices is API. The Application Server uses the warehouse management API to inform the system that an RFID reader has encountered an RFID tag. Warehouse management uses the response status of the WMS-API for processing RFID transactions to drive the

signals to the output devices

However, you can customize your own events based on several other output methods supported within warehouse management. Supported output methods are Extensible Markup Language (XML), Comma Separated Values (CSV) and API (using a synchronous API call). If the output method is set to either XML or CSV, specify an output directory for the flat file to be written as well as the prefix for the file. You must include this directory in the database setting for the output directories (as specified in the v$ parameter setting).

You can leave the default flags for Lot/Serial, Notify on Task Completion, Force Sign On, Employee, and Model.



Assign device to a WMS business event

After you model the RFID reader as a device, you can assign it to a business event on the Assign Devices to Business Events window.

You can automate the following business events using an RFID system within warehouse management:

- Direct Receipt
- Inspection Receipt / Standard Receipt
- Truck Load
- Truck Load and Ship

You can assign an RFID reader to one business event even though the system allows multiple assignments. The parameter Auto Invoked does not affect RFID.

What's Next

After setting up the WCS layer, proceed with setting up the middle tier as described in the following white paper on My Oracle Support: *Oracle WMS: Implementing Warehouse Control System / Material Handling Equipment*, Document ID 382834.1.

Related Topics

Oracle WMS: Implementing Warehouse Control System / Material Handling Equipment, Document ID 382834.1.

Business Flow Description

Using an RFID system, you can automate receiving and shipping process in your warehouse. You can use a label printing kit to write a LPN number into the RFID tag. For automating the shipment process you need to ensure that the RFID tag contains a LPN ID. Similarly, you need to instruct your suppliers that they need to put a LPN ID into ASN shipment line and into RFID tag.

Typically an RFID reader is attached to the locator. The RFID reader sends out electromagnetic waves that form a magnetic field. When material passes through the locator, the magnetic field of the RFID reader interrogates with the antenna of the RFID tag and the magnetic field powers the microchip's circuits. The chip then modulates the waves to send the LPN information back to the reader. The reader then converts the new waves into a digital data and sends it to the application server

When you move goods through the locator, RFID reader attached to the locator interrogates the RFID tag on the outer LPN and responds. RFID reader then passes the message along with the device name. Based on the RFID read event and configured rules, the Oracle WMS API is called and passes LPN number and device name as input.

You can configure a light stack as an output device to receive feedback events. You can configure the light stack such that when a read event is successfully determined, a yellow light glows in the light stack. When a light stack glows yellow, then operator waits for success or failure of the transaction.

Based on the LPN context and RFID device name, Oracle WMS automates the transaction. After automatically performing the transaction, Oracle WMS returns a confirmation / failure message using the outbound process attached to the device. If the outbound process is API, then status of the transaction is returned synchronously. If the transaction is successful, then a green light glows, otherwise red. If the green light glows in the light stack, then the operator can proceed. If a red light glows in the light stack, then the operator needs to stop and start debugging the reasons for the failure. In case the light stack shows a red light, then the operator can also perform using mobile pages.

You can also configure a buzzer with various frequencies for confirmation.

Automating the Outbound Process

You can use the RFID system for automatic Ship Confirmation of Internal orders and Sales Orders. Automatic confirmation is controlled by two factors – LPN Context and the Business event associated with RFID event

LPN Context	Business Event	Result in Device History	Comments
In Inventory	Truck Load	Success	LPN context is changed to Loaded to Dock. Use 'Close Truck' option in Direct ship menu on the mobile UI to confirm the shipment.
In Inventory	Truck Load and Ship	Success	Shipped Automatically by the System.
Picked	Truck Load	Success	LPN context is changed to Loaded to Dock. Use LPN ship in the mobile UI to confirm the shipment.
Picked	Truck Load and Ship	Success	Shipped Automatically by the System

Automating Direct Ship

You can raise a sales order and reserve a LPN against the Sales Order. This sales order can also be a result of an internal requisition.

You can use a label printing kit to write a LPN number into the RFID tag. When you move material out of the dock door, the RFID reader attached to the dock door detects the RFID tag on the outer LPN and passes the LPN number. Based on the RFID read event, the Oracle WMS API is called and passes LPN number and device name as input.

Warehouse management identifies the business event from the device name. Since the context of the LPN is *Resides in Inventory*, warehouse management triggers a *Direct Ship* transaction. If the associated business event is *Truck Load and Ship*, then warehouse management automatically confirms the shipment.

However, if the business event associated with the RFID device is *Truck Load*, the

system sets the context of the LPN to *Loaded to Dock*. You have many options to confirm the shipment. You can use a push button, which triggers *Close Truck* public API. You can also use the *Truck Close* option in the *Direct Ship* menu in the mobile UI to ship the material.

Automating LPN Ship

Unlike automating direct ship, in this scenario you need to Pick release the Sales Order. You can stage the material either by picking from storage locator or by cross docking from a receiving locator.

You can use a label printing kit to write a LPN number into the RFID tag. You need to write the LPN number of the item being shipped and not the LPN number from where the item is picked. Therefore, it is better to write the LPN number into RFID tag in staging lane. When you move goods out of the dock door, RFID reader attached to the dock door detects the RFID tag on the outer LPN and passes the LPN number to the system. Based on the RFID read event, the Oracle WMS API is called and passes LPN number and device name as input.

Warehouse management identifies the business event from the device name. Since the context of the LPN is Picked, warehouse management triggers an LPN Ship transaction.

If the associated business event to the RFID device is Truck Load, then Oracle WMS automatically confirms the event of the loading the LPN into the truck. Oracle WMS uses the sub-inventory and locator associated with the device for automatic confirmation. Operator then needs to manually confirm the Ship Confirm event using his mobile. Alternatively the operator can use a push button which in turns calls Close Truck public API to close the truck and ship the material.

If the associated business event for the RFID device is Truck Load and Ship Confirm, warehouse management automatically confirms the event of loading of LPN into truck and ship confirms when last RFID is read.

Inbound Process

You can automatically record a receipt event for the following:

- Internal Order
- Purchase Order for which an ASN has been received. The ASN sent by the supplier should have an LPN number.

Business Flow / Receipt Routing	Locator Type	Locators Required
Direct Receipt	Storage	Yes

Business Flow / Receipt Routing	Locator Type	Locators Required
Standard / Inspection Receipt	Receiving	Optional

Note: If the subinventory is defined for a reader, the locator must also be specified on the reader definition.

Warehouse management supports all receipt routings for a receipt from an internal sales order or ASN receipt. If the receipt routing is direct, a read of the tag will automatically receive the LPN into the inventory locator associated with the reader. If the receipt routing is standard or inspection, a read of the tag will automatically receive the LPN into the optional receiving locator associated with the reader.

Automating Direct Receipts

You can automate the orders whose receipt routing is direct receipt. In this case the RFID reader is attached to the storage locator.

Warehouse management identifies the business event from the device name. It then retrieves the internal order or purchase order associated with LPN. This is the reason you can automate only those Purchase Order receipts that have a LPN in ASN. The system then checks whether the LPN context is 'In transit'.

If the business event is 'Direct Receipt', the receipt routing in the order is 'Direct receipt' and LPN context is 'In Transit', warehouse management automatically performs receipt and put way transaction into sub inventory and locator associated with RFID device.

Automating Standard and Inspection Receipts

You can automate the receipt process for orders where the receipt routing is standard or inspection receipt. In this case, the RFID reader is attached to a receiving locator.

When you receive goods into a receiving locator, the RFID reader attached to the locator detects the RFID tag on the outer LPN and passes the LPN number to the system. Based on the RFID read event, the Oracle Warehouse Management API passes the LPN number and device name as input.

Oracle Warehouse Management identifies the business event from the device name. It then retrieves the internal order or purchase order associated with LPN. This is the reason you can automate only those Purchase Order receipts that have an LPN.System then checks whether the LPN context is *In transit* or *Resides at Vendor*.

If the business event is *Standard/Inspection receipt*, the receipt routing in the order is either *Standard receipt* or *Inspection Receipt* and LPN context is *In Receiving*, warehouse management automatically performs the put away task. The destination inventory will be the sub inventory and locator associated with RFID device.

If a RFID device is not associated with a sub inventory and locator, warehouse management uses the suggested subinventory and locator in the put away task.

The RFID enabled outbound process is as follows:

Business Flow	Validation to automatically ship
Truck Load	Does not automatically ship; use either public API or mobile RF to close truck
Truck Load and Ship	All LPNs in delivery or trip tied to LPN have been loaded

Debugging Tips

This section provides information on how to solved debugging problems during an RFID implementation.

Device Request History

Once transaction processing completes, the details of the transaction are moved to the `WMS_DEVICE_REQUESTS_HIST` table and you can view the history on the history window. The system uniquely stamps every invocation. You can use the Device Requests History window to view the status of the transactions.

To view information about one of the requests, select the Request ID. The detailed success or error message appears in the Message field.

Use Responses as XML or CSV

You can set output method of the RFID device as XML or CSV files and mention an output directory. If this type of response is easier to debug, the response mode and output directory can be set in the Define Devices form (N: Warehouse Manager: Setup > Warehouse Configuration > Printers & Devices > Define Devices). Just be sure that the output directory is a directory that the application has permissions to write to. You can check the directories that the system has write access to with the following SQL query:

```
select value from v$parameter where name = 'utl_file_dir'
```

Mobile Use

You can use a mobile page to directly invoke the `WmsRfidEpcPub.processRfidTxn() API`. You can pass the RFID device name and LPN number as input values and trigger the RFID event. No validation is present on the RFID device name or the LPN number. To add this mobile page in your menu, add the

function *Mobile RFID test* to the menu in which you desire the test mobile page to appear.

Enable Logging

Enable logging for user ID with the parameter `WMS: RFID`. System will write into the log file maintained for the user ID identified by the parameter`WMS: RFID user`.

Frequently Asked Questions

1. Can I implement bar codes and RFID?

   Bar codes are inexpensive and effective for certain tasks. It is likely that RFID and bar codes will coexist for many years. For example, you can use labels on each LPN so that it is easy to read the contents of the LPN and attach a RFID tag for the outer LPN for automating the transactions. However, most of your needs for a barcode can also be met with RFID. There may other reasons why you need to use both bar codes and RFID. One reason might be the cost associated with RFID tags. In such scenarios, you can choose to use RFID for materials that are costly or hazardous in nature. For low cost items you can go for barcodes.

2. Can warehouse management write data into an RFID tag?

   Oracle WMS can write data into a RFID tag. Most RFID tag writers are label printers. Therefore, you can leverage on the existing infrastructure of label integration to write any kind of data into a RFID tag. When you write data always verify that RFID tag holds LPN number. Please check with 3rd party label printing software vendors for the capability to write data into a RFID tag.

3. Does warehouse management provide special tags as an XML output file in the label integration for writing data into an RFID tag?

   No. You can configure the data as attributes in the XML and most third party software (like Loftware and Zebra) can extract these attributes from the XML for writing into a RFID tag.

4. What does on RFID tag contain?

   At present the only content of a RFID tag, which warehouse management can read is the LPN number. It can contain other information, warehouse management does not use.

5. What happens if the RFID tag does not contain and LPN number?

   Warehouse management records the event as a failure.

6. How can I connect to the object name server?

   Warehouse management does not yet provide any out-of-box solution for connecting to Object Name Server (ONS).

7. Can an RFID device be associated with two business events?

   An RFID device cannot be associated with two business events. If an RFID is associated with two business events, warehouse management returns an error. However, the system does not prevent you from assigning a RFID device to multiple business events.

8. What happens if an RFID tag is attached to an inner LPN as well as an outer LPN?

   Warehouse management reads both the tags and ignores the inner LPN. Therefore you can process an RFID-enabled pallet consisting of RFID-enabled cases.

9. What happens if an overlap exists in the reader field (area of coverage of two devices, and they detect the same LPN?

   The RFID reader software deals with this problem where algorithms for tag and reader field collision are implemented. First, the warehouse manager should make sure that there is no overlap between reader fields of the devices. If one or more devices detect a LPN simultaneously warehouse management performs the transaction for the first read and logs an error for the second read.

10. Can warehouse management ship or receive multiple RFID enabled pallets at a single RFID reader at once?

    Warehouse management supports shipping or receiving of multiple RFID-enabled pallets at a single RFID reader at once. However, the way in which the light stack is triggered would need to be enhanced. Specifically, each pallet read and subsequent event will trigger a yellow light followed by either a green or red light. The link between warehouse management and the light stack simply passes the message from warehouse management on to the light with no filtering or aggregation. So with two simultaneous reads, it is entirely possible to see yellow > green > yellow > green, or a long yellow followed by a long green. With three reads, it can become even more complex, and as error conditions are also introduced, the light stack becomes even more unpredictable.

26

Oracle Warehouse Management Planning for High Availability and Performance

This chapter covers the following topics:

- Introduction
- Overview
- Security
- Warehouse Management Availability
- Performance
- Summary

Introduction

Warehouses and distribution centers are the pivotal points in the supply chain that facilitate the balance between supply and demand. System performance and availability is an important consideration in the implementation of a warehouse management systems as any interruption may cause a ripple effect in the supply chain.

This chapter focuses on the system and network design to optimize performance and availability of the Oracle WMS application. The recommendations provided should be tailored to suit specific business requirements and rolled back into the overall deployment plan.

Overview

The goal of any Information Technology (IT) organization is to provide its customers with smooth and uninterrupted access to applications and system resources. It is therefore very important to minimize disruptions due to planned and unplanned downtime.

Because it is unpredictable, unplanned downtime is of primary concern to IT. Software

and hardware related failures are the most likely to occur and account for 49% of all unplanned downtime. Human error, typically due to lack of training or inadvertent operator error ranks second, representing about 36% of unplanned downtime.

Although unlikely, disasters happen but account for only 3% of all unplanned downtime.

Planned downtime is periodic in nature and is necessary to provide good system performance and continuous operation. Regular maintenance activities include backups, upgrades, and data re-organization. The challenge of the IT organization is to minimize planned downtime.

Although traditionally not considered a part of system availability, system performance can be regarded as a type of Unplanned Downtime, in that it has a similar effect in reducing productivity. Here, the lost time is not in a contiguous block, but rather spread out as unproductive waits between user interactions. Often, this can be more frustrating to the user than a total downtime. Studies indicate that productivity is inversely proportional to response time (as response time reduces, productivity increases). Indeed the productivity of an expert user with poor (5 seconds or more) response time reduces to that of a novice user with good (below 1 or 2 seconds) response time. This is particularly true of "execution" type applications such as Oracle Warehouse Management.

Achieving both high availability and good performance usually requires an investment in a robust IT infrastructure. This includes both capital expenditures on hardware and networks, and in the management and operation of those resources.

This chapter covers some of the high availability tools that Oracle provides and how they can be applied to provide a reliable warehouse management application. In addition, it makes recommendations for the organization and sizing of the hardware and network resources to deliver good performance.

Causes of Downtime

Unplanned Downtime	Planned Downtime
System Failures: Power outage, system crash	Routine operations: upgrades, patches
Data failures: Data corruption	Routine Maintenance: backups, defragmentation
Human Error: Deleted data, Administrator error	

Security

Warehouse Management Architecture

Warehouse Management is completely integrated with Oracle ERP and Supply Chain Management applications. It is a part of the e-Business suite and therefore provides all the functionality and tools of a regular e-Business installation. A typical Oracle Warehouse Management installation consists of the following components:

- Oracle database instance
- MWA application server
- Wide Area Network (WAN)
- RF network for mobile devices
- Printers

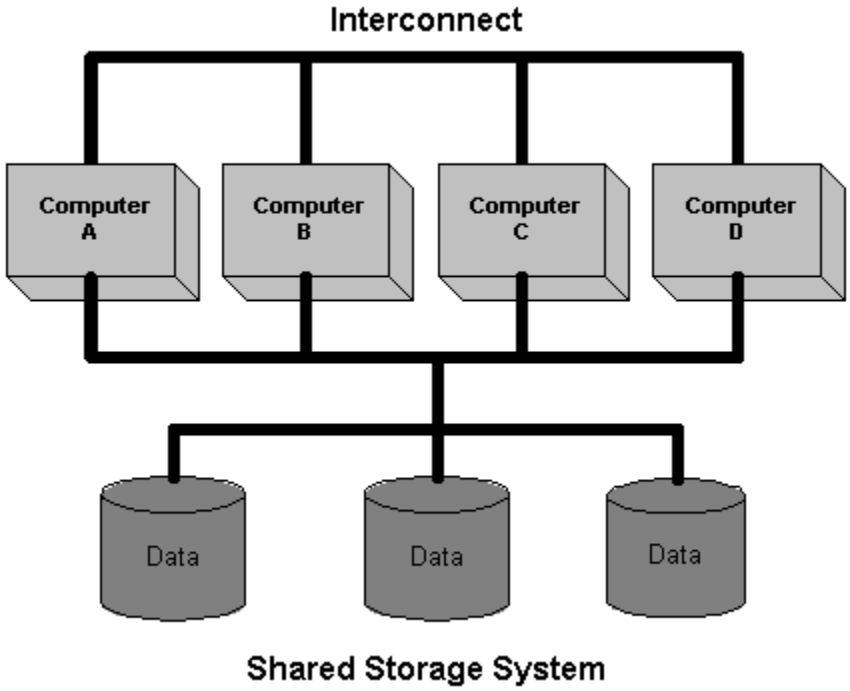
Warehouse Management Availability

System Failures

System faults and crashes are some of the most common causes of unplanned downtime. System faults are the result of hardware failures, power failures, and operating system or server crashes. The amount of disruption incurred depends upon the number of affected users, and the speed at which service is restored. High availability systems are designed to quickly and automatically recover from failures, should they occur. Oracle9i Real Application Clusters provides a highly resilient, fault-tolerant, flexible and scalable architecture that can virtually eliminate any unplanned downtime. A Oracle9i Real Application Cluster consists of a set of nodes (machines) that share a common set of disks. The nodes of the cluster are tightly integrated to provide a cooperative of servers. In the event of a node failure, users are transparently switched to another node in the cluster. The cluster performs a load balancing function and nodes can be added without any disruption to the cluster. Applications need not be modified to take advantage of this architecture. Oracle provides lower cost alternatives to Real Applications Cluster. They focus primarily on fast recovery from system faults, rather than fault-tolerance.

Media failures are another major cause of system failures. It is strongly encouraged to use RAID technology to protect against these types of failures. In the event of a disk failure, the RAID storage system automatically re-creates the lost data using its redundancy algorithms. Users of the system are unaware of the failure, although they may experience a slower response.

Oracle Real Application Cluster



Data Failures

It is extremely important to design a solution to protect against and recover from data and media failure. A system or network fault may prevent users from accessing data, but media failures without proper backups can lead to lost data that cannot be recovered. Oracle provides advanced features that guarantee that data will remain intact in the event of a media failure.

Oracle Recovery Manager helps IT managers create proper backup and restore procedures.

In addition, Oracle offers Data Guard, a comprehensive set of data protection and recovery tools.

Human Error

Many studies on system availability point to human error as one the major causes of unplanned downtime. A recent survey by the Disaster Recovery Journal estimated that some 36% of unplanned downtime is due to human error. Human errors include accidents (e.g. deleting important data), unintended outcomes (e.g. an action that monopolizes system resources), and even sabotage. The real challenge with human error lies in identifying the impact of the error then taking the fastest route to recovery. The Oracle Database arms administrators with the tools they need to quickly diagnose

and recover from human error.

One of the major new features of Oracle Database is Flashback Query. Flashback Query enables administrators to view and reconstruct data that may have been accidentally deleted or changed.

Planned Downtime

In today's environment, businesses are rarely presented with a window during which users are not affected by system availability. Planned downtime can be as disruptive for users as unplanned downtime.

As the volume of stored data becomes increasingly large, so does the time required to perform regular maintenance operations. The Oracle Database has been designed to ensure these routines and maintenance operations can be carried out with little or no downtime at all. The Oracle Recovery Manager can make full and incremental backups of data while the database server is online and users are querying or updating data.

Another important feature is Partitioning. Partitioning of data with the Oracle Database enables administrators to divide large tables up into smaller more manageable chunks without having to change any underlying application code. This allows maintenance tasks to be performed at the smaller partition level, allowing the bulk of the data to remain unaffected during maintenance.

Users can take advantage off all the features mentioned above to protect their Oracle Warehouse Management instance against unwanted prolonged downtime.

RF Network Availability

The RF network is the network that supports the hand-held devices in the warehouse. Most suppliers of RF networks provide high levels of network redundancy. Oracle strongly recommends redundant RF networks, as disruptions to the network will result in disruptions in the warehouse operation. Please contact your RF hardware vendor (Intermec, Symbol, LXE, and so on) to discuss these capabilities.

