ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service

Configuration Guide

Release 25.4

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ORACLE

ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service Configuration Guide

Contents

Preface

Welcome to the ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service Configuration Guide for release 25.4.

The preface includes the following:

Audience

This document is intended for anyone implementing the integration of the following products with ESRI ArcGIS:

- Oracle Utilities Work and Asset Cloud Service

Documentation and Resources

For more information regarding this integration, foundation technology and the edge applications, refer to the following documents:

Product Documentation

Topic	Location
ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service documentation	https://docs.oracle.com/en/industries/energy-water/integrations-index.html
Oracle Utilities Work and Asset Cloud Service documentation	https://docs.oracle.com/en/industries/energy-water/work-asset-cloud-service/index.html

Additional Documentation

Resource	Location
Oracle Support	Visit My Oracle Support at https://support.oracle.com regularly to stay informed about updates and patches.
Oracle Technology Network (OTN) for latest versions of documents	http://www.oracle.com/technetwork/index.html
Oracle University for training opportunities	http://education.oracle.com/

Updates to Documentation

The complete ESRI ArcGIS to Oracle Utilities Work and Asset Cloud Service integration documentation is available https://docs.oracle.com/en/industries/energy-water/index.html on Oracle Help Center.

Visit My Oracle Support for additional and updated information about the product.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website.

Access to Oracle Support

Oracle customers have access to electronic support for the hearing impaired. Visit My Oracle Support or Oracle Accessibility Learning and Support for more information.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Acronyms

The following terms are used in this document:

Term	Expanded Form
ESRI	ESRI ArcGIS
OIC	Oracle Integration Cloud
DVM	Domain Value Map (Lookup)
OUWACS/WACS	Oracle Utilities Work and Asset Cloud Service
OUWAM/WAM	Oracle Utilities Work and Asset Management

Chapter 1

Introduction

This chapter provides an overview about ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service using Oracle Integration Cloud. It focuses on the software requirements, Oracle Integration Cloud, and business standpoint of the integration. It includes the following:

Overview of the Integration

Geographic Information Systems (GIS) play a key role in day-to-day operations of utility companies. GIS represents a foundational layer of technology for effective asset management and regulatory compliance. GIS can be leveraged for various purposes, including asset inventory and infrastructure insights, field operations management, digitizing the data collection process, and more.

The ESRI ArcGIS to Oracle Utilities Work and Asset Cloud Service integration, built in Oracle Integration Cloud, enables asset and location synchronization between ESRI ArcGIS and Oracle Utilities Work and Asset Cloud Service. With support for ESRI ArcGIS version 11 and the Utility Network Model, the solution provides support for the latest ESRI ArcGIS software versions and data models, enhanced data consistency, and improved geospatial and asset management capabilities.

This solution provides:

- **Empowered Decision-Making**: Provides precise geospatial insights for faster, data-driven utility management.
- **Extended Use Cases**: Manages complex asset-location relationships, multi-utility datasets, and improved monitoring via Oracle Integration Cloud.
- **Full Compatibility**: Supports ESRI ArcGIS version 11 and the Utility Network Model for seamless integration.
- **Multiple ESRI Enterprise Portal Support and Scalability**: Supports multiple ESRI ArcGIS environments, enabling broader adoption across different utility landscapes.
- **Optimized Performance and Ease of Use**: Utilizes modern ESRI ArcGIS and Oracle Integration Cloud technology stacks to improve processing speeds, reduce errors, and simplify user interaction.

In this integration release, the following features are included:

- Ability to perform a full/initial synchronization of asset and asset locations from ESRI ArcGIS to Oracle Utilities Work and Asset Cloud Service.
- Incremental synchronization from ESRI ArcGIS to Oracle Utilities Work and Asset Cloud Service for assets that have been added, updated, and deleted.
- Synchronizing extendable lookups from Oracle Utilities Work and Asset Cloud Service to Oracle Integration Cloud for streamlined access to asset-feature mapping.

The integration will be facilitated via Oracle Integration Cloud and will include flows for synchronizations between both ESRI ArcGIS and Oracle Utilities Work and Asset Cloud Service.

About Oracle Utilities Work and Asset Cloud Service (WACS)

Oracle Utilities Work and Asset Cloud Service efficiently manages asset lifecycles, streamlines