Printer Availability

Of all the components listed above, printers are the most likely to experience problems. Backup printers should be available and ready to be brought on line in case of malfunction of the primary printers.

Most printer control software solutions provide a simple way to re-assign an IP address to a different printer. The IP address of the malfunctioning printer can be quickly re-assigned to the backup printer with minimal disruption to the warehouse operation.

Effect Of Failures On Warehouse Management Availability

As described above, the Oracle WMS consists of several interrelated components. Failure of any component in this architecture will prevent users from accessing some

pieces of the WMS functionality. User access to WMS functionality can be broken down into two parts:

- Configuration and control functions
- Warehouse operator functions

Configuration and Control Functions

These functions involve set-up tasks such as creating organizations, users, rules, and locators, as well as management tasks such the Materials Workbench and the Control Board. These functions are accessible through the desktop using a standard web browser. Users have access to these functions while the WMS instance and the Wide Area Network are running.

Warehouse Operator Functions

These functions involve all material movement tasks, such as picks and put away. These functions are only accessible through mobile devices. Users have access to these function as long as all components are running (the database instance, the MWA Server, the Wide Area Network, and the RF network).

Effects of Failure to Users in WMS

System Component	Failure Prevention	Effect of Failure on WMS Availability
Oracle ERP instance	Oracle Real Application Cluster Oracle Fail-safe	WMS and desktop applications are unavailable.
MWA application server	Oracle Real Applications Cluster Multiple MWA servers on multiple machines	WMS application is unavailable through mobile devices. Desktop access to applications is available through a browser.
Wide Area Network	Redundant Wide Area Network	WMS and desktop applications are unavailable.
RF network for mobile devices	Redundant access points and base stations	WMS application is unavailable through mobile devices. Desktop access to applications is available through a browser.

System Component	Failure Prevention	Effect of Failure on WMS Availability
Printers	Good maintenance program Backup printers	Unable to print LPNs and shipping documents.

Performance

Oracle WMS performance is primarily dependent on the following components of the architecture:

- MWA application server
- Wide area network

MWA Application Server

The MWA Application Server is written in java and acts a the middle-tier for the hand-held devices. It communicates through Telnet with hand-held devices and displays the screens and data to the users. To provide high availability, the MWA Application Server could be installed in a Oracle Real Application Cluster, or it could be installed on multiple non-clustered nodes. In a non-clustered configuration, Oracle recommends running the MWA server on a separate machine from the WMS database instance. However, these machines should be co-located (housed in the same data center) to provide users with optimal response time.

MWA is shipped with a dispatcher that provides a mechanism for load balancing as well as redundancy. When the user attempts to connect to a MWA server, the Dispatcher routes the connection to the proper MWA server following a round robin algorithm.

The dispatcher should be started from the Oracle Concurrent Manager. The Concurrent Manager will automatically re-start the dispatcher in the unlikely event that the Dispatcher experiences any downtime.

The RF devices should be configured to connect to the Dispatcher, NOT to the different instances of the MWA server.

To maintain high performance the MWA servers should be reset on a periodic basis. This will clear memory and reset the Java VM. The reset should happen during warehouse shift changes (8 or 12 hours). The reset should also be transparent to end users. For example, in a 3 shift warehouse operation the following reset schedule could be implemented via Shell/batch scripts:

1. At 6:30 a.m. start the MWA dispatcher

2. At 6:35 a.m. start MWA server instances MWA1, MWA2, and MWA3 for the 7:00 am shift. The dispatcher will load balance all new connections between the 3 WMA server instances

3. At 3:45 p.m., gracefully shutdown MWA server instances MWA1, MWA2, and MWA3 and start up MWA server instances MWA4, MWA5, and MWA6 for the 4:00 p.m. shift. This will cause the dispatcher to stop sending any new connections to the MWA1, MWA2, and MWA3 instances. As new shift operators connect to the dispatcher, they are routed to the MWA4, MWA5, or MWA6 instance. Once all users logged into MWA1, MWA2, and MWA3 have logged off, these server instances are signaled to shutdown.

4. At 11:45 p.m., gracefully shutdown MWA server instance MWA4, MWA5, and MWA6 and start up MWA server instance MWA1, MWA2, and MWA3 for the 12:00 am shift.

5. At 6:30 a.m. repeat the process.

Wide Area Network

Today, most WANs provide T1 or fractional-T1 speeds and are highly resilient. Network latencies of 300 milliseconds are very attainable even in international networks. Disruptions are rare and of short duration. Wide Area Networks are typically found in the form of leased lines or private customer networks. Network suppliers can provide a guaranteed quality of service (uptime and speed) based on your needs. Oracle recommends using dedicated leased lines as the primary channel of communication between the data centers and the warehouse.

There are more affordable alternatives to dedicated leased lines and private networks. Telecommunications companies are investing heavily into IP Virtual Private Networks (IP-VPNs) to provide small businesses and remote offices with low cost connectivity. Several categories of VPN services are available: dial-up, DSL, Frame Relay, and so on. They are differentiated by the Quality of Service offered by the service provider. Unlike Leased Frame Relay or T1 lines that use dedicated circuits, IP VPNs use the service provider's IP backbone. The network infrastructure is managed by the service provider and you only need a router at their premises. VPNs do not typically provide the same quality of service, performance, and predictability as dedicated leased lines. Oracle does not recommend using VPNs as the primary vehicle for data transmission for mission critical applications such as WMS, however, VPNs are a relatively cheap means of providing redundancy to a leased line WAN. You can lease a DSL VPN and only use it as a standby backup to the primary leased line network. In the unlikely event that the leased line experiences problems, critical network traffic can be diverted to the VPN.

Network Traffic

Since most of the network traffic takes place between the MWA server and the Oracle

WMS instance, Oracle recommends co-locating the MWA server with the Oracle WMS instance in the data center, and accessing the application from the warehouse over a wide area network (WAN). The network traffic between the hand-held devices and the MWA server (at the data center) is much smaller than that between the MWA server and the database. It consists of data entered by users and data to be displayed on the screen and control characters to paint the screen. The average size of packets sent from the MWA server to the mobile device is less than 500 bytes and consists of control characters and regular ascii characters to paint the screen. The average size of packets sent from the mobile device to the MWA server is less than 200 bytes. It consists of the data entered/scanned by the user in each of the fields. This volume of traffic is far less than that generated by any equivalent browser based or traditional client/server application.

As a result, the principle consideration for achieving good performance on the hand-held device is how many packets need to be sent rather than packet size, and how long each packet takes to send. The MWA server and WMS application have been architected to minimize the number of packets generated by the user interaction with the screens. This leaves network latency rather than total bandwidth as the principle consideration for good response – though adequate bandwidth is required to eliminate any possible queuing delays.

Character vs. Block Mode

The MWA server provides the function of an application server as well as a Telnet server. Handheld devices are configured to act as Telnet clients. Most suppliers provide Handheld devices that can operate in two modes:

- Character mode
- Block Mode

Character mode is the default Telnet operation mode. In character mode, any character entered by the user on the terminal (in this case the handheld device) is sent to the Telnet server (in Oracle WMS, this is the MWA server) and echoed back for display on the terminal screen. This results in a large number of packets being sent for each field. For example, if the user enters (or scans) the purchase order number: PO-ABC-12345, each character (P, O, -, A...) is sent in a separate packet to the Telnet server and echoed back to the handheld, resulting in 3 packets for each character (the character from the handheld, the Echo from the Telnet server and the Acknowledge from the handheld) for a total of 36 packets. Due to the dependency between the number of packets and user response time, this increase in the number of packets due to standard Telnet Character mode is undesirable.

In contrast, in block mode, all the characters are sent in the same packet to the Telnet server when the user presses the Enter key. For the purchase order above, PO-ABC-12345, this would result in only 3 packets being transmitted (the characters from the handheld, the Echo from the Telnet server and the Acknowledge from the handheld).

Whenever there is significant network latency (over 200ms), Oracle recommends using handheld devices in Block Mode. This will highly improve the user experience.

There are some minor differences from a user prospective when using Block mode as opposed to Character mode:

- When choosing menu options using numbers instead moving the cursor to the menu selection (e.g. press the number 3 instead moving the cursor to menu selection number 3), press the <ENTER> key to proceed. This is because regular characters are not transmitted to the Telnet server until the user presses the <ENTER> key.

- When typing more characters than a field can hold, the field does not scroll to show the characters being typed. This is not an issue when users are scanning labels.

To illustrate the nature of the traffic between the handheld devices and the MWA server, this document shows the TCP/IP packets generated by a typical Oracle WMS receiving transaction.

The handheld device used in this test is an Intermec-2415 and was configured to operate in both Character and Block Mode. A network analyzer was used to capture packets exchanged between the MWA server and the handheld device.

The three data entry screens shown below are the screens the user interacts with on the handheld device to complete a typical receiving transaction.

The following tables show the Number of packets and their distribution according to packet size for both Block mode and Character mode:

Block Mode

Block Mode

Source Node	Destination Node	Packets	Bytes
Handheld device	MWA server	62	4216
MWA	Handheld device	46	8406

Block Mode - Packets

Packet Size (bytes)	Number of Packets	% of Total Packets
0-64	2	2

Packet Size (bytes)	Number of Packets	% of Total Packets
65-127	86	79.5
128-255	8	7.5
256-511	12	11
> 511	0	0

Character Mode

Character Mode

Source Node	Destination Node	Packets	Bytes
Handheld device	MWA server	84	5712
MWA server	Handheld device	62	9184

Character Mode - Packets

Packet Size (bytes)	Number of Packets	% of Total Packets
0-64	11	7.5
65-127	116	79.5
128-255	8	5.5
256-511	11	7.5
> 511	0	0

For this receiving transaction example, the character mode generates 35% more traffic than block mode (146 vs. 108 packets).

The difference in the number of packets exchanged increases as the number of character entered in each data entry field increases. For Oracle WMS, character mode will typically generate between 30% and 90% more traffic.

Network Traffic Priority

Prioritizing traffic, improves network latency by giving higher priority to traffic destined to specific IP targets (e.g. and MWA server).

For example, if typical network latency is around 500 milliseconds and varies widely, a high priority can be assigned to the telnet traffic between the MWA server and the routers that support the mobile devices. In most environment this will provide a consistent network latency that is considerably faster than non prioritized traffic. It is very likely that the latency would drop to about 350 milliseconds. This in turn results in improved response time on the mobile devices.

Network Performance Summary

Minimizing network latency is a key factor for ensuring good performance. A reasonable target is 300ms or better across the WAN. In situations where network latency is over 200 ms, system administrators can use Block mode as well as prioritize the Telnet traffic between the MWA server and the handheld devices.

Summary

Oracle Warehouse Management is a comprehensive warehouse management solution. It is an integral part of the Oracle e-Business suite and benefits from all the system management features available to the e-Business suite. Oracle recognizes the need for companies to be "open for business" 24 hours a day, 7 days a week, and has invested heavily in developing technologies that provide high levels of performance and availability. You should carefully consider these features when designing a WMS deployment. Close attention should also be paid to a redundant infrastructure for LANs, WANs, and RF networks to minimize disruptions to the business.

27

Global Trade Item Numbers

This chapter covers the following topics:

- Overview
- Global Trade Item Number Data Structures
- Modeling of GTIN in Warehouse Management
- Global Trade Item Number Configuration
- Label Printing and GTIN
- Frequently Asked Questions

Overview

A Global Trade Item Number (GTIN) is a unique number assigned to a product within the EAN/UCC framework for standard product identification. The product can be a physical item or different packaging configurations for an item. You can retrieve pre-defined information for an item such as item description, manufacturer, etc. at any point in the supply chain using the GTIN.

A GTIN is a 14-digit number that accommodates different structures within the EAN/UCC system for standard product identification. GTIN accommodates the following EAN/UCC standard data structures:

- 12-digits (UPC)
- 14- digits (EAN/UCC-14)
- 13-digits (EAN-13)
- 8-digits (EAN-8)

These data structures provide unique identification when right justified and zero padded in the GTIN 14-digit reference field.

Advantages of Global Trade Item Numbers

The following paragraphs contain the advantages of using Global Trade Item Numbers.

Re-label Products with Internal SKU number

Wide adoption of EAN/UCC standards have resulted in most products and their packaging configurations having one of the existing EAN/UCC standard data structures such as 12-digits (the U.P.C.), 14- digits (SCC-14), 13-digits (EAN-13) or 8-digits (EAN-8) in a bar coded form. Usually one of these data structures are applied the item at the point of manufacture such as UPC Barcode on loose items sold through retail outlets or EAN/UCC-14 barcode on corrugated cartons.

Warehouse management allows transactions to be carried out by scanning one of the constituent data structures of GTIN. Therefore if the product already has a UPC, EAN-8, EAN-13 or EAN/UCC-14 barcode assigned either by the manufacturer or by another entity in the supply chain, there is no need to re-label an item with a bar code for the internal SKU number. Scanning one of the above barcodes is enough to identify the item for mobile transactions in WMS.

Internal Cross-References

Because GTIN is unique and widely accepted, the need for maintaining internal cross-references to vendor or customer item is substantially reduced. Data entry and maintenance is also simplified.

Support for Standard Packing Configuration

: Support for EAN/UCC-14 implies that each packaging configuration of the item can be assigned a new 14-digit number. This implies that a carton of a particular product will have a distinct 14-digit number from a standard pallet of the same item. Warehouse operations are vastly simplified as the warehouse operator can transact based on standard pack quantities (i.e. Pick 2 Cases, 3 Pallets, etc.) rather than transacting in primary UoM (e.g. 20 EA in 2 Case)

Global Uniqueness

Adherence to EAN/UCC standards ensures a globally unique 14-digit GTIN. The global uniqueness ensures you can identify a given item and trace it to the manufacturer. All members of the supply-chain can use the same number to reference the item. Because GTIN is based on widely adopted EAN/UCC standards, it is understood and accepted worldwide. Compliance to GTIN standards is also a key requirement for UCCNet integration.

Data Accuracy

Oracle mobile application recognition of GTIN facilitates bar code scanning and use of auto-identification techniques such as application identifiers (AI). This results in substantially higher data accuracy during transactions.

Global Trade Item Number Data Structures

GTIN describes the family of EAN/UCC data structures for global product identification. The four data structures in the GTIN family are as follows:

- EAN-8 (Europe)
- UCC-12 (North America)
- EAN-13 (Pacific Rim and Europe)
- EAN/UCC (worldwide, includes packaging level)

You can use four numbering structures to construct a GTIN that depends on the exact application and the bar code symbology to be used. However, in a database all GTINs are unique and unambiguous when right justified in a 14-digit field padded by leading zeros. The 14th digit in all GTIN data structures is a check digit. This check digit is calculated by using modulo-10 check digit algorithm.

Num. Str.	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14
EAN-8	0	0	0	0	0	0	N1	N2	N3	N4	N5	N6	N7	N8
UCC-12	0	0	N1	N3	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
EAN-13	0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13
EAN / UCC-14	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14

EAN-8

An EAN-8 barcode is a 2- or 3-digit number system code followed by a 4- or 5-digit product code. The numbering authority directly assigns EAN-8 product codes. Any company can request an EAN-8 code regardless of its EAN-13 manufacturer or product

code. You must store EAN-8 codes in each database separately because you cannot translate an EAN-8 code to an EAN-13 equivalent.

UCC-12

UCC-12 is a 12-digit number that identifies trade items, commonly known as UPC. UCC-12 number consists of a one-digit UCC Prefix, a Company Number, an Item Reference, and a Check Digit. The UCC-12 number is represented using UPC-A (12 Digit) or UPC-E (8 digit) Bar Code Symbol. The UPC-A barcode shows all the 12 digits of the EAN/UCC-12 whereas the UPC-E bar code symbol carries only eight digits of a UCC-12 number and suppresses the zeros using a zero suppression technique.

EAN-13

EAN-13 is a superset of UPC-A. The only difference between EAN-13 and UPC-A is the number system code. UPC-A is a single digit from 0 through 9 whereas an EAN-13 number system code consists of two digits ranging from 00 through 99, which is essentially a country code. Each country has a numbering authority that assigns manufacturer codes to companies within its jurisdiction. The manufacturer code is five digits long, as is the product code, and the check digit is calculated in exactly the same way.

EAN/UCC-14

You use EAN/UCC-14 when packaging identical consumer units into standard quantities of intermediate packs or shipping containers. EAN/UCC-14 is the new term used by EAN/UCC for Shipping Container Code or SCC-14. EAN/UCC-14 is commonly used in a non-retail environment, particularly in distribution centers dealing with packaged goods. The General EAN/UCC standards specify that you assign different packing configurations a new, 14 digit number. Thus cartons containing ten units would be assigned a different 14-digit number than cartons containing twenty units of the same product.

As per EAN/UCC specification, prefixing 2-digit of package level information to the base UPC number and recalculating the check digit generates EAN/UCC-14. This 14-digit code identifies intermediate packs and shipping containers holding standard configurations of consumer units.

Modeling of GTIN in Warehouse Management

GTIN functionality in Oracle relies on item code-GTIN relationship. This relationship can be established using the cross-reference types functionality. In order to use GTIN functionality, item-GTIN cross-reference relationship must be defined. This can be done by in one of the following ways:

Example
Option 1 One Item to Many GTINS

This approach associates a distinct UoM (e.g. Case, Pallet, etc.) for every packaging configuration of an inventory item. This offers execution flexibility for warehouse

operations. Since the underlying inventory transaction always occur in primary UoM this option allows demand for an item to be fulfilled in any UoM e.g. a customer may place an order for an item in pallets but net inventory across all packaging configurations will be considered for allocation and eventually the order may be fulfilled using cases. The drawback of this approach is visibility of inventory in terms of packaging configurations. If an item with a primary UoM of Each is also stocked as Case and Pallet, the available inventory is always visible in Eaches. It's not possible to view inventory in terms of Eaches, Cases and Pallets. It's also not possible to honor customer constraints related to packaging i.e. its not possible address the requirements of a customer who wants to buy a finished good packaged only as pallets.

Example

Option 2 One Item to One GTIN

This approach associates a distinct Inventory item for every packaging configuration of an inventory item. This option allows the user to view inventory across GTINs i.e. it is possible to view stock of Cases, Pallets, Eaches, etc. as they are defined as different inventory items. However this option does not allow demand for an item to be fulfilled in a different packaging e.g. if a customer places an order in pallets his order will be backordered when no pallet stock exists even though sufficient inventory is available in cases.

Either of these two options can be modeled in Oracle Applications. Considering the flexibility of execution in WMS, Option 1: One item to many GTINs is the recommended approach. Subsequent examples in this document will assume this approach for modeling GTINs. In future releases, Oracle WMS will address many of these drawbacks associated with this option particularly the visibility of packaging levels in on-hand inventory.

The following table summarizes the two options for modeling GTIN.

Parameters	One Item to Many GTIN	One Item to One GTIN
Execution, Flexibility	High execution flexibility. Possible to fulfill orders using material at any level in the packaging hierarchy	Low execution flexibility. Not possible to fulfill orders using material at any level in the packaging hierarchy
Setup Requirement	• GTIN Item corrs reference wit UOM • UOM definition for packaging levels • UOM conversion	• GTIN Item cross-reference

Inventory Visibility	GTIN visibility in Inventory is not possible. Inventory is assumed to exsit in primary UOM	GTIN visibility in Inventory is possible. Separate Inventory records are maintained for GTIN.
Data Maintenance	Low: Since only one invnetory item is required for multiple packaging levels.	High: Since one inventory item is required for each packaging level

Global Trade Item Number Configuration

GTIN functionality assumes that each standard pack configuration is modeled as a Unit of Measure and the quantity of item in the standard packaging configuration is specified in the UoM conversion setup. The Item cross-reference relationship has been enhanced for EAN/UCC-14 to include an item, revision and packaging configuration (i.e. UoM). The revision and UoM are optional fields. If item is not revision controlled, revision field may be left blank in the cross-reference table. Similarly UoM is not required for UCC-12, EAN-8 or EAN-13 data structures.

As per EAN/UCC guidelines, a unique EAN/UCC-14 is assigned for each packaging configurations of the item i.e. pallet, inner pack, master cases, etc. Therefore a separate entry in the cross-reference table would be needed for each packaging configuration. In this case cross-reference codes corresponding to the EAN/UCC-14 would be associated with the same item and different packaging configurations for the item.

Transactions Involving Global Trade Item Numbers

GTIN allows Oracle Mobile transactions to be carried out by scanning one of its constituent data structures in bar coded format. Whenever a GTIN data structure (i.e. UCC-12, EAN-8, EAN-13 or EAN/UCC-14) is scanned in the item field, Oracle mobile application converts it into GTIN by right justifying and zero padding into a 14-digit field. This 14-digit number is used to lookup for the item, revision and its packaging configuration in the GTIN cross-reference relationship table. If a match exists for the GTIN, the referenced item is substituted in the item field and revision if any is populated. If a EAN.UCC-14 is scanned the transaction Unit of measure is also substituted with the UoM from the cross-reference table. In case of pick tasks, the suggested pick quantity is recomputed in terms of the transaction unit of measure.

Example

Example: Item NA100AX (UPC: 012345678905) comes in two standard pack configurations, a master case (EAN.UCC-14: 20012345678909) containing 10 EA and a pallet (EAN.UCC-14: 50012345678900) containing 100 EA. The GTIN cross reference setup for this item will be as follows:

GTIN	Item	UOM	GTIN Description
00012345678905	NA100AX	EA (Each)	UPC Code for Item NA110AX
20012345678909	NA100AX	CAS (Case)	Master case of item NA100AX containing 10 EA
50012345678900	NA100AX	PLT (Pallet)	Pallet of item NA100AX containing 100 EA

The UoM conversion for Item NA100AX is defined as 1 PLT=100EA and 1 CAS = 10 EA When GTIN is scanned in a WMS mobile transaction form, the cross-referenced item and packaging configuration (UoM) is populated automatically. The warehouse operator now enters the transaction quantity in terms of the specific packaging configuration.

Example

Example: Warehouse operator performs a miscellaneous receipt of 2 pallets of item NA100AX. He scans the EAN.UCC-14 bar code (50012345678900) on one of the pallet in the item field. The item is defaulted to NA100AX and UoM is defaulted to PLT. He enters the quantity of the cases received (2) in the quantity field. In the background a receipt transaction of 200 EA is posted.

When performing pick load, the suggested quantity is shown in terms of the specific packaging configuration.

Example

Example: Warehouse operator performs a pick load of 40 EA of item NA100AX. He scans the EAN.UCC-14 bar code (20012345678905) appearing on the master case in the item field. The item is defaulted to NA100AX and UoM is defaulted to CAS. The operator is suggested to pick 4 master cases. He enters the quantity of the cases picked (2) in the quantity field. In the background a pick load of 20 EA is posted.

Label Printing and GTIN

GTIN and GTIN description have been enabled for the following label types:

- Material
- LPN Contents
- Shipping Contents

In addition, if GTIN cross-reference an Item and UOM, the copies of material label that

get printed on transactions is equal to the transaction quantity. The following table illustrates this point using transaction quantities:

Frequently Asked Questions

1. Do GTINS place the UPC?

   No. Since UPC is one of the data structures included in GTIN, replacing UPC with GTIN is not required. GTIN is just a new term and it does not replace the UPC. Companies that place a UCC-12 (UPC) on products now should continue to do so.

2. The warehouse stores an item in a different packaging configutation i.e. Pallet, Box, etc?

   Yes. The GTIN standards dictate that there should be a unique 14-digit number identifying the single unit, an inner or multi-pack, a case, a pallet, etc.

3. What is 2005 Sunrise?

   This is an initiative underway in USA and Canada with two objectives. First, retailers must upgrade Point of Sale (POS) systems to scan and store EAN-13 symbols in addition to U.P.C. symbols. This needs to be completed by 1/1/2005. Second, all supply chain participants are encouraged to expand the GTIN field in their databases to 14-digits to enable all forms of the GTIN. GTIN framework within Oracle WMS satisfies this requirement by storing the entire 14-digit number in a single cross-reference entity

4. Is GTIN functionality available only in warehouse management?

   Yes. This functionality is available in only WMS transactions and Inventory transactions in MSCA. This functionality is not enabled for Manufacturing or Quality transactions in MSCA.

5. Is it necessary to have an additional barcode for an internal item ID?

   Additional bar code for internal item id is not required if the vendor or manufacturer of the product already has one of the GTIN data structures (i.e. UPC, EAN-8, EAN-13 or EAN/UCC-14) in bar code form on the product. Oracle mobile application transactions can be carried out by scanning the GTIN bar code.

6. How do you generate a label with a bar code for GTIN data strucutres?

   Currently this is not supported, as GTIN data structures are not included in the standards label fields for material or LPN label. EAN-8, EAN-13 and UCC-12 can be stored as item attributes and printed easily. For EAN/UCC-14, work around maybe explored by defining base UPC as an item attribute and defining a UoM that includes packaging indicator. The packaging indicator along with base UPC number can be used to compute check digit in 3rd party label printing software and print GTIN.

7. Is it possible to default the transaction UOM based on EAN/UCC-14?

   This is not a supported feature in DMF PS 'I' (This is a candidate for a future release). However if customization is an option, customizable bar code scanning feature in PS 'I', can be used to default the transaction unit of measure when a EAN/UCC-14 barcode is scanned. The task quantity is automatically recomputed in terms of the transaction unit of measure.

8. Can Scanners distinguish the GTIN from other symbols?

   Yes. However the scanners must be configured to distinguish between different symbology. One of the great strengths of the EAN/UCC standards is the use of a unique symbology for the number structure that identifies a product/service (e.g., a UPC. or EAN symbol is only used to identify product).

9. Can I derive the supplier ID from the GTIN?

   No. The EAN/UCC company prefix is not a company identifier. The company prefix in GTIN ensures globally unique product identification. The objective is not to determine the vendor or manufacturer identifier. Parsing of company prefix from GTIN to identify manufacturer is not recommended by EAN/UCC. The resulting vendor or manufacturer maybe inaccurate as companies have multiple EAN/UCC company prefixes due to mergers and acquisitions. In addition, different divisions of a company may have distinct UCC company prefixes.

A

Label Type Fields

This appendix covers the following topics:

- Label Type Fields

Label Type Fields

The most current complete list of label fields that are available for printing on each of the label types can be seen by executing the following query on your database:

```
select ml.meaning "Label Type",
wlf.field_name "Field Name",
wlf.field_description "Field Description"
from apps.wms_label_fields wlf, apps.mfg_lookups ml
where ml.lookup_type = 'WMS_LABEL_TYPE'
and wlf.document_id=ml.lookup_code
order by wlf.document_id, wlf.field_name
```

This list is ordered first by label type identifier, and then by label field name. Additional fields are added by seeding new data, and so with new releases or label printing patches, you can run this query again to get the most up-to-date list for your instance.

B

Rules Engine

This appendix covers the following topics:

- Date Types
- Objects
- Selected Parameters
- Seeded Rules
- Seeded Strategies

Date Types

Oracle Warehouse Management Rules Engine - Date Types

Date Type	Example	Additional Notes
Accounting Period	3rd period to 4th period	Accounting defined on the general ledger
Always	No additional data needed	none
Calendar Period	1st period to 6th period	Calendar periods defined on BOM calendar
Day	Monday to Thursday	none
Day of month	1st to 5th every month	none
Full date	Jan. 1, 2001 to Jan. 5, 2001	none

Date Type	Example	Additional Notes
Month	January to March	none
Quarter	1st quarter to 3rd quarter	none
Shift	2nd shift only	Work shifts defined as BOM shifts
Week	10th to 25th week of the year	none
Year	2001 to 2002	none

Objects

Oracle Warehouse Management Rules Engine - Objects

Object	Usage	Rule Type
Account Alias	Attributes of the account alias. Used for finding cost group for account alias receipt.	Cost Group
Actual Transaction	Information from the move order line.	Pick, Put away, Cost Group
BOM Bill of Materials	Details about the job and schedule bill of materials header. This object is applicable for discrete, lot based (OSFM), repetitive, and flow manufacturing.	Pick

Object	Usage	Rule Type
BOM Components	Details about the job and schedule material requirements defined on the BOM bill of materials. At work order creation, discrete, lot based, and repetitive jobs create a copy of this data. The copy can be referenced with the object WIP Requirements. This object is therefore applicable mostly for flow manufacturing, but can also be used by discrete, lot based (OSFM), and repetitive manufacturing.	Pick
BOM Operations	Details about the job and schedule operations defined on the BOM routing. At work order creation, discrete, lot based, and repetitive jobs create a copy of this data. The copy can be referenced with the object WIP Operations. This object is therefore applicable mostly for flow manufacturing, but can also be used by discrete, lot based (OSFM), and repetitive manufacturing. This is only applicable when the job has a routing, which is optional for discrete manufacturing.	Pick
BOM Routing	Details about the job and schedule routing header. This object is applicable for discrete, lot based (OSFM), repetitive, and flow manufacturing. This is only applicable when the job has a routing, which is optional for discrete manufacturing.	Pick

Object	Usage	Rule Type
Category	Information on the item category.	All
Category Set	Attributes of the item category set.	Cost Group, Label
Cost Group	Information on the cost group on the move order line.	Pick
Cost Group Transaction	This object represents the input record passed to the cost group engine. It is based on the view WMS_COST_GROUPS_INPUT_V.	Cost Group
Container	Attributes of the inventory item used as the container for this task.	Task Type
Customer Contact	Contact person at the customer.	Label
Customer Item Cross Reference	The attributes of the customer item which corresponds to the current inventory item	Label
Customers	Customer information. For picking rules, this object is useful only for pick wave move orders.	Pick, Cost Group, Label
Date	Current date.	Pick, Put away, Task Type
Destination Locator	For picking rules, this is the destination locator on the move order line. On pick wave move orders, this would be the staging locator specified during pick release. For put away rules, this is the destination locator found through the rules.	Pick, Put away, Cost Group, Task Type

Object	Usage	Rule Type
Destination Organization	For picking and put away rules, the source organization and destination organization are the same - the organization on the move order line.	Pick, Put away, Cost Group
Destination Project	The destination project for the transaction or task.	Cost Group, Task Type
Destination Subinventory	For picking rules, this is the destination subinventory on the move order line. On pick wave move orders, this would be the staging subinventory specified during pick release. For put away rules, this is the destination subinventory found through the rules.	Pick, Put Away, Cost Group, Task Type
Freight Carrier	Freight carrier information. For picking and put away rules, this object is useful only for pick wave move orders.	Pick, Put away, Label
Hazard Class	The hazard class of the inventory item	Label
Item	Attributes of the item on the move order line	All
Item Locator	Attributes of relationship between item and source locator (for picking) or destination locator (for put away).	Pick, Put away

Object	Usage	Rule Type
Item Subinventory	Information on any Item-Subinventory relationship between the item and the current source subinventory (for picking) or destination subinventory (for put away), such as min-max quantities.	Pick, Put away
License Plate	Attributes of the LPN on the move order line.	Pick, Put away, Cost Group, Label
License Plate Contents	Attributes of the contents of the LPN on the move order line.	Pick, Put away, Label
Lot	Attributes of the Lot being allocated for the current move order line. Useful only for lot controlled items.	All
Order Type	Attributes of the Order Type on the sales order line. Useful only for pick wave move orders.	Pick, Put away
Primary UOM	Information on the Item Primary Unit of Measure.	Pick, Put away
Purchase Order Header	Attributes of the purchase order. Used mostly for put away move orders created during a PO receipt.	Pick, Put away, Label
Purchase Order Lines	Attributes of the purchase order lines.	Put, Cost Group
Purchase Order Lines type	Attributes of line type on the purchase order line.	Put, Cost Group
Revision	Attributes of the revision being allocated.	Pick, Put away

Object	Usage	Rule Type
Sales Order Header	Attributes of the sales order header. For pick and put away rules, this object is useful only for pick wave move orders.	Pick, Put away, Cost Group, Label
Sales Order Lines	Attributes of the sales order line for this move order line. For pick and put away rules, this object is useful only for pick wave move orders.	Pick, Put away, Cost Group, Label
Secondary UOM	Attributes of the item secondary unit of measure.	Pick, Put away
Serial Number	Attributes of the current serial number being allocated.	All
Ship To Customer Sites	The customers ship-to location.	Label
Source Locator	The locator from where the engine is allocating.	All
Source Organization	For picking and put away rules, the source organization and destination organization are the same - the organization on the move order line.	Pick, Put away, Cost Group
Source Project	Attributes of the project specified on the move order line.	Pick, Put away, Cost Group, Task
Source Project Task	Attributes of the task specified on the move order line.	Pick, Put away
Source Subinventory	The subinventory from where the engine is allocating during picking.	Pick, Put away, Cost Group, Task

Object	Usage	Rule Type
Stock on-hand	Information about the storable unit (combination of revision, lot, subinventory, locator, and cost group) being allocated, including receipt date and quantity.	Pick, Put away
Subinventory / Locator	For picking, information about the material in the locator being picked from, such as quantity in the current locator.	Pick, Put away
Supplier	Attributes of the supplier of the material.	Put, Cost Group, Label
Supplier Site	Attributes of the site for the supplier of the material.	Put, Cost Group
Transaction Action	Information about the move orders transaction action.	Pick, Put away
Transaction Reason	Information about the transaction reason on the move order line.	Pick, Put away
Transaction Source Type	Attributes of the transaction source type for the move order line.	Pick, Put away, Cost Group
Transaction Type	Attributes of the Transaction Type of the move order line.	Pick, Put away, Cost Group
UOM	Attributes of the unit of measure specified on the move order line.	Pick, Put away
UOM Class	Attributes of the class which contains the UOM specified on the move order line.	Pick, Put away
User	Information on the user who created the move order line.	Pick, Put away

Object	Usage	Rule Type
Warehouse Task	Attributes of the task the task type is being assigned to.	Task
WIP Entity	The job name and reference to the manufacturing mode. This is applicable to discrete, lot based (SOFM), repetitive, and flow manufacturing.	Pick, Put away, Cost Group, Task
WIP Job	Details about the particular job. This is applicable to discrete and lot based (OSFM) manufacturing only.	Pick, Put away, Cost Group, Task
WIP Operations	Details about the job and repetitive schedule operations. This is applicable to discrete, lot based (OSFM), and repetitive manufacturing only. This is only applicable when the job has a routing, that is optional for discrete manufacturing.	Pick
WIP Repetitive Schedule	Details about the repetitive schedule. This is applicable to repetitive manufacturing only.	Pick, Put Away, Cost Group, Task
WIP Requirements	Details about the job and repetitive schedule material requirements. This is applicable to discrete, lot based (OSFM), and repetitive manufacturing.	Pick
WIP Schedules	Details about the flow schedule. This is applicable to flow manufacturing only.	Pick, Put away, Cost Group, Task

Selected Parameters

Oracle Warehouse Management Rules Engine - Parameters

Parameter	Object	Usage
Transaction Quantity	Actual Transaction	The quantity to be allocated, as entered on the move order line, in the transaction UOM.
Transaction Date	Actual Transaction	The date the transaction occurs.
Secondary Quantity	Actual Transaction	The quantity to be allocated on the move order line in the secondary UOM.
Current Date	Date	The current date according to the database.
Number of Other Items in the Location	Destination Locator	For put away rules, this value is the number of items other than the item on the move order line currently residing in the destination locator. Useful for put away rules preventing item commingling.
Number of Other Lots in the Location	Destination Locator	For put away rules, this is the number of lots for this item that currently reside in the destination locator, other than the lot being put away. Useful for put away rules preventing lot commingling.
Number of Other Revisions in the Location	Destination Locator	For put away rules, this is the number of revisions for this item that currently reside in the destination locator, other than the revision being put away. Useful for put away rules preventing revision commingling.

Parameter	Object	Usage
Proximity To Locator With Item By Coordinates	Destination Locator	For put away rules, this is the distance between the destination locator and the nearest locator that contains the item. If the item resides in the locator, this value = 0. The calculation only works if locators have defined x, y, and z coordinates. Useful for put away rules limiting the scattering of material in the warehouse.
Proximity To Locator With Item By Picking Order	Destination Locator	For put away rules, this is the distance between the destination locator and the nearest locator that contains the item, as determined by locator picking order. This calculation assumes that locators that have picking orders that are close in value are physically close in the warehouse. If the item resides in the locator, this value is 0. The calculation only works if locators have defined picking order. Useful for put away rules limiting the scattering of material in the warehouse.
Parent Child Generation Method	Destination Organization	Determines how the child lot is determines for the organization.
Child Lot Prefix	Destination Organization	The child lot prefix of the item.
Child Lot Total Length	Destination Organization	The total length of the child lot number.
Child Lot Zero Pad Code	Destination Organization	Indicates if there is a lot zero pad for the child lot.

Parameter	Object	Usage
Child Lot Validation Code	Destination Organization	Indicates if the child lot is subject to validation
Child Lot Copy Lot Attributes Code	Destination Organization	Indicates if the child lot inherits the parent lot attributes.
Item	Grade Controlled	Indicates if the item is grade controlled.
Lot Grade	Lot	Preferred grade of the lot listed on the move order line.
Lot Origination Date	Lot	Day you created the lot in the system.
Lot Origination Type	Lot	How you created the lot. For example if you created the lot in the lot master, then the origination type is lot master. If you generated the lot during a transaction, then the origination type is inventory.
Lot Retest Date	Lot	The date you need to retest the lot for usability.
Lot Expiration Date	Lot	The date you perform the predetermined lot expiration action.
Lot Expiration Action Code	Lot	The action to perform on a lot once it expires.
Lot Hold Date	Lot	The date until which you hold the lot before you can take any action.
Lot Maturity Date	Lot	The date the lot matures.

Parameter	Object	Usage
OPM QC Matching	Lot	This parameter determines if the lot matches process manufacturing customer quality specifications.
Preferred Grade	Sales Order Line	Grade listed on the sales order line
Fulfillment Base	Sales Order Line	Used in advanced catch weight scenarios, this field shows whether the fulfillment base is Primary (P), Secondary (S), or null. The Fulfillment Base field appears on the Sales Orders window > Line Items tab > Shipping sub-tab.
Schedule Ship Date	Sales Order Line	The date the material is scheduled to ship.
Secondary UOM Code	Secondary UOM	The secondary unit of measure for an item if the item is under dual unit of measure control.
Direct ATT/ATR Quantity	Stock On-Hand	The quantity of the storable unit currently being examined by the rules engine. A storable unit is a collection of material that has the same revision, lot number, and cost group that sits in a single subinventory and locator. In the database, a storable unit is a single row in MTL_ONHAND_QUANTITIES. When allocating serial numbers, this value is always equal to 1. Useful for rules for picking all of the material from a single locator.

Parameter	Object	Usage
Actual item on-hand quantity / txn UOM	Subinventory/Locator	The picking locator's on hand quantity. Useful for picking to deplete locators.
Actual on-hand quantity / txn UOM	Subinventory/Locator	The onhand quantity for all items being allocated in the locator being picked from or being put away to. Useful for picking to deplete locators.
Available Capacity by Customer-Specific Algorithm	Subinventory/Locator	The capacity of the destination locator as defined through a custom API. See Customization section. Available for put away rules.
Available Capacity by Units	Subinventory/Locator	Available capacity in destination locator for put aways, based on the defined Unit capacity on the locator.
Available Capacity by Volume	Subinventory/Locator	Available capacity in destination locator for put aways, based on volume. Returned value is in transaction UOM.
Available Capacity by Weight	Subinventory/Locator	Available capacity in destination locator for put aways, based on weight. Returned value is in transaction UOM.
Empty Flag	Object Destination Locator	Use this parameter to find empty locators. The value is equal to Y for empty locators, if there value is N the locator is not empty. Using this parameter is the most efficient way to find an empty locator.

Parameter	Object	Usage
Item Resides in Locator	Object Destination Locator	To find locators that already contain this item, use this parameter. The value is equal to 'Y' for locators that contain the selected item, and 'N' for locators that do not contain the item. This parameter is best used to find locators that contain mixed items including the item under consideration. The best performance will occur if rules that use this parameter also set the Mixed Items flag equal to 'Y'. To find locators where the item does not mix with other items, use the Only Item in Locator parameter.
Maximum Occupied Capacity by Units, Volume and Weight	Subinventory/Locator	The highest value from among occupied capacity of the locator determined by weight, occupied capacity of the locator determined by volume, and occupied capacity of the locator by units. Available for put away move orders.
Maximum Occupied Capacity by Volume and Weight	Subinventory/Locator	The populated locator's highest value, determined by weight and population governed by volume. Available for put away move orders. Value is in transaction UOM.
Minimum Available Capacity by Units, Volume and Weight	Subinventory/Locator	The lowest value from among available capacity of locator measured by weight, available capacity of locator measured by volume, and available capacity of locator by units. Available for put away move orders.

Parameter	Object	Usage
Minimum Available Capacity by Volume and Weight	Subinventory/Locator	The lower value from among available capacity of locator measured by weight and available capacity of locator measured by volume. Available for put away move orders. Value returned in transaction UOM.
Minimum Remaining Available Capacity by Units, Volume and Weight	Subinventory/Locator	The lowest value from among remaining available capacity of locator measured by weight, remaining available capacity of locator measured by volume, and remaining available capacity of locator by units. Remaining available capacity is the capacity that will be available in the locator after the current transaction. Available for put away move orders
Minimum Remaining Available Capacity by Volume and Weight	Subinventory/Locator	The lower value from among remaining available capacity of locator measured by weight and remaining available capacity of locator measured by volume. Remaining available capacity is the capacity that will be available in the locator after the current transaction. Available for put away move orders. Value is in Transaction UOM.
Minimum Total Capacity by Units, Volume and Weight	Subinventory/Locator	The lowest value from among total capacity of locator measured by weight, total capacity of locator measured by volume, and total capacity of locator by units. Available for put away move orders

Parameter	Object	Usage
Minimum Total Capacity by Volume and Weight	Subinventory/Locator	The lower value from among total capacity of locator measured by weight and total capacity of locator measured by. Available for put away move orders. Value is in transaction UOM.
Mixed Items Flag	Object Destination Locator	This parameter returns 'Y' if the locator contains more than one item, and 'N' if the locator contains 0 or 1 item. Please refer to the Update Locator Capacity concurrent request to understand how this flag is maintained.
Occupied Capacity by Customer-Specific Algorithm	Subinventory/Locator	Currently occupied capacity in the destination locator as defined by a custom API. See the Customization section.
Occupied Capacity by Units	Subinventory/Locator	Currently occupied capacity in the destination locator as measured by unit.
Occupied Capacity by Volume	Subinventory/Locator	Currently occupied capacity in the destination locator as measured by volume. Value in Transaction UOM.
Occupied Capacity by Weight	Subinventory/Locator	Currently occupied capacity in the destination locator as measured by weight. Value in Transaction UOM.

Parameter	Object	Usage
Only Item in Locator	Object Destination Locator	This parameter returns the item identifier of the only item in the locator. This parameter is null if the locator is empty, or if the locator contains more than one item. To putaway to locators that contain only the current item, set the Only Item in Locator parameter equal to the Inventory Item Identifier parameter on the Item object.
Remaining Available Capacity by Customer-Specific Algorithm	Subinventory/Locator	The capacity that will be available in the destination locator after this transaction, as determined by a custom API. See the section on customization
Remaining Available Capacity by Units	Subinventory/Locator	The capacity that will be available in the destination locator after this transaction, as measures in units.
Remaining Available Capacity by Volume	Subinventory/Locator	The capacity that will be available in the destination locator after this transaction, as measures by volume. Value in Transaction UOM.
Remaining Available Capacity by Weight	Subinventory/Locator	The capacity that will be available in the destination locator after this transaction, as measures by weight. Value in Transaction UOM.
Total Capacity by Customer-Specific Algorithm	Subinventory/Locator	Total capacity of the destination locator, as given by custom API. See Customization section.
Total Capacity by Units	Subinventory/Locator	Total capacity of the destination locator in units.

Parameter	Object	Usage
Total Capacity by Volume	Subinventory/Locator	Total capacity of the destination locator in volume. Value in the Transaction UOM.
Total Capacity by Weight	Subinventory/Locator	Total capacity of the destination locator in weight. Value in the Transaction UOM.

Seeded Rules

Oracle Warehouse Management Rules Engine - Seeded Rules

No.	Type	Rule Name	Description
1	Pick	Rotate stock	Pick stock based on FEFO for expiration date controlled material and FIFO for non-expiration date controlled material
2	Pick	Absolute LIFO	Pick stock based on LIFO of receipt date
3	Pick	30-day range FEFO min pick task	Pick any lot that expires in the next 30 days, splitting the pick across storage units-of-measure intelligently, and ordering to deplete locators closest to empty first (restricted to items that are lot controlled)

No.	Type	Rule Name	Description
4	Pick	Serial order	Pick stock in alphabetical order of the serial number (restricted to items that are serial controlled)
5	Pick	Single lot, pick UOM	Pick a single lot, splitting the pick across storage units-of-measure intelligently, and ordering by FEFO or FIFO (restricted to items that are lot controlled)
6	Pick	Rotate stock pick UOM	Pick stock based on FEFO for expiration date controlled material and FIFO for non-expiration date controlled material, splitting the pick across storage units-of-measure intelligently
7	Put away	Empty locator	Put away to any empty locator
8	Put away	Prevent lot or item commingling	Put away to any locator, when the item commingling (different items) or lot commingling (different lots of same item) are prevented, ordering the locator to minimize fragmentation

No.	Type	Rule Name	Description
9	Put away	Single location	Put away to any locator that has enough capacity for the entire put away, while trying to minimize item fragmentation
10	Put away	Minimize fragmentation	Put away to minimize fragmentation of the item
11	Put away	Like material status code for lots	Put away a lot controlled item to a locator or subinventory that has the same material status (restricted to items that are lot status controlled)
12	Put away	Like material status code for serials	Put away a serial controlled item to a locator or subinventory that has the same material status (restricted to items that are serial status controlled)
13	Pick	Pick Common Stock	This rule is applicable for project manufacturing organizations only. It will ensure that only material that is not stored in a project locator, or common stock, is allocated.

No.	Type	Rule Name	Description
14	Pick	Same Planning Group	@ This rule is applicable for project manufacturing organizations only. It ensures that only material that is in a project locator of the same planning group as the planning group on the move order request is allocated
15	Pick	Same Project	This rule is applicable for project manufacturing organizations only. It ensures that only material that is for the same project as that on the move order line is allocated.
16	Pick	Same Project Same Task	This rule is applicable for project manufacturing organizations only. It ensures that only material that is for the same project and task as that on the move order line is allocated.
17	Pick	Seeded Default Pick Rule	This rule has no restrictions and no sort criteria and is automatically assigned as the default organization picking rule when the organization is first enabled for warehouse management.

No.	Type	Rule Name	Description
18	Put away	Seeded Default Put away rule	This rule has no restrictions and no sort criteria and is automatically assigned as the default organization putaway rule when the organization is first enabled for warehouse management.

Seeded Strategies

Oracle Warehouse Management Rules Engine - Seeded Strategies

No.	Type	Strategy Name	Description
1	Pick	Prefer single lot	Attempt to pick single lot, but pick multiple lots if necessary, splitting the pick across storage units-of-measure intelligently (rule 5, then rule 6)
2	Pick	30-day range FEFO	Pick any lot that expires in the next 30 days, splitting the pick across storage units-of-measure, and deplete the almost empty locators first (rule 3)

No.	Type	Strategy Name	Description
3	Pick	Rotate stock	Pick stock based on FEFO for expiration date controlled material and FIFO for non-expiration date controlled material (rule 1)
4	Pick	Rotate stock, pick UOM	Pick stock based on FEFO for expiration date controlled material and FIFO for non-expiration date controlled material, splitting the pick across storage units-of-measure (rule 6)
5	Put away	Empty locator	Put away to any empty locator (rule 7)
6	Put away	Minimize fragmentation	Put away to minimize fragmentation of the item (rule 10)
7	Put away	Same material status code	Put away lot or serial status controlled material to a locator or subinventory with the same status (rule 11, then rule 12)

No.	Type	Strategy Name	Description
8	Pick	Project Manufacturing Allocation Preferences	This strategy uses five seeded picking rules to model common requirements of a project manufacturing organization. The strategy is automatically assigned to the organization when an organization is enabled for both warehouse management and project manufacturing. This means that a picking strategy search order, with the source organization as the only object, is also defined when an organization is both warehouse management and project manufacturing enabled. The strategy attempts to allocate first the most specific material for a particular project and task, gradually loosening the restrictions, finally allocating any material if necessary. It behaves as follows: 1. Allocate material from the same project and task 2. Allocate material from the same

No.	Type	Strategy Name	Description
			project 3. Allocate material that is not stocked for any particular project (Common stock) 4. Allocate material from the same planning group 5. Allocate any material The last rules may be too generic for some organizations, but a copy of the strategy can be made, and then that copy modified by removing or modifying the last rule.

C

Task Management

This appendix covers the following topics:

- Overview
- Business Example

Overview

The attached sample worksheet serves as a functionality implementation guideline. The business example and worksheet are based on the example to present a clear overview of the implementation process.

Business Example

There are six tasks that are performed on a regular basis in this warehouse (Atlas Distribution Center) that is being considered in this example - hazardous picks, cycle counts, replenishments (HZPK) (HZCC) (HZRP), pallet picks and replenishments (PLPK)(PLRP), case picks (CSPK), and each picks (EAPK).

There are three operators (Rob, Charlie, and Michael) employed by a warehouse and three types of equipment (Fork Lift, Pallet Jack, and Trolley) available to perform all the tasks.

Worksheet

1. What are the different operations that are carried out on a daily basis?

   There are three main functions that are performed on a regular basis. They are picking, cycle counts, and replenishments. Each system task has a separate set of rules that are associated with their type.

2. What are the different types of jobs within each type of operation?

   Based on the example above, there are seven main tasks that are carried out on a

day-to-day basis.

They are hazardous picks, cycle counts, and replenishments (HZPK)(HZCC)(HZRP), pallet picks and replenishments (PLPK)(PLRP), case picks (CSPK), and each picks (EAPK). For brevity, we will only discuss setting up the rules for jobs of type picking.

3. How do we identify a job?

   The next step is to create rules to distinguish the jobs based on some criteria. The user has to be careful in setting up the rules so that the same set of conditions are not applicable for a different type of job. Setting up a flow chart during such scenarios would be advisable. Moreover, the order in which these rules are to be evaluated is also important so that two different task types do not satisfy the same rule set.

   The priority of jobs

   1. Hazardous
   2. Cold Storage
   3. Rest of the jobs

      The rules have to be identified separately to evaluate each of the above types.

4. How do we identify a specific task type?

   In the next step, list out all the criteria that would identify a specific task type.

   How will a hazardous task be identified? The item HAZMAT code should be 'yes'.

   Secondly, how would a cold storage task be identified? The subinventory where the material is being picked from would suggest the second type.

5. What jobs are to be identified as special?

   All hazardous and cold storage jobs and pallet picking jobs are to be considered special since they either use a trained resource or a specific type of equipment.

6. What are the available resources and who are qualified to do special jobs?

   Rob, Charlie, and Michael are the available resources. Rob is qualified to perform hazardous jobs and can drive a fork lift. Charlie can drive a forklift while Michael cannot drive a fork lift and is qualified to perform hazardous jobs.

7. What jobs require special equipment?

   All pallet jobs require a fork lift and all jobs involving cases requires a pallet jack or a trolley.

8. How do we group resources into departments?

All task types identified in step three should be associated with the employee and equipment that can be qualified to do the tasks.

HZPL - Rob, Fork Lift

CDPL - Rob, Charlie, Fork Lift

EAPK, DFPK - Rob, Charlie, and Michael, no equipment needed, and so on

Each group of employees within a specific task are classified as human resources and all the equipment is classified as an equipment resource.

Now group both to a department, which is the associated to the task type itself.

D

LPN Contexts

This appendix covers the following topics:

- LPN Contexts
- Definitions of Context Values

LPN Contexts

Oracle Warehouse Management system (WMS) defines a context for each LPN to denote the current state of the LPN. Some of these contexts can be used in the WMS Rules Engine to define specialized picking and put away rules. The table below summarizes the LPN context codes currently defined in Oracle WMS.

Oracle Warehouse Management - LPN Context Codes

LPN Context Value	Description
1	In Inventory
2	In WIP
3	In Receiving
4	Issued out of Stores
5	Defined but not used (Pre-generated)
6	Intransit
7	At Vendor

LPN Context Value	Description
8	Packing context (used as a temporary context value)
9	Loaded to Dock
10	Prepack for WIP
11	Picked
12	Loaded in Staging

Note: Search by the lookup type WMS_LPN_CONTEXT in the Manufacturing Lookups window to view the available WMS context codes.

Definitions of Context Values

The following sections give definitions of LPN context values.

In Inventory

An LPN with a context of 1 indicates that material associated with this LPN has been costed and accounted for in inventory. A LPN with this context may not be used when receiving material against a standard or inspection routed receipt, but may be used during a direct delivery routed receipt. Outbound transactions can be performed on LPNs with a context of 1.

In WIP

An LPN with a context of 2 indicates that material associated with this LPN is currently being transacted in WIP (Work in Process). Therefore, the associated material is not yet in inventory and has not been costed to inventory.

In Receiving

An LPN with a context of 3 indicates that material associated with this LPN have been received using a standard routing or inspection routing receipt and have not been put away yet. Therefore, the associated material is not yet in inventory and has not been costed to inventory.

Issued out of Stores

LPNs with a context of 4 are no longer tracked by the system, and hence, no longer associated with a locator within the warehouse. The system does however retain history information pertaining to transactions this LPN was involved in and material it was associated with prior to leaving the warehouse. LPNs shipped out of inventory receive this context and may not be re-received.

Defined but not used

When LPNs are pre-generated by Oracle WMS and have not been used yet, they are not associated with any physical material. They can be printed and used to identify material during any stage of the material management process such as inbound, replenishment, outbound, and so on. Essentially, this context refers to LPNs that are ready to be used.

Intransit

A LPN with this context is an indication that it is currently moving from one location to another. Possible uses for this are when a LPN is moved from one organization to the next, for example while the LPN is on a truck. The LPN is in an intermediary state, but resides within the entire system. This context is used only for inter-org transit or internal sales orders where an indirect shipping network is defined between the organizations.

At Vendor

When a vendor sends an Advanced Shipment Notice (ASN) to Oracle WMS, the system internally generates LPNs and associates them with material information on the ASN. These LPNs receive a context of 7. Material associated with LPNs of this context are not on-hand or costed until it is actually received.

Packing Context (used as a temporary context value)

This context is temporary and used internally by the software as an intermediary. It should not be used or referenced anywhere including the setup of picking or put away rules

Loaded to Dock

An LPN loaded for shipment has just been loaded onto a carrier ready to leave the warehouse. Once the entire carrier leaves the dock, the LPN obtains a context of 6 Resides in Intransit or 4 Issued out of Stores.

Prepack for WIP

LPNs that reside in WIP and are associated with material that is pre-packed by WIP receive this context. This context adds an extra level of granularity to an LPN's usage within WIP. This is used when the system has associated the LPN with material and printed the labels, but the material has not yet been physically packed.

Picked

LPNs picked during the picking process receive this context. They are intransit within the warehouse.

Loaded in Staging

The LPN status Loaded in Staging indicates that the LPN has been loaded and dropped into a staging lane for further packing and labeling before shipment.

E

Warehouse Management Case Study

This appendix covers the following topics:

- Overview
- Inbound Process
- Outbound Process
- Retail Picking:
- Replenishment
- Accuracy and Counting
- Major Challenges
- Facility Map
- Sample As-Is Process Maps
- Using Warehouse Management in Conjunction with Business Process Re-engineering to Address Current Challenges
- Sample Warehouse to be Process Maps

Overview

Beanz n' Leavz (B&L) is the world leader in the specialty coffee industry. B&L sources whole beans from the best coffee plantations in the world and roasts them using patented roasting technology. The company sells whole bean and ground coffee along with freshly brewed espresso style beverages, cookies, pastries, candy and allied accessories and equipment via its numerous retail stores throughout the world. B&L also sells tea products and their flagship bottled coffee drink Beanzo by exclusively partnering with niche suppliers. In addition to sales through its company-operated retail stores, B&L sells whole bean coffee and specialty items online through B&L.com and to special customers such as supermarkets and hotels. B&L's vision is to establish itself as the most recognized and respected brand in the world. The company plans to achieve its vision by rapidly expanding its retail operations, growing its specialty

business and introducing new products.

B&L has approximately $2.5 Billion in annual revenue and has two distribution centers, one located in Memphis, Tennessee and the other in Irvine, California. The business is rapidly growing at the rate of approximately 1000 new retail stores a year. Revenues are growing at 20% a year and operating income by 30% a year. Recently, B&L has decided to replace its paper-based Warehouse Management System (WMS) and implement the Oracle Warehouse Management System in its Memphis facility. The company has brought in a team of consultants to analyze the operations, propose an implementation plan and recommend how the new warehouse management can increase throughput.

The following information pertains to the Memphis facility only.

Application Landscape

B&L uses the following applications for their various operations:

- Retail, International, Interplant – DistributeX
- Online – Amadeus OM, DistributeX and X-Ship
- Super markets, Hotels – Picasso OM, DistributeX and X-Ship

Product Profile

B&L has the following product profile:

- 15000 SKUs
- 9000 Active SKUs, some lot/expiration controlled
- General product mix:
    - Ground Coffee (3 pack sizes),
    - Whole Beans (3 pack sizes),
    - Tea (2 pack sizes),
    - Beanzo bottled drinks,
    - Confections and Candy,
    - Coffee makers,
    - Espresso machines,
    - Cups,

- Syrups,
- A large variety of specialty items such as mugs, CDs, T-Shirts,
- Store setup items such as tables, chairs, product tags etc.

Customer Profile

Retail

B&L Outlets 4000 worldwide, growing at the rate of 1000 a year. B&L Memphis services 2000 outlets and 600 new stores a year.

Online customers:

- 5000 to 8000 Orders per day (90% single, 100% piece picks)

Super Markets, Hotels:

- 200 – 300 orders per day, 3000 to 4000 pieces per day
- B&L Pennsylvania caters to customers in the Midwest, North East and South of the US and all International Orders

Vendor Profile

B&L receives material from the following:

- Roasted Ground and Whole Bean coffee from the adjacent production plant
- Most specialty items from China
- Paper Cups, CDs, Tables, and Chairs etc. from US vendors
- Tea from partners

Shipments comprising any of the above from the other facility in Irvine

Inbound Process

General Merchandise and Non-Green Coffee receiving is performed via the 6 inbound dock doors. A unload, stage, and check in process is utilized. Purchase order is used for merchandise check in. Inbound shipments are scheduled by appointments over two shifts. A color coded pallet ticket is applied to loads. Receipt quantity is shown on receiver. Expiration code date is entered when available. Inbound staging lane space is highly utilized on first shift.

Receipts are put away on a first come basis. Material is always received and putaway in full pallets. Pallets are put away one pallet at a time. An attempt is made to put away product in the primary pick location but high space utilization causes product to be put away in a random manner.

Production coffee is staged in the Production Staging Area. Production inventory is updated in the DistributeX system 3-4 times per shift. Production inventory is not reconciled between production and the warehouse.

Only visibly damaged material or non-compliant pallets are sent to the rework area. In the re-work area 3-4 people correct vendor errors and prepare product for putaway. Vendors are charged back for non-compliance. This information is kept track in a spreadsheet and sent to vendors twice a month.

Outbound Process

The Outbound process can be divided into the following:

Retail Picking:

- Ten to twelve waves are handled over two shifts
- Twenty to forty thousand units are picked over two shifts
- Orders are processed on the DistributeX System
- Pick zones consist of Candy, Overstock, Primary and Case Flow (Promotion)
- Pick to single orders. Pick tickets are printed and sorted by zone for each order.
- One person picks entire order from all zones except Case Flow
- Candy, Overstock and Primary picks are brought directly to staging lanes and consolidated on pallets.
- Picks from Case flow are consolidated in the intermediate consolidation area and finally consolidated with others in the staging lane.
- Consolidated pallets are stretch wrapped. Pallets are 7ft high.
- Each store receives one shipment of 1-2 pallets per week with two shipments during Christmas. The second shipment is generally a small shipment.
- There are 8 major promotions per year.
- Space utilization is low on Case Flow

New Store Orders:

- On an average has 1500 lines
- Orders are processed on the DistributeX System
- Pick to single orders. Pick tickets are printed and sorted by zone for each order.
- One person picks entire order from all zones.
- It takes 2-3 days to pick a complete order.
- Staged in the New Store staging area.
- Two store orders can occupy a truck load.

International Orders:

- Same as retail and new store orders.
- There are 100 international stores.
- There is one new store order per month.

Online Customers:

- Picked to order
- Orders are processed on the Amadeus OM< DistributeX and X-Ship systems.
- Printers sorts orders into pick zones; however, orders still have some manual sorting.
- During peak season 5000-8000 orders are processed per day.
- Gift orders create a flow problem during the busy season.
- Space utilization is low on the pick belt.
- The packaging operation is very labor intensive.
- Shipment verification is a manual scan.
- Product is transferred from retail to online as needed.
- There are 8 packing stations.

- Products are shipped using FedEx or UPS

Super Markets and Hotels:

- 200-300 orders per day
- 3000-4000 pieces picked per day
- Orders are processed using Picasso OM, DistributeX and X-Ship
- Picks from case flow only
- It takes 4.5 hours to prepare order shipping paperwork
- 75% case pick
- A shipment tracking bar code is applied to all cases via Pfast Ship

Replenishment

The DistributeX System generates a list of replenishments in advance of requirements for all of the above. Replenishment is performed from Overstock to Primary. Not all replenishments arrive at the primary locations before the pick is attempted.

Accuracy and Counting

- Cycle coutning is performed on an as needed basis
- Inventory accuracy is 85%
- Average inventory level is $16M
- Coffee turns are approximately 13.0 turns per year
- Obsolete inventory is $1M
- Duplicate SKUs between retail and online are being eliminiated
- No ABC stratification

Major Challenges

B&L is facing substantial challenges in the following areas:

- Maintaining information in three systems

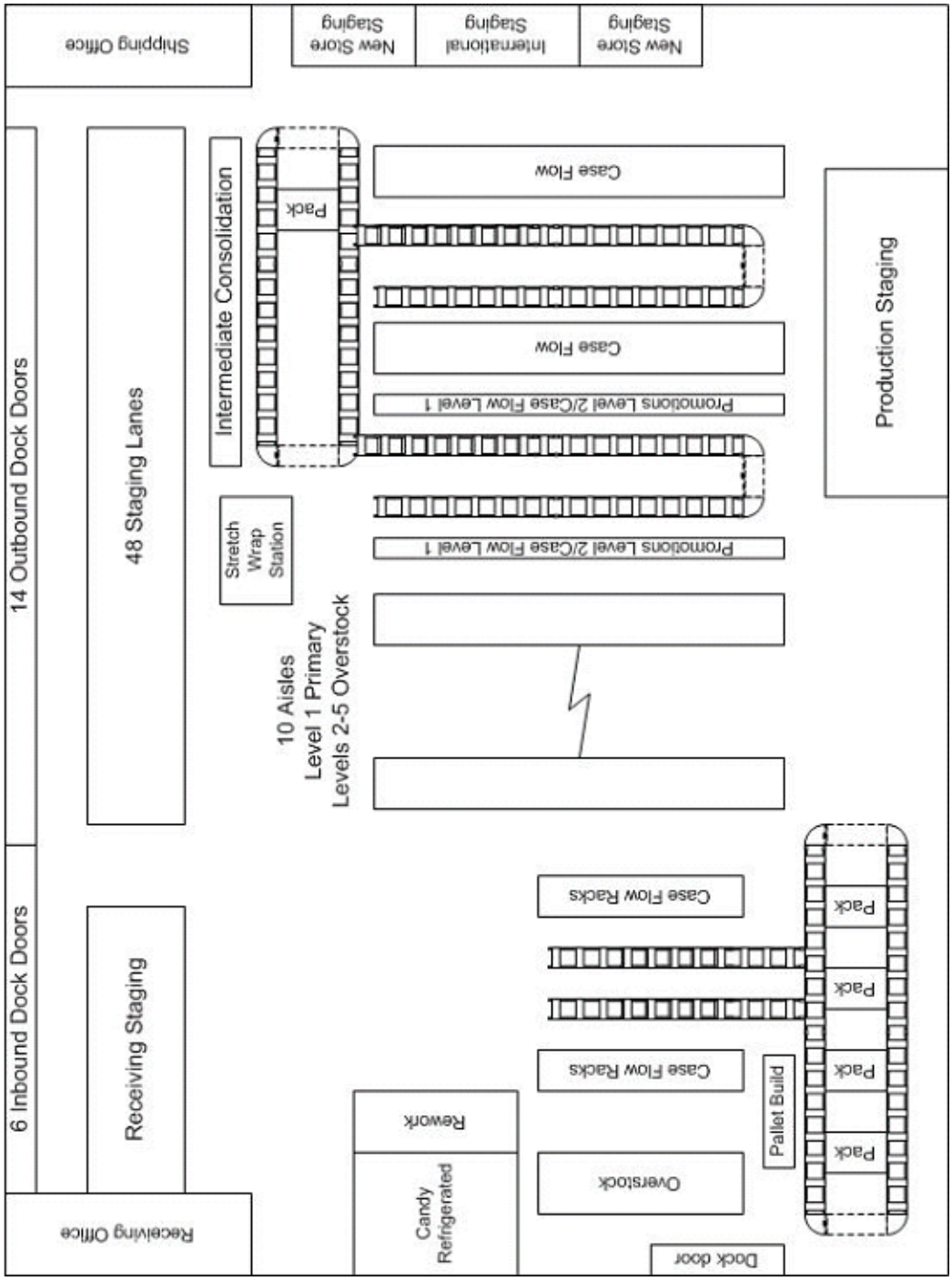
- Inventory accuracy is 85%
- Annual Inventory obsolescence is $2 M
- High Space Utilization of 90%
- Overtime and Temps
- Mis-shipments are $500,000 per year
- Attempted implementing a Best-of Breed warehouse management and pulled the plug in a week due to a severe backlog (5% of pre go-live volume shipped per day)

B&L is currently not interested in replacing its existing production system.

Facility Map

The facility map is shown in the attached layout below. The warehouse is 300,000 sq. ft. and is attached to a production facility. It has 6 Inbound Dock Doors for general receiving and 14 Outbound Dock Doors for general shipping on one side of the building. It has one dock door on one side of the building separate from all other dock doors, catering to FedEx and UPS shipments. All Locators are labeled but not barcoded because operations are paper based.

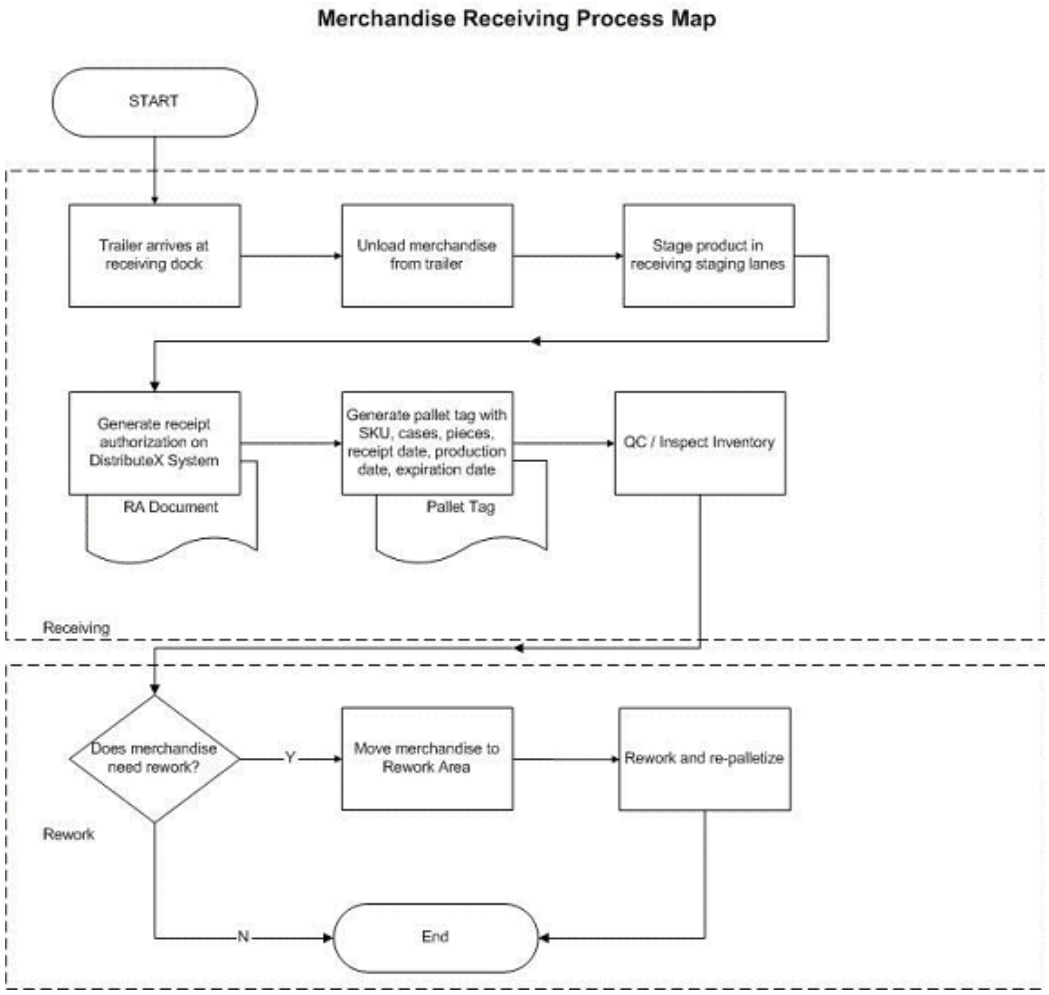
Beanz n' Leavz



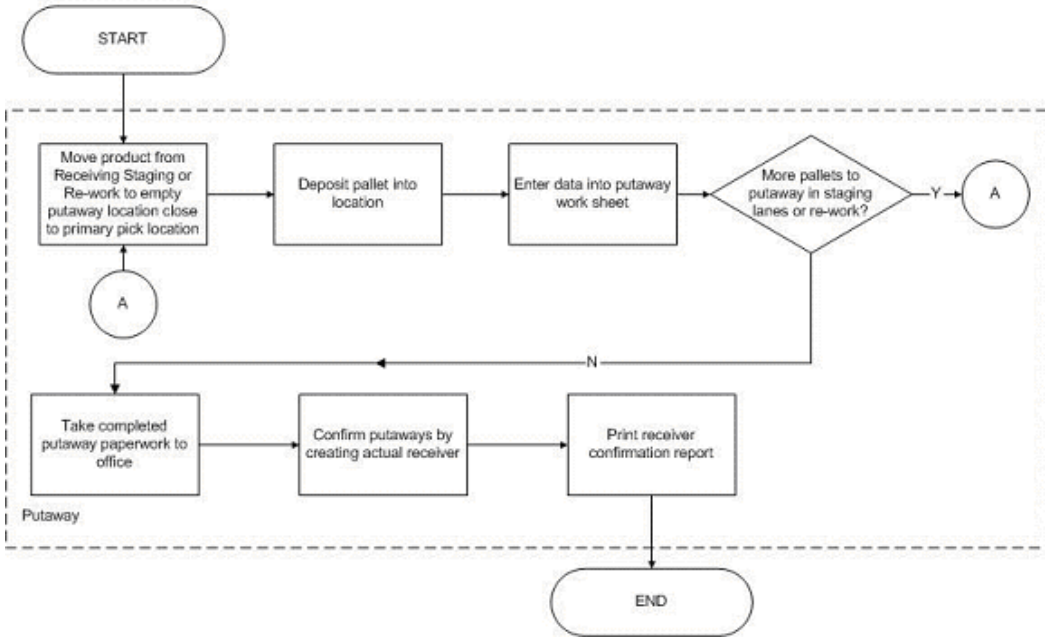
Sample As-Is Process Maps

The following section shows the sample "as-is" process maps for the company named

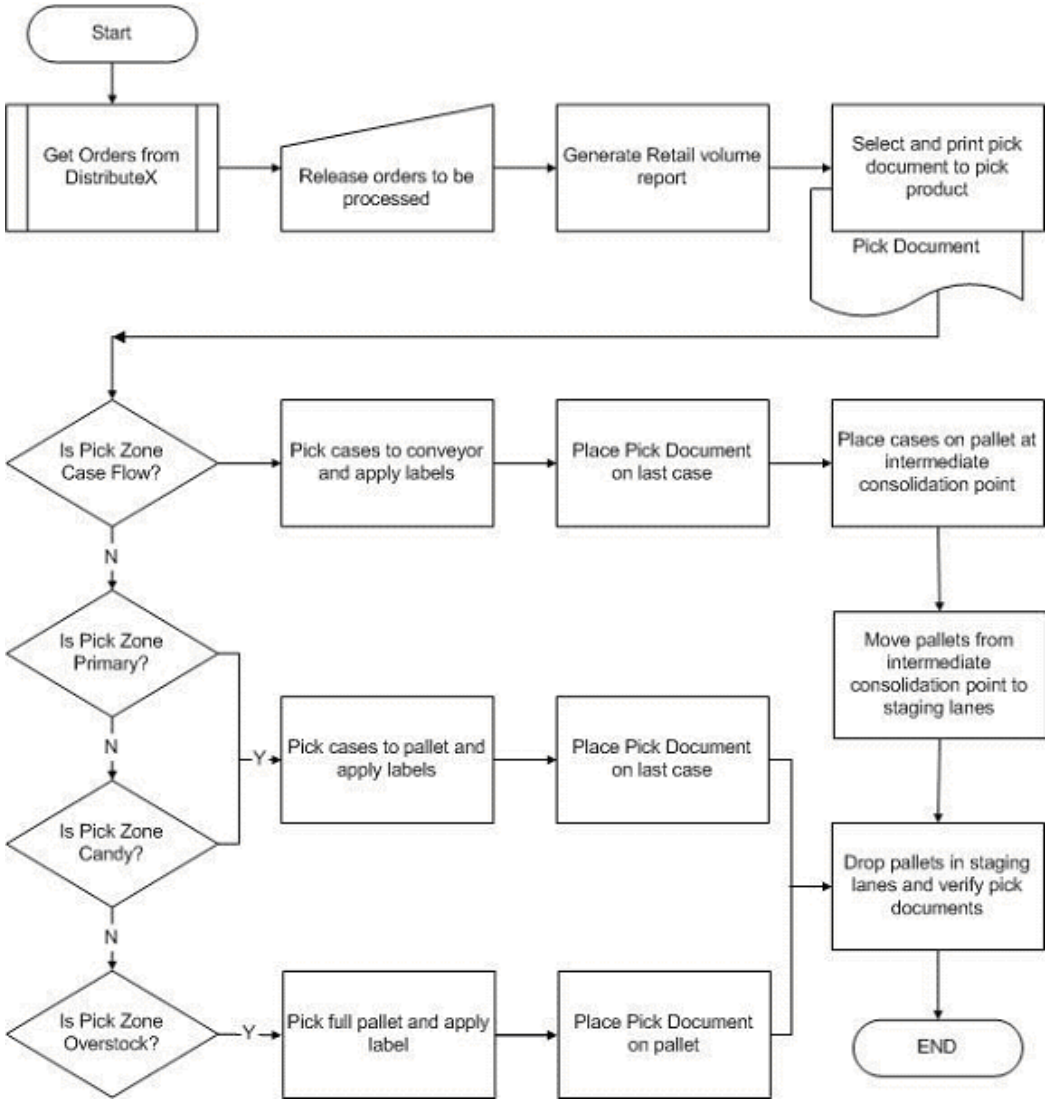
Beanz nLeavz.



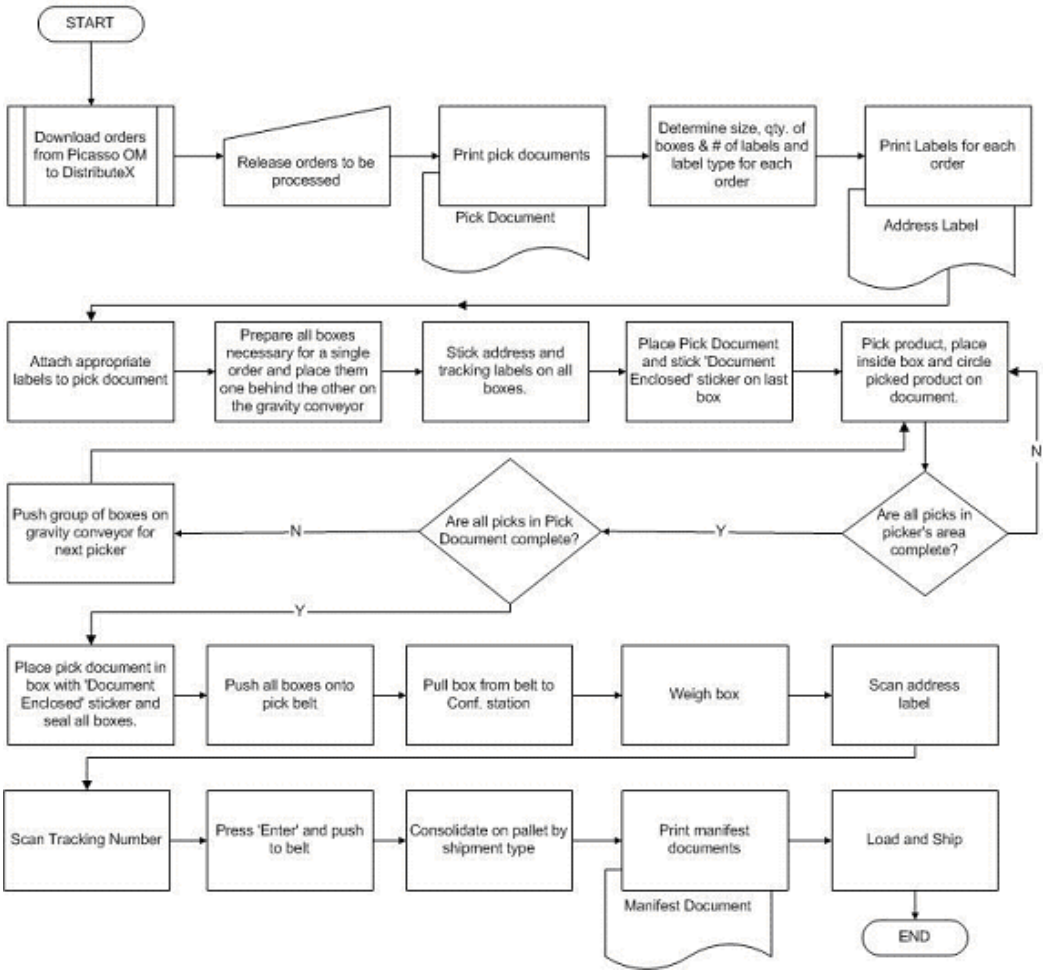
Merchandise Putaway Process Map

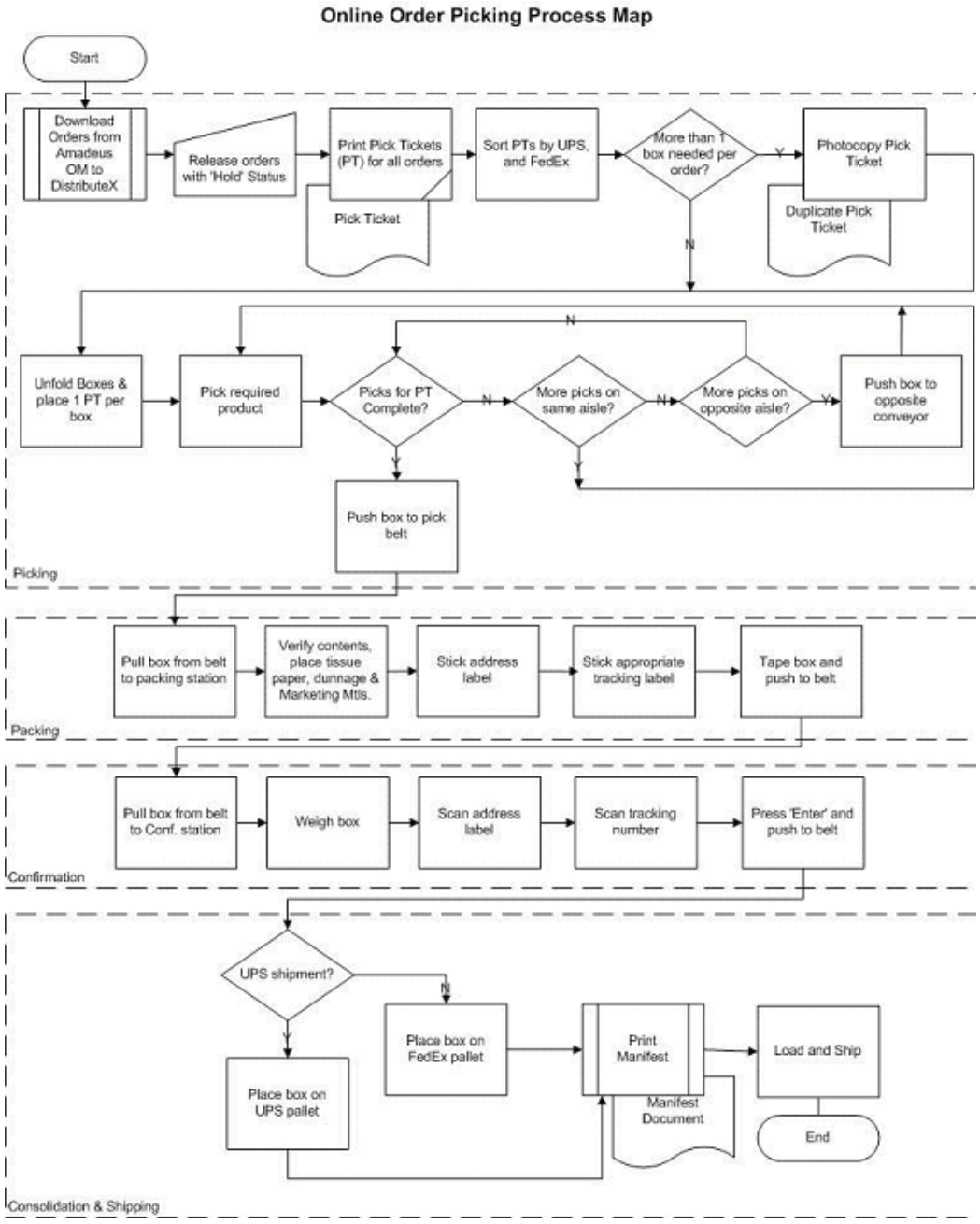


Retail Picking Process Map



Super Market and Hotel Picking Process Map from Case Flow Zone





Using Warehouse Management in Conjunction with Business Process Re-engineering to Address Current Challenges

The following section discusses the challenges and the solutions for Beanz n' leaves.

Maintaining Information

Challenge

Beanz n' Leavz currently maintains in three separate systems.

Solution

The Oracle e-business suite is a fully integrated system that allows order entry and capture via multiple channels such as back-office call center order entry, web orders and order import. This multi-faceted solution should eliminate the current necessity to use multiple systems to capture orders. In addition, warehouse management negates the necessity to hold inventory information in multiple systems. Also, warehouse management is a real-time application in that the database is updated as and when a transaction is performed thereby maintaining currency of inventory information.

Inventory Accuracy

Challenge

Beanz n' Leavz inventory accuracy is currently 85%

Solution

As stated above, warehouse management is a real-time application in that the database is updated as and when a transaction is performed thereby maintaining currency of inventory which in turn will aid in using accurate data for material allocation. This will ensure that the pickers will indeed find material in the right locators when they perform picks. Currently, B&L uses a paper based system with minimal barcodes to perform transactions. Warehouse management thrives on using barcodes for a majority of its execution transactions. Barcodes eliminate errors, improve efficiency and augment the real-time nature of doing business.

Inventory Obsolescence

Challenge

Annual Inventory obsolescence is $2 Million

Solution

When inventory accuracy is increased, the inventory availability picture is current and accurate. This in conjunction with sophisticated material allocation rules via the warehouse management rules engine can ensure elimination of inventory obsolescence by allocating material long before expiry. In addition, system directed tasks in warehouse management will pin-point locators and material and direct users to retrieve and/or deposit material with tremendous accuracy and efficiency.

Space Utilization

Challenge

Beanz n' Leavz has a space utilization of 90%

Solution

This challenge can be addressed via a combination of business process re-engineering, layout changes and warehouse management.

Space utilization is currently low in the case flow area. The online picking process is similar to the case flow picking process but requires tremendous amount of space and labor. In addition, shortages in either the case flow or online picking areas are addressed by transferring merchandise from one to the other as appropriate. The key reasons behind having a separate online picking area are that the volume is high and the order entry/management systems employed is different.

By implementing the Oracle e-business suite, a single Order management system can be used to capture all kinds of orders. By implementing warehouse management and utilizing cartonization and pick and pass methodology, high volumes can be addressed.

By business process re engineering, the online order picking area can be eliminated and consolidated with the case flow area. This in turn will free up all the space used for online picking thereby reducing the space utilization and creating room to expand throughput.

The intermediate consolidation step can be totally eliminated by re engineering the business process via better pick release planning and consolidation.

Personnel

Challenge

Use of temps and overtime for employees

Solution

The re-engineering and elimination of the current online order picking process will allow for reassignment of labor thereby eliminating the necessity to hire temps. The operational efficiency introduced by warehouse management will eliminate the necessity for overtime.

Mis-Shipments

Challenge

Mis-shipments is $500,00per year.

Solution

The current system is entirely paper based with minimal barcoding at the time of shipment. By the time picks are performed and are ready to be shipped, it becomes impossible to accurately determine if the shipments contain the required merchandise.

Warehouse management can increase picking accuracy up to 99.9% via barcodes and system directed picking. If picks are accurate, shipments will be accurate. Quality at the source will ensure quality of the end result. It will also eliminate packing and shipment verification thereby enhancing the overall efficiency of order fulfillment.

Best-of-Breed Attempted Implementation

Challenge

Attempted implementing a Best-of-Breed WMS and pulled the plug in a week due to severe backlog (5% of pre go-live volume shipped per day)

Solution

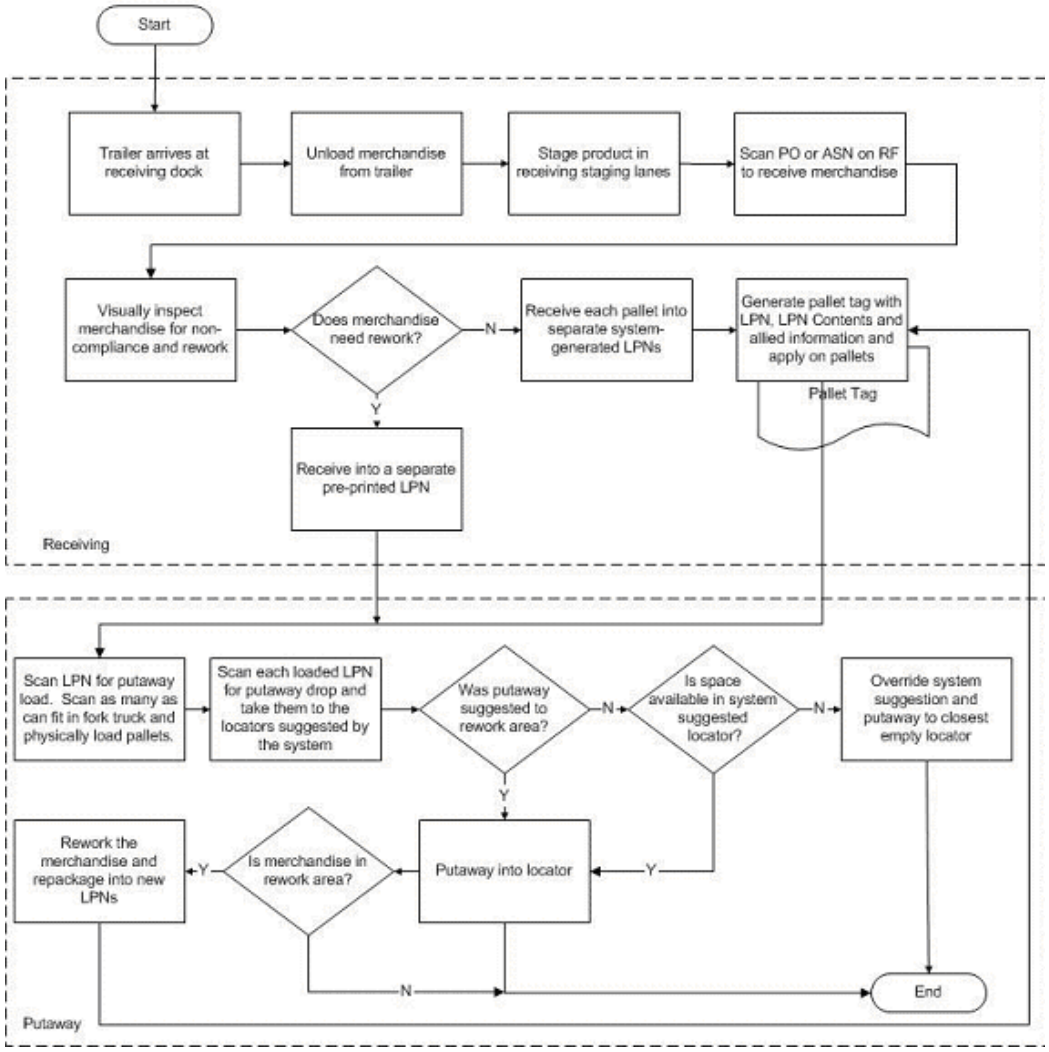
The Best-of-Breed warehouse management system would have provided operational efficiencies but would not have been able to address order entry/import into a single system. Consequently, it would not have been able to aid in re engineering the business process to consolidate the online order picking process with the case flow picking process. In addition, it is extremely vital that the implementation team understands the current business process and recommends the optimal business process that should be adopted when using the new system without sacrificing operational efficiency and/or accuracy.

The above warrants a strong implementation team that has a sound understanding of analyzing warehousing processes, recommending best practices and most importantly implementing warehouse management.

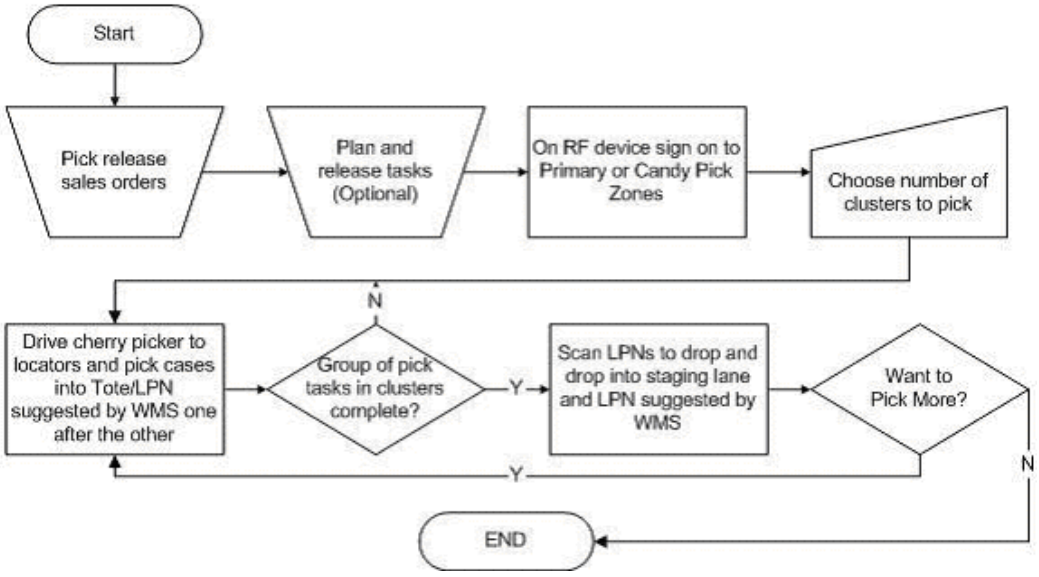
Sample Warehouse to be Process Maps

The following section shows the sample "to-be" process maps for the company named Beanz nLeavz using Oracle Warehouse Management.

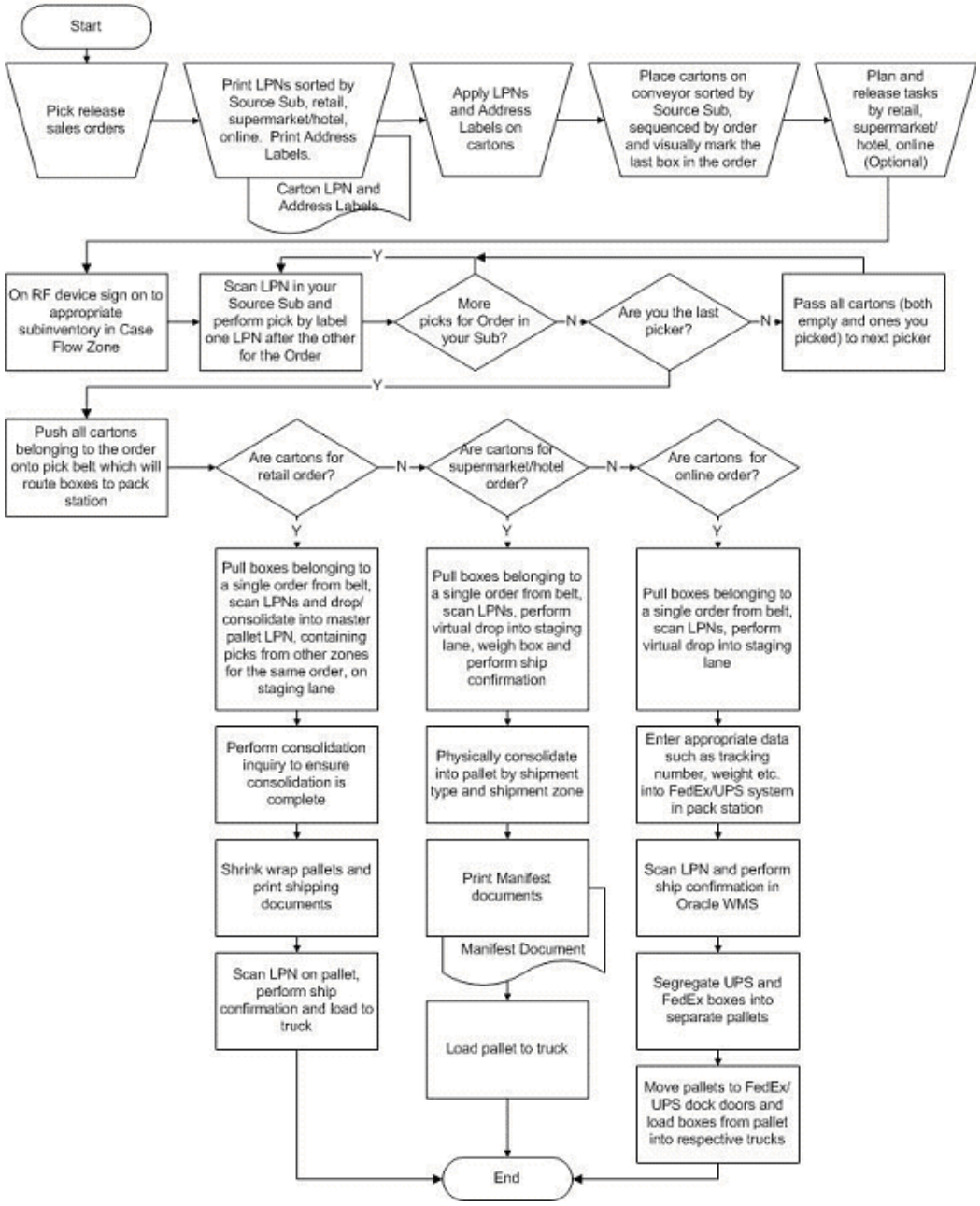
Inbound Receiving, Re-work and Putaway Process Map



Retail Picking Process Map
Non-Cartonized Zone Cluster picking from Primary and Candy Pick Zones



Retail, Online and Supermarket/Hotel Order Picking and Shipping Process Map
Cartonized Pick by Label from Case flow Pick Zone



F

Migrating to Oracle Warehouse Management

This appendix covers the following topics:

- Overview
- Migrating to LPNs
- Migrating to Material Statuses
- Migrating to Cost Groups
- Migrating to Locator Control
- Migrating to Setting Up Item Dimension and Locator Capacities
- Migrating to Lot & Serial Attributes
- Migrating to Rules Engine

Overview

Oracle offers enhanced functionality with the release of Oracle Warehouse Management system (WMS). Many features of Oracle WMS are new, for example the use of License plate Numbers (LPNs), cartonization, and so on. However, other features are an extension of existing Oracle Inventory features, for example Advanced Lot and Serial Attributes, Mobile Cycle and Physical counting, and so on. This chapter details how to migrate to these new features of WMS from the existing Oracle Inventory features. This chapter also discusses the business considerations and system considerations for this upgrade/migration process. Detailed functionality will not be discussed, however a brief introduction will be given. The details of implementing these new and enhanced existing features are discussed in the other chapters of this guide.

Migrating to LPNs

Physically, the License Plate (LP) is equivalent to a label and the License Plate Number (LPN) is a unique number that is printed on the label. A barcode representing the unique number is also printed on the label to facilitate scanning of the LPN when

performing transactions as opposed to performing keypunch data entry.

When migrating to LPN functionality, perform the following steps:

- Loose items should be packed into LPNs by a pack transaction. This will pack the loose materials into an LPN. An LPN can be a pallet, box, cart, and so on.
- LPN labels (barcodes) should be printed and posted on respective pallet, box, cart, and so on.

There are no mass pack scripts available for this purpose. The user has to perform pack transactions so that the material can be associated with LPNs. For example consider a warehouse scenario where the warehouse is migrating from existing Oracle Inventory to Oracle WMS. The user goes into the warehouse and decides what on-hand inventory needs to be in LPNs. After this is determined, a pack transaction is performed and labels are printed and posted on the pallets or boxes. The inventory that needs to remain loose is left as it is.

Migrating to Material Statuses

Material Status Control makes it possible to control the movement and usage for portions of on-hand inventory that may have distinct differences due to grade, quality, or maturity level. It provides the user flexibility in specifying allowable transactions. Users can indicate with a high degree of granularity the actions to be allowed or disallowed, the statuses that are applicable to their warehouse or facility, and the entities that are assigned to various statuses. For further details on Material status functionality please refer the *Oracle Warehouse Management User's Guide* or the Material Status Control chapter of this guide.

To start using this feature following steps should be taken:

There are SQL scripts available in a driver file that are run during installation of Oracle WMS. After running these SQL scripts the item becomes Lot and Serial status enabled. By default they are given a status of Active, which means that all transactions can be performed on the lots and serials for that item. This script also assigns a status of Active to all the lots and serials of that item in all the organizations to where that item is assigned.

Similarly there is a SQL script in the driver file that updates the status of all the subinventories and locators in the organization to Active. The status of Active here has the same meaning as that of lot and serial Active status.

These statuses can be changed according to the needs of the user.

Migrating to Cost Groups

A Cost Group is the set of accounts that hold on hand inventory. Cost Groups were introduced in Oracle WMS to separate tracking of Physical and Accounting attributes. With the introduction of Cost Groups, it is now possible to have a 1:1 mapping of the

zones in the warehouse to the subinventories in the system resulting in more accurate representation of capacity.

Cost Groups have been a part of Oracle Inventory since before the introduction of Oracle WMS. There is a data migration script that can be used to migrate to Cost Groups. For more information, refer to the Oracle Inventory Implementation Guide.

Migrating to Locator Control

Unlike Oracle Inventory, in Oracle WMS all the subinventories must be locator controlled. Every subinventory must have at least one locator. Locator control can be decided at the organization parameter level or at the subinventory level. For a WMS organization, Locator Control cannot be None, it can either be predefined or dynamic.

When migrating from Oracle Inventory to Oracle WMS all subinventories have to be made locator controlled. When converting an organization with an on hand inventory to a WMS enabled organization, the do the following:

Use the Locator Control API to create locators in the existing subinventories. After this is done perform a mass move to move the existing on hand inventory to the newly created locator for a given subinventory. Details about this API are in the following section.

Migrating to Setting Up Item Dimension and Locator Capacities

In Oracle WMS, available weight capacity, available volume capacity, and available units capacity of a locator is maintained in real time. This is essential for an efficient put away process. During any material transaction, the available weight capacity, available volume capacity, and available units capacity of the transacted locator are updated based on the total weight and total weight of the transacted item and maximum weight, maximum volume and maximum units allowed of the locator. It is therefore imperative that all locators used in WMS have weight unit of measure, maximum weight, volume unit of measure, maximum volume, and maximum units defined.

For existing Oracle Applications users, who are upgrading to Oracle WMS, it is recommended that a set of check scripts, that are provided with the product, be run and any corrective action be taken before using Oracle WMS. These scripts identify pre-WMS data that may have to be enhanced to better utilize the capabilities of Oracle WMS. One of the check scripts is the Locator check script. It lists locators with either one of the following not defined:

- Weight unit of measure
- Maximum weight
- Volume unit of measure
- Maximum volume

- Maximum units
- X coordinate
- Y coordinate
- Z coordinate
- Dimension unit of measure
- Length
- Width
- Height

The existing Locators Maintenance form can be used for adding the missing attributes to the definition of the listed locators. However, data entry would be time consuming and cumbersome if the locators list is large. A faster approach would be to write a script in an appropriate language that would repeatedly call APIs that perform Locator Maintenance passing the required data.

Currently, in Oracle Inventory, items can be restricted to certain locators, but with Oracle WMS the same functionality is used to assign items to locators to create a "soft" assignment that can be used by the WMS Rules Engine. In Oracle Inventory, locators cannot be deleted. There may be a need to delete locators that are obsolete. This may reduce the volume of data and also improve performance. But then it's essential that before deleting, you confirm that the locator to be deleted doesn't exist in any core Oracle Inventory table.

Locator Maintenance APIs handle the above said requirements. They constitute the following:

- Create Locator API to create a new locator (CREATE_LOCATOR)
- Update Locator API to update an existing locator (UPDATE_LOCATOR)
- Locator Item Tie API to assign an item to a locator (CREATE_LOC_ITEM_TIE)
- Delete Locator API to delete an existing locator (DELETE_LOCATOR)

The APIs are part of PL/SQL package INV_LOC_WMS_PUB. This is defined in $INV_TOP/patch/115/sql/INVLOCPS.pls.

Migrating to Lot & Serial Attributes

Advanced Lot and Serial Control provides two new areas of functionality for tracking lots and serials. Lot and Serial attributes enable you to store a range of information for material based upon the lot and or serial number. Sublot functionality enables you to

split and merge lots to differentiate between quantities of material that are no longer similar enough to be considered a single lot. Lot Genealogy stores the parent/child relationship between lots and sublots and provides lot traceability resulting from inventory transactions, including all lot splits and merges. The analogous functionality for Serial Genealogy has been available with Discrete Manufacturing.

Upgrading to the Advanced Lot & Serial attributes, when there is existing on hand inventory, is done from the Maintain Lot Numbers / Maintain Serial Numbers form. There are no API or concurrent requests to update all the existing on hand lots so that they receive the default and or mandatory attributes. Perform the following steps to update the existing on hand lot:

- Assign lot context to item or item category
- Query up the lot number in the Maintain Lot Numbers form
- Enter the mandatory values for the different segments in the context

These steps must be performed for all the existing on hand lots. Same procedure is followed for assigning serial attributes to the existing on-hand serial numbers. There is a different form, Maintain Serial Number that is used for updating the serial number attributes.

A future proposal states that there should be a fully developed functionality for mass update of lot and serial attributes.

Migrating to Rules Engine

Oracle WMS provides tools that enable a warehouse to effectively dispatch tasks and manage inventory. Currently, many decisions within a warehouse are left to the operator, demanding a high degree of operator training, but still yielding suboptimal results and occasionally, serious mistakes. Material handling rules, customer requirements, and storage constraints place complex demands on the warehouse. The Rules Engine provides a flexible repository for the many different types of rules and restrictions to effectively manage a warehouse. This section illustrates how the Rules Engine can automate this decision making process, removing it from operators and thereby reducing mistakes and increasing efficiency. The Rules Engine enables directed picking and put away, assigns transactions to a cost group, ensures customer compliant labeling, and assigns tasks to a resource with the appropriate training and equipment. Rules can be based on nearly any attribute in the database, including user defined flexfields. Strategies, or a collection of rules, can be organization specific, customer specific, item specific, or specific to one of many additional business objects.

While migrating to Oracle WMS, the simplest possible setup is as follows:

- One picking rule with no restrictions or sort criteria
- One put away rule with no restrictions or sort criteria

However, a warehouse would likely not want to utilize only this setup because of specific business requirements that would restrict what should be picked or where material should be put away.

Reasonable picking rules would utilize First In First Out (FIFO) and First Ended First Out (FEFO) picking standards, which have been seeded within Oracle WMS. These are basic standards for picking material, however put away is also a consideration for a warehouse. The following put away decisions may need to be made:

- Should material be put away to any empty locator?
- Should lots and items be commingled?

If this basic approach is not sufficient to model the warehouse, you need to go through the entire setup process including:

- Strategy search orders
- Defining rules
- Defining strategies
- Defining strategy assignments

For detailed information on defining strategy search orders, defining rules, defining strategies, and strategy assignments, refer to the *Oracle Warehouse Management System User's Guide*.

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Form Function Parameters

This appendix covers the following topics:

- Form Function Parameters Overview

Form Function Parameters Overview

A form is a special class of function that appear in the Navigate windows in Oracle Applications. A function is a part of an application's functionality that is registered under a unique name and used to assign or exclude it from a responsibility.

A form function parameter allows you to change the appearance, behavior, value defaulting and other features of an Oracle Applications window. Oracle Mobile Supply Chain Applications relies on form function parameters to simplify the user interface and navigation.

Form function parameters are name-values lists and they are widely used in Oracle Warehouse Management transactions to control the form appearance, layout and functionality. Form function parameters are configured by navigating to Application->Function option in the system administrator responsibility. Standard WMS install comes with seeded menu options with pre-configured form function parameters. You can specify different values for the form function parameters to create your own mobile menu options. This can be done by creating a user-defined function and assigning it a unique function name.

- Lot and Serial Numbers
- Miscellaneous Transactions
- Putaway Page
- WMS Control Board
- Mobile Advanced Catch Weight

- Mobile Cycle and Physical Counting
- Mobile Inbound Page
- Mobile Manufacturing
- Mobile Picking
- Mobile Shipping
- Mobile Update Interface
- View Device Request

Lot and Serial Form Function Parameters

The Maintain Lots and Maintain Serial Numbers windows enable authorized personnel to update lot and serial attributes. The View Lot Numbers and View Serial Numbers windows will give non-authorized personnel view-only access to lot and serial attributes. Limiting access is achieved by calling the Lots and Serials forms in query only mode as shown below:

Lot and Serial Form Function Parameters

Mode	Form	Parameter
View Lot Numbers	Update Item Lot Information	QUERY_ONLY='YES'
Maintain Lot Numbers	Update Item Lot Information	-

Miscellaneous Transactions Form Function Parameters

The following form function parameters are used to setup the various transactions:

Miscellaneous Transactions Form Function Parameters

Form	Parameter	Valid Parameters	Description
Mobile Inventory Issue	TRANSACTION	ALIAS_ISSUE, MISC_ISSUE	Determines if the operator must enter an account alias or an account number for an issue transaction. If no parameter provided, defaults to ALIAS_ISSUE
Mobile Inventory Receipts	TRANSACTION	--	Determines if the operator must enter an account alias or an account number for a receipt transaction. If no parameter provided, defaults to ALIAS_RCPT
Mobile WMS Pack / Unpack	TYPE	PACK, UNPACK, SPLIT, CONSOLIDATE, UPDATE	Determines if the transaction is a pack, unpack, split, consolidate, or LPN update transaction. A value for this parameter must be provided
Mobile Inventory Issue Mobile Inventory Receipts Mobile Sub Transfer Mobile Org Transfer	TXN_TYPE_ID	Any valid transaction type id from MTL_ TRANSACTION_ TYPES TXN_TYPE_ID that have the same transaction action and transaction source type as the applicable system defined transaction type	Defaults the transaction type and hides the transaction type field from the operator if a parameter is provided

Form	Parameter	Valid Parameters	Description
Mobile Inventory Issue Mobile Inventory Receipts	ACCOUNT	Any valid account alias as defined in CONCATENATED_SEGMENTS.MTL_GENERIC_DISPOSITIONS_KFV defined within the current organization	Defaults the transaction account and hides the account field from the operator if a parameter is provided. Note that this can only be used for Alias Issues and Alias Receipts.
Mobile Inventory Receipts	SERIAL_TYPE	INDIVIDUAL RANGE	If this parameter is set it to RANGE then the form accepts a range of serial numbers. The form will show two serial number fields - From SN and To SN on the mobile page. The serial numbers within that range are assumed to be continuous and not missing. If the form function parameter was set to " INDIVIDUAL" then in that case only one serial number field is displayed and the user needs to enter all the serial numbers one at a time. If no parameter provided, defaults to INDIVIDUAL

Form	Parameter	Valid Parameters	Description
Mobile Sub Transfer Mobile Org Transfer	QTYRG	Y,N	Indicates if the lot and serial quantity is cross-checked for lot / serial transactions (Y), or if the transaction quantity is calculated from the lot / serial quantity (N). If no parameter provided, defaults to Y.

Packing Workbench Form Function Parameters

The form function parameter `ENABLE_LOT_DFF` for the functionFo rth efunction `WMS_PACK_WORKBENCH` controls the display of the Lot Attributes button on t, he LPN Pack (Packing Workbench) window. The Lot Attributes button is needed when a lot is received on the desktop forms and is packed into LPN using the Packing Workbench before its putaway on the mobile application.

Packing Workbench Form Function Parameters

Form	Parameter	Valid Parameters	Description
Packing Workbench	ENABLE_LOT_DFF	Y, N	• ENABLE_LOT_DFF=Y Displays the Lot Attributes button instead of the Expiration Date field on the packing workbench windows (such as LPN Pack and so on). When the lot number is scanned (entered), the Lot Attributes button is enabled, and when clicked, displays the Lot Entry window. **Note:** This is applicable for lot-controlled items only. • ENABLE_LOT_DFF=N Displays the Expiration Date field for the lot instead of the Lot Attributes button. This is the default setting.

Putaway Page Form Function Parameters

The put away process has several modes in which a put away can be performed. These modes are configured by form function parameters set on the put away page, and are as follows:

- User-directed rules validated put away
- User-directed put away without rules validation
- System-directed put away with consolidation
- System-directed put away without consolidation

Putaway Form Function Parameters

Parameter Name	Allowed Values	Comments
SUGGESTION	RULES, USER, BOTH, LINES	This form function parameter controls the visibility of buttons on the drop page and also controls if automatic consolidation on drop is enabled. If the rules engine suggests a single location for all contents within an LPN, automatic consolidation implies that the user is not asked to individually confirm each item, locator and quantity being dropped. Instead the user just needs to confirm the sub and locator for the entire drop once. The behavior for different values of this parameter is as follows: RULES: displays <load>and<Drop>buttons. The <User Drop>button is not displayed. This automatically consolidates on location suggested for the entire LPN. USER: Displays only <User Drop>button. used for user-directed putaway. This automatically consolidates on location suggested for the entire LPN. BOTH: Displays the <Load>, <Drop>, and <User Drop>buttons. This allows you to perform system directed or use directed putway. This automatically consolidates on location suggested for the entire LPN. LINES: Displays the <Load>and <Drop> buttons. Thi is used for system-directed putaway. This options forces you to confirm each line individually even if all items in the LPN have the same destination locator. Default Value = BOTH

Parameter Name	Allowed Values	Comments
VALIDATE	YES, NO	This parameter is applicable only if`User Drop` button is activated and therefore it is applicable only if SUGGESTION is set to either BOTH or USER If this parameter is set to "Yes", the sub-inventory and locator is validated to see if violate a constraint defined in putaway rules. No rules engine validation is performed if this parameter is set to "No".
LOAD_INTO_LPN	YES, NO	Controls display of the Into LPN field in the Manual Load Page.
LOAD_FULL_LPN	YES, NO	Controls the display of the `<Load Entire LPN>`button in the Manual Load page.
LOAD_CONTENTS	YES, NO	Controls display of the `<Select Contents>` button in the Manual Load page.
LOAD_TRANSFER_CONTENTS	YES, NO	Controls display of the `<Transfer All Contents>`button in the Manual Load Page
SERIALLY_COUNTED	YES, NO	If set to 'YES', each entry of serial number increments the qty in item based putaway. If 'NO" user enters the qty and then serial
PAGE_TYPE	MANUAL_DROP, MANUAL_LOAD, DROP_ALL, SYSTEM_DROP, PUTAWAY_LOAD	Controls if the page being configured will be of type manual load, manual drop, drop all or system directed drop.
DROP_INTO_LPN	YES, NO	Controls the display of the Into LPN field in the Drop Pages.
DROP_FULL_LPN	YES, NO	Controls the display of the `<Drop Entire LPN>` button in the Drop Pages

Parameter Name	Allowed Values	Comments
DROP_TRANSFER_CONTENTS	YES, NO	Controls display of the <Transfer All Contents> button in the Drop Pages.

Example

The following form setup creates a user defined Mobile Receipt menu option that allows receipt only for Purchase Orders. The mobile receipt form has the Country of Origin field enabled for entry.

Function	Function Description	HTML Call	Parameters
TEST	PO Receipt with COO Field enabled	oracle.apps.inv.rcv.server.RcptGenFunction	TRANSACTION=PO SERIAL_TYPE=RANGE ATTACHMENT_DISPLAY_MODE=NEVER ITEM_CONTROLLED=NO DOCTYPE=PO SHOW_COO=YES

WMS Control Board Form Function Parameters

The following table lists the parameters on the WMS Control Board / Find Tasks window (function = WMS_WMSCTLBD):

Parameter Name	Allowed Values	Comments
SHOW_PICK_NONE_TASKS	Y,N	Enter one of the following options: • SHOW_PICK_NONE_TASKS=Y Displays the Pick None option on the WMS Control Board / Find Tasks window. • SHOW_PICK_NONE_TASKS=N Does not display the Pick None option on the WMS Control Board / Find Tasks window. **Important:** The Pick None status is available for only Outbound, Manufacturing and Warehousing sources.

Mobile Advanced Catch Weight (Mobile Application Function Parameters)

The following table lists the parameters for the following Catch Weight mobile pages:

- Mobile WMS Catch Wt Entry page (function = WMS_CATCH_WT_ENTRY)
- Mobile WMS Catch Wt Update page (function = WMS_CATCH_WT_UPDATE)

Parameters for the Catch Weight page

Parameter Name	Allowed Values
CTWT_LPN_TARE	• Y: Display the LPN tare weight fields. • N: Hide LPN tare weight fields. This is the default value.
CTWT_PKG_TARE	• Y: Display the package tare weight field. • N: Hide package tare weight field. This is the default value.

Parameter Name	Allowed Values

CTWT_CCNT_SEC_RESD	• Y: When the Order Fulfillment base is Secondary and a catch weight entry/update is performed for an LPN before pick drop, and
	  • The pick task has consumed all of the primary quantity in a locator.
	  • A secondary quantity remains in that source locator.
	then the remaining secondary quantity will be automatically issued as a residual transaction after the pick drop.
	Setting this parameter to Y will create a cycle count entry for the source locator of that task (using the default Cycle Count header specified on Organization Parameters).
	Note: This parameter is applicable only when the Order Fulfillment base is Secondary, and for LPNs loaded through pick load but not dropped yet when catch weight is being entered.
	• N: This is the default value.

Parameter Name	Allowed Values
CTWT_MAX_PRI_RESID	Value = Any positive number. In some situations, a primary quantity may remain in the source locator if the: • Order Fulfillment base is Secondary and a catch weight entry/update is performed for an LPN before pick drop. • On-hand secondary quantity is being fully consumed. Setting this parameter ensures that quantities below the specified threshold are issued automatically from the source locator when the pick drop is done. For example, suppose a picker picked 10 pounds (primary) and 1 each (secondary). The weight of the material for catch weight entry/update is 9.9 pounds. If the pick drop is now performed with the updated weight, the staged material is 9.9 pounds, 1 each. However, the source locator will still have an on-hand record for 0.1 pounds, 0 each. However, you can prevent remaining fractional on-hand primary quantities by setting this parameter as described in the following example. For example, if you set the parameter to `CTWT_MAX_PRI_RESID=0.1` then the remaining quantity of 0.1 pounds, 0 each (or any quantity less than 0.1) will be automatically flushed out of the system. The value specified for the `CTWT_MAX_PRI_RESID` parameter represents the maximum primary quantity that the system automatically generates from the source locator for a task. Primary quantities greater than the specified number will remain untouched. This parameter applies only when: • Order Fulfillment base is Secondary (and therefore applies only to primary quantities). • Automatic issue of material occurs only if the remaining on-hand secondary quantity becomes zero. **Note:** The LPN must be loaded (by pick load) but not dropped at the time of catch weight entry.

The following form function parameters for the form function WMS_LOAD_TRUCK control catch weight behavior on the mobile Direct Ship (Load Truck) page:

Parameter Name	Allowed Values
FULFILLMENT_BASE	• P: The order fulfillment base is Primary. This is the default value. • S: The order fulfillment base is Secondary.
CATCH_WEIGHT	• Y: Enable catch weight entry. • N: Disable catch weight entry. This is the default value.

Mobile Counting (Mobile Application Function Parameters)

The following table contains the cycle and physical counting form function parameters for the form function Mobile Cycle Count (INV_MOB_CYCL_COUNT).

Mobile Counting Function Parameters

Parameter Name	Allowed Values	Comments
COUNT_OPTION	DETAIL, SUMMARY, BOTH	If your count contains an LPN, you can alternatively do a summary count or a detail count. Note that these options might not both be available depending on the user that is set as a form function parameter. • DETAIL: A detail count means that the user will open up the LPN and count items stored within it. • SUMMARY: A summary count means that the user is sure that everything inside the LPN agrees with what the system thinks is inside it.
SERIAL_TYPE	INDIVIDUAL, RANGE	• INDIVIDUAL: This specifies the user must enter each serial number individually. • RANGE: The user should enter by specifying the FROM and the TO serial number in the range.

Parameter Name	Allowed Values	Comments
ENFORCE_TOTAL_QTYCOUNT_FOR_LOTITEM	YES, NO	• NO: Enables the counter to enter and process the individual lot quantities without entering the total item quantity first for lot controlled items. Displays the Next Lot button on the Cycle Counting page to enable the counter to enter the current lot and lot quantity, and proceed to the next lot. The system calculates the sum of the quantity entered for individual lots as the *count quantity*. • YES: The counter must enter the total item quantity for a lot-controlled item during the count and then enter the quantity for individual lots on the Cycle Counting page. Displays the Quantity and Remaining Quantity fields for mobile cycle counting.

Mobile Express Receipts (Mobile Application Function Parameters)

You can use the following parameters to specify a mobile express receipt function.

Mobile Express Receipt Function Parameters

Parameter Name	Allowed Values	Comments
SERIAL_TYPE	RANGE, INDIVIDUAL	If this parameter is set it to RANGE then the form accepts a range of serial numbers. The form will show two serial number fields - From SN and To SN on the mobile page. The serial numbers within that range are assumed to be continuous and not missing. If the form function parameter was set to " INDIVIDUAL" then in that case only one serial number field is displayed and the user needs to enter all the serial numbers one at a time.

Parameter Name	Allowed Values	Comments
TRANSACTION	REQEXP, ASNEXP, SHIPMENTEXP, SHIPMENTCONFM	Controls the documents that can be used to perform an express receipt.

Mobile Inbound Page (Mobile Application Function Parameters)

The easiest way to change the behavior of receiving forms is using the function parameters. The user-defined function must also be associated with an HTML call that relates it to the underlying inbound function. A list of the HTML call and the standard inbound function is specified in the following table.

Mobile Inbound Function Parameters

Inbound Function	HMTL Calls
Mobile Receipt	oracle.apps.inv.rcv.server.RcptGenFunction
Express Receipt	oracle.apps.inv.rcv.server.RcptASNFunction
Load and Drop	oracle.apps.wms.td.server.PutawayFunction

A list of mobile function parameters and their values can be entered under the parameters column. Only certain form function parameters are valid for specific inbound function. A list of form function parameters and allowed values for each parameter is shown for each inbound function. The following table lists the function parameters and the impact of their values on the behavior of receiving forms:

Parameter Name	Allowed Values	Comments
SERIAL_TYPE	RANGE, INDIVIDUAL	If this parameter is set it to RANGE then the form accepts a range of serial numbers. The form will show two serial number fields - From SN and To SN on the mobile page. The serial numbers within that range are assumed to be continuous and not missing. If the form function parameter was set to " INDIVIDUAL" then in that case only one serial number field is displayed and the user needs to enter all the serial numbers one at a time.
ATTACHMENT_DISPLAY_MODE	NEVER, ALWAYS, REQUEST	Controls if document attachment should be displayed on receipt. If this parameter is set to Request, then the receipt page shows a button for <ATTACHMENTS>.
SHOW_COO	YES, NO	This form function parameter controls the display of Country of Origin field.
DOCTYPE	ALL, PO, INTSHIP, ASN, RMA, REQ	This form function parameter controls the document type used for receipt e.g. if the parameter value is set to "PO", only Purchase Orders can be used to receive items from the form.
ITEM_CONTROLLED	YES, NO	If this form function parameter is set to "yes" , the receipt page is configured for item-initiated receipt. In such a case, user enters the item and then selects the document number to receive the item. If the value is set to "no", document initiated receipt is assumed.
TRANSACTION	ALL, PO, INTSHIP, ASN, RMA	Control allowed transaction types in for Inspection in MSCA inspection menu. No relevance for WMS. Default to ALL.

Mobile Manufacturing Form Function Parameters

For WIP completion there are two modes in which the transaction can be done. The transaction type parameter set for the completion transactions decide the mode in which the transaction will operate.

Form	Parameter	Valid Parameters	Description
Completion transactions (WIP_WIPTXCMP)	TXNTYPE	STOP, DROP	The value DROP integrates the completion and put away transactions, while the value STOP makes the two operations distinct. The user-interface for the two modes is identical; the form function parameter only controls which buttons <Load> and <Drop> or <Save> are displayed. If STOP is used, you can still use the directed put away features by entering the put away form and scanning the newly completed LPN to be put away.

Mobile Material Status Update (Mobile Application Function Parameters)

Material status can be updated on the mobile by users with the proper access. There are three levels of access to view and update material status: inquiry only, limited access, and full access.

Update Mobile Interface Parameters

Parameter Name	Allowed Values	Comments
LEVEL	QUERY_ONLY, LIMITED_ACCESS, FULL_ACCESS	QUERY_ONLY: Users with inquiry only access will not be able to update any material status, but they can inquire on the status of any object. Users with inquiry only access will still be able to set the status of lots or serials at receipt, but do not have the ability to update that status after the receipt transaction has been completed. LIMITED_ACCESS: Users with the need to update the status of lots and serials only will have limited access. They cannot update the material status of locators or subinventories. FULL_ACCESS: Users with the need to update any material status will have full access. They have the ability to change lot, serial, locator, and subinventory material status.

Mobile Picking (Mobile Application Function Parameters)

For mobile pick load pages, a configuration framework has been provided that can pre-define and control the behavior of various fields. This configuration framework can be defined through the set up forms and referenced through the form function parameters to display the appropriate mobile page.

Parameters common to the following pages: Pick Load page, Pick Drop page, Unload page:

Parameter	Valid Parameters	Description
CACHE	YES, NO	Specifies whether the configuration should be cached, or should be retrieved from the database each time the Pick Load page is rendered. This parameter should be set to YES for better performance. If this parameter is not specified, caching is enabled.
PAGE_TYPE	DIRECTED_TASK, SYSTEM_DROP, MANUAL_UNLOAD **Note:** The following parameters are applicable only if the PAGE_TYPE is DIRECTED_TASK	Decides which page will the user be taken to. DIRECTED_TASK: Pick Load page SYSTEM_DROP: Pick Drop page MANUAL_UNLOAD: Unload page

Parameter	Valid Parameters	Description
SKIP_MOISSUE_ACCT_PAGE	YES, NO	This parameter controls whether the user, while picking a move order issue, must confirm charge account information for the issued material in the Charge Account Confirmation page. Confirming the account information is typically the last step while picking in a move order issue task. • If set to Yes, the Charge Account Confirmation page is bypassed, and the user does not have to confirm charge account information. This is useful when processing a high volume of transactions because the picker does not need to spend extra time confirming the account information. This is the default value. • If set to No, then the Charge Account Confirmation page is not bypassed, and the user must confirm charge account information for the issued material in the Charge Account Confirmation page.
TASK_FILTER	NONE, ALLOW_SO_IO, ALLOW_WO, ALLOW_REPL, ALLOW_MO_XFER, ALLOW_MO_ISSUE, ALLOW_COUNT	This form function parameter setup determines the type of tasks, which will be rendered from the user-defined menu. NONE: All types ALLOWSO_IO: Sales Order and Internal Order ALLOW_WO: WIP tasks ALLOW_REPL: Replenishment ALLOW_MO_XFER: MO transfer ALLOW_MO_ISSUE: MO issue ALLOW_COUNT: Cycle Count

Parameter	Valid Parameters	Description
TASK_METHOD	DISCRETE, ORDER, CLUSTER, WAVE, PICKBYLABEL, BULK	Specifies the manner in which the tasks are dispatched DISCRETE – Uses the pick slip grouping rule stamped at time of pick release to group the tasks together. Identical to patchset I grouping. ORDER – Uses the source order or request and all tasks of the same sales order or WIP job are dispatched to the user. CLUSTER – Uses a predefined number and dispatches all tasks for that many deliveries to the end user WAVE – One tasks is dispatched at a time to the user. PICKBYLABEL – Dispatches all tasks associated with an LPN based on container setup or cartonization rules BULK – dispatches all bulk tasks to the user
TXN.ALLOW_UNRELEASED_TASK	YES, NO	Applies to Manual Picking only.
TXN.ATTACHEMENT_DISPLAY_MODE	ALWAYS, NEVER, REQUEST	Displays item attachments.
TXN.PRIORITIZE_DISPATCHED_TASKS	YES, NO	Dispatches tasks that exist in the queue as a results of the retains_dispatch_task parameter.
TXN.RETAIN_DISPATCH_TASK	YES, NO	Retains dispatch task in the queue after you press F2.

Parameter	Valid Parameters	Description
UI	GENERAL, EXP_PICK, EXP_LOAD	As part of seeded data the following page types are available. GENERAL: The task page rendered will be similar to the patch set I page EXP_PICK: Minimal confirmations and Drop EXP_LOAD: Minimal confirmations and Load

Mobile Shipping (Mobile Application Function Parameters)

There are four distinct types of shipping: Quick Ship, LPN Ship, and Dock Ship. LPN Ship and Dock Ship have a shipment mode and a verification-only mode, as described earlier. These combine to give six different flavors of shipment confirmation on the mobile. The Quick Ship and Direct Ship modes have their own page, but the other modes are setup using different function parameters of the same page. The pages and the parameters are included below:

Mobile Shipping Interface Form Function Parameters

Mode	Form	Parameter
Quick Ship	Mobile Quick Ship	None, SHIP_SERIAL_TYPE=RANGE OR INDIVIDUAL
LPN Ship	Mobile LPN Ship Confirm	DOCK=N VERIFY_ONLY=N
LPN Ship Verification	Mobile LPN Ship Confirm	DOCK=N VERIFY_ONLY=Y
Dock Ship	Mobile LPN Ship Confirm	DOCK=Y VERIFY_ONLY=N
Dock Ship Verification	Mobile LPN Ship Confirm	DOCK=Y VERIFY_ONLY=Y
Direct Ship	Mobile Direct Ship	None
INV Ship Confirm	Ship Confirm	TXN.SHIP_SERIAL_TYPE= RANGE OR INDIVIDUAL
LPN Ship	LPN Ship	TXN.VERIFY_ONLY = Y OR N

LPN Ship	LPN Ship	TXN.CLOSE_TRIP = Y OR N
LPN Ship	LPN Ship	TXN.ALLOW_SHIP_SET_BREAK = Y OR N
LPN Ship	LPN Ship	TXN.UNASSIGN_ALLOWED = Y OR N
LPN Ship	LPN Ship	TXN.CHECKNT = Y OR N
Direct Ship	Unload Truck	TXN.RELIEVE_RSV = Y OR N

Note: The default form function parameters are VERIFY_ONLY=N and DOCK=N, giving the LPN Ship page. All the shipment modes support entering serial numbers for serial at sales order items except Quick Ship. Serial numbers for these items can be entered either individually, or by specifying a range. This functionality is controlled by a form function parameter called SHIP_SERIAL_TYPE, that can take on one of two values: RANGE, and INDIVIDUAL.

View Device Request Form Function Parameters

The Device Requests window also shows the status of errored device requests. You can modify the transaction lines to allow the errored device responses to transact.

View Device Request Form Function Parameters

Form	Parameter	Valid Parameters	Description

Device Requests History	OPERATION_MODE	NORMAL, DEBUG	If the parameter is set to OPERATION_MODE =DEBUG then the window is fully editable and each modification to the window modifies WMS_DEVICES_REQUESTS. However, if the profile is set to OPERATION_MODE =NORMAL then this window is for error handling of device responses. If this is the case, you can edit a limited number of fields on the View Device Requests window.

Index

Symbols

3PL billing, settign up, 15-13

A

Advanced shipping notice
  receipts, 6-17
Advanced task framework
  concept, 5-1
  consolidation and deconsolidation, 5-2
  destination and routing, 5-1
  execution, 5-12
  setup, 5-11
AK dictionary, 22-6
Allocation
  License plate numbers, 12-25
  move order, 9-6
  picking for manufacturing, 9-7
  replenishment, 9-6
  sales order, 9-6
  task, 9-6
API
  custom_restrict_labels, 8-5
  specification, 8-12
Architecture, 26-3
ASN transactions, 23-1
Assemble to order
  reservations, 18-4
Assign
  devices, 24-5
Attribute
  functionality, 2-6
Attributes
  desktop functionality, 2-7
  mobile functionality, 2-7
  Populate, 2-6
  Setup, 2-10

B

Bar codes, 22-1
  out of order scanning, 22-2
  scanning, 22-10
  standards, 22-1
Block mode, 26-9
Bulk pack, 12-2
  verification, 12-32
Bulk picking, 9-8
Business
  assign label types, 8-10
Business objects, 4-6

C

Cartonization, 9-8, 12-1, 12-12, 18-5
  multi level, 12-4
  pick release, 12-2
  process, 12-3
  setting up, 12-8
    categories, 12-8
    organizations, 12-12
    subinventories, 12-12
  single level, 12-3
  uses, 12-2
Catch weight
  pricing, 17-3
catch weight items, 17-12

Categories
assignments, 12-31
setting, 12-8
Character mode, 26-9
client details, defining, 15-8
Client Parameters window, 15-8
Cluster picking, 9-25
Completion windows
setting up, 18-6
Container
items, 12-10
load relationships, 12-6, 12-11
prepack, 12-2
Container Item Attributes, 12-18
Corrections, 6-9, 6-10
Cost groups, 4-1
assign, 18-4
custom rules, 3-39
process, 4-2
project, 19-19
receiving
different grade, 4-4
multiple suppliers, 4-3
Crossdocking, 3-4, 6-11, 7-1, 14-7, 14-12, 18-4
advanced task framework, 7-3
consolidation, 7-3
criteria, 7-2
frequently asked questions, 7-6
setup, 7-4
Cross project
issues, 19-3
Cross unit
issues, 19-3
Cycle count, 19-14
license plate numbers, 10-13
discrepancies, 10-15
overview, 10-1
serial numbers, 10-16
setting up, 10-9
task, 9-5
cycle counting, opportunistic, 10-11

D

Data failures, 26-4
Data field identifiers, 22-1
field recognition, 22-2
out of order scanning, 22-2
seeded, 22-7
setting up, 22-4, 22-11
transactions, 11-4
Define
custom rules, 3-31
default task types, 9-20
departments, 9-20
devices, 24-4
employees, 9-18
equipment instances, 9-19
equipment items, 9-18
expressions, 3-28
label formats, 8-8
multiple records, 8-8
locators, 19-5
resources, 9-19
task type rules, 9-20
task types, 9-20
Defining
labor standards, 20-7
defining catch weight items , 17-12
defining client parameters, 15-8
Departments
define, 9-20
Device
API, 24-10
debug, 24-18
response messages, 24-8
sign on, 24-7
Devices
assign, 24-5
define, 24-4
Discrepancies, 10-15
Dispatch
task, 9-10
distributed warehouse management system, 16-1
Dock door, 17-2
appointment, 17-7
ship, 17-4, 17-5
staging lane, 13-2
Dock management
scheduling, 13-2
setting up, 13-1
trip planning, 13-2
Drop
task, 9-10

E

EAN/UCC, 27-3, 27-4, 27-6
EDI
  inbound ASN transactions, 23-1
Employee Resources, 9-14
Employees
  associate to users, 9-18
  define, 9-18
Equipment
  instances
    define, 9-19
  items
    define, 9-18
Equipment Resources, 9-14
Error handling, 24-17

F

Form function parameter
  view device history, G-23
Form function parameters, G-1
  counting, G-13
  lot, G-2
  manufacturing , G-16
  miscellaneous transactions, G-5
  mobile inbound, G-15
    express receipts, G-14
  Mobile Material Status Update, G-17
  mobile picking, G-18
  Packing Workbench, G-5
  putaway, G-6
  serial, G-2
  shipping, G-22

G

global lot attributes, 2-11
Global trade item numbers, 27-1
  configuration, 27-6
  transactions, 27-6
Global uniqueness, 27-2

I

Inbound logistics, 19-6
Inspection, 6-5
  quality, 6-19
  receiving modes, 6-6
  serial numbers, 6-6
Internal cross references, 27-2
Internal SKU number, 27-2
Item Attributes, 1-25
items
  catch weight, 17-12
Items
  contained, 12-9
  container, 12-10

K

Kanban, 19-18

L

Label printing, 6-17, 8-1, 9-12, 18-4
  assign printers, 8-8
  assign to business flows, 8-10
  configuring API for Label Printing, 8-5
  content, 12-8
  custom rule, 3-40
  format assignment, 3-3
  formats
    define, 8-8, 8-8
  label format rules, 8-11
  rules, 3-7
  summary, 12-8
  types, A-1
  WIP, 14-8
Labor management
  implementation considerations, 20-10
  labor standards, 20-7
  non-tracked users, 20-7
  overview, 20-1
  prerequisites , 20-2
  setup, 20-3, 20-5
  troubleshooting, 20-11
Labor standards
  defining, 20-7
License plate numbers, 10-15, 12-7, 23-2
  allocation, 12-25
  co-mingling, 19-18
  context, 9-33, D-1
  cycle count, 10-13
  drop to, 9-33
  generate, 18-6

matching, 9-29
physical inventory, 10-18
pick to, 9-32
prepacked, 18-6
ship, 17-3, 17-5
storage, 6-6
transactions, 11-4
Load
task, 9-10
Location Parameters
Consolidation and Packing Stations, 1-15
Locator determination parameters, 5-7
Locator Parameters, 1-14
Staging Lanes and Dock Doors, 1-17
Locators, 19-4
capacity, 6-19
classification, 13-1
common, 19-2
defining, 19-5
logical, 19-5
physical, 19-5
project, 19-2
receiving, 19-7
receiving, 5-4
restrict, 3-24
storage, 5-4
lot attributes, global, 2-11
Lot control
attributes, 2-19, 3-26
genealogy, 2-20, 2-21
item level, 2-20
lot level, 2-21
merge, 2-18
full, 2-19
partial, 2-19
merge material
loose, 2-19
packed, 2-19
overview, 2-1
setting up, 2-20
split, 2-18
autosplit, 2-19, 2-21
full, 2-18
loose, 2-18
manual, 2-19, 2-21
packed, 2-18
partial, 2-18
transactions, 11-4
translate, 2-19
Lot Control, 2-11
LPN Content and LPN Summary Label Types, differences between, 8-19
LSP billing, setting up, 15-13

M

Maintenance, 3-45
strategies, 3-45
managing logistics service providers, overview, 15-7
Manufacturing picking, 14-1
Mobile personalization
setup, 21-2
Move order
issue
allocation, 9-6
task, 9-5
transfer
allocation, 9-6
task, 9-5
MWA application server, 26-7

N

Non-tracked users, 20-7

O

Operation plan, 5-4, 9-13
custom rule, 3-40
selection rules, 5-11
opportunistic cycle counting, 10-11
Oracle Distributed Warehouse Management System, 16-1
Order Picking, 9-11
Organizations, 12-12
setting up, 19-2
Setup, 1-4
Outbound logistics, 19-7
setting up, 19-7
overview of managing logistics service providers, 15-7

P

Packaging, 12-7

Packing workbench, 12-25
transactions, 12-27
Percent fill basis, 12-6
Performance, 26-1
Physical inventory, 19-15
license plate number
counts, 10-18
Picking
bulk, 9-8, 9-8
cluster, 9-25
custom rule, 3-32
for manufacturing
allocation, 9-7
task, 9-5
manufacturing, 14-2
order, 9-7
paper assisted, 9-8
rules, 9-7
wave, 9-7
zone, 9-7
picking SKU, validating with API, 3-38
Pick methodologies, 9-7, 14-5
Pick Methodologies, 9-11
Pick release, 13-3, 13-4
cartonization, 12-2
task, 9-4
Planned downtime, 26-5
Prepack container, 12-2
Printer availability, 26-5
Printers
assign, 8-8
create, 8-7
Process trace, 23-9
Profile options
WMS Barcode Font Name, 1-29
WMS Barcode Type, 1-29
WMS Express Returns, 1-30
WMS Item/Revision Delimiter, 1-30
WMS Label File Prefix, 1-31
WMS Label output directory, 1-31
WMS Label Print Mode, 1-31
WMS PO Number/Line Delimiter, 1-31
WMS Sequence Picks Across Waves, 1-32
WMS Subinventory/Locator Delimiter, 1-32
Project manufacturing
control level, 19-4
integration, 19-1
locators, 19-5
Putaway, 6-6, 18-2
custom rule, 3-32
directed, 3-2
issues, 6-18
windows, 18-7

Q

Quality
inspection, 6-19

R

Receipts, 6-18
ASN, 6-17
cross docking, 6-19
express, 6-17
inspection, 6-19
inspection modes, 6-6
issues, 6-18
locators, 19-7
lot and serial, 6-20
matching, 6-21
mixed types, 6-16
returns, 6-16
routings, 6-16
shortages, 6-19
tolerances, 6-20
Receiving
different grade, 4-4
multiple suppliers, 4-3
Replenishment
allocation, 9-6
task, 9-5
Reservations
ATO, 18-4
manual, 3-20
Resources
define, 9-19
Returns, 6-9
one-step, 6-10
purchase orders, 19-7
receipts, 6-16
two-step, 6-10
RFID, 25-1
architecture, 25-2
terminology, 25-2

RF network availability, 26-5
Rules
operation plan selection, 5-11
putaway, 5-4
Rules engine, 3-1, 18-8
considerations, 6-20
cost group assignment, 3-3
customization, 3-27
capacity, 3-42
define, 3-31
expressions, 3-27
strategy, 3-40
directed picking, 3-2
directed putaway, 3-2
expressions, 3-24
defining, 3-28
label format, 8-11
label format assignment, 3-3
label format rules, 3-7
maintenance, 3-45
methodology, 3-4
objects, B-2
performance, 3-21
serial attributes, 3-26
seeded rules, B-19
seeded strategies, B-23
selected parameters, B-10
sequencing, 3-23
sort criteria, 3-23
staging lane, 3-19
strategies, 3-15
assign, 3-17
business objects, 4-6
table aliases, 3-28
task type
define, 9-20
task type assignment, 3-2
task type rules, 3-7

S

Scale
weight, 17-18
Serial control
attributes, 3-26
cycle counts, 10-16
inspection, 6-6
overview, 2-1
rules engine
performance, 3-26
transactions, 11-4
Setting up
cartonization, 12-8
completion windows, 18-6
cycle count, 10-9
data field identifiers, 22-4, 22-11
dock management, 13-1
Labor Management, 20-3, 20-5
lot control, 2-20
non-tracked users, 20-7
organizations, 19-2
outbound logistics, 19-7
putaway windows, 18-7
shipping, 17-6
windows, 17-10
Setting Up
Cost Group Setup
Setting Up Cost Groups, 4-4
Material Setup, 1-25
Item Attributes, 1-25
Outbound Setup
Cartonization, 12-12
Pick Methodologies, 9-11
Shipping Parameters, 1-25
Overview of Setting Up WMS, 1-1
Task Management Setup, 9-14
Departments, 9-16
Employee Resources, 9-14
Equipment Resources, 9-15
Task Types, 9-15
Warehouse Setup, 1-2
Locator Parameters, 1-14
Organizations, 1-4
Subinventory Parameters, 1-12
Warehouse parameters, 1-4
setting up LSP billing, 15-13
Shipment
dock door, 17-5
license plate number, 17-5
quick, 17-4
Shipping, 19-11
dock door appointment, 17-7
setting up, 17-6
windows, 17-10

shipment confirmation, 17-3
shipment types, 17-3
Shipping Parameters, 1-25
Simulation, 3-46
SKU, validating with custom hook API, 3-38
Staging lane, 17-2
associate
dock door, 13-2
default, 13-2
dock appointment, 13-3
rule, 3-19
trip, 13-3
Status control
material, 18-3
Strategies
assignment, 3-17
depth, 3-21
pick, 19-8
Subinventories, 12-12, 19-4
transactions, 19-13
Subinventory Parameters, 1-12
System failure, 26-3

T

Task
allocation, 9-6
create, 9-3
cycle count, 9-5
Cycle count, 10-4
define default types, 9-20
define types, 9-20
dispatch, 9-10
drop, 9-10
exceptions, 9-29
load, 9-10
menu, 9-24
merging, 9-8
move order, 9-5
picking for manufacturing, 9-5
pick release, 9-4
planning, 9-13
replenishment, 9-5
split, 9-9
system type, 9-6
task type rules
define, 9-20
type assignment, 9-9
Task management, C-1
custom rule, 3-39
overview, 9-1
rules, 3-7
update, 14-8
Task Management, 9-14
Tasks
dispatched, 14-9
retain dispatched, 14-8
Task Types, 9-15
Transactions, 11-1, 19-13
ASN, 23-1
bulk packing, 11-3
consolidate, 11-3
data identifiers, 11-4
default
account, 11-4
type, 11-4
documented, 11-2
global trade item numbers, 27-6
inter-organzations, 19-13
lot, 11-4
merge, 19-15
split, 19-15
LPN, 11-2, 11-4
controlled subinventory, 11-5
miscellaneous, 19-13
non-documented, 11-2
pack, 11-3
processing, 6-21
processing mode, 11-4, 11-8, 17-17
reasons, 9-21, 9-29
returns, 19-7
serial, 11-4
split, 11-3
subinventories, 19-13
supported transactions, 11-1
unpack, 11-3
update, 11-3

U

UPC, 27-3, 27-4, 27-6

W

Warehouse control board, 9-13, 9-34

warehouse parameters, 1-4
Warehouse Setup, 1-2
Wave Picking, 9-11
Wide area network, 26-8
WIP
  allocation rules, 14-4
  backordered requirement, 14-7
  change management, 14-6
  crossdocking support, 14-7
  dropping tasks, 14-5
  job cancellation, 14-5
  label printing, 14-8
  loading tasks, 14-4
  manual material issue, 14-6
  paper assisted picking, 14-8
  picking, 14-1
  pick release, 14-2
  supply types, 14-3
  task type rules, 14-4
  unloading tasks, 14-7
  updating allocation, 14-8
  updating tasks, 14-8
WIP completion, 18-1
  exception handling, 18-3
WMS Control Board form function parameters, G-9

X

XML
  DTD, 8-11
  formatting, 8-11

Z

Zone Picking, 9-11
Zones, 5-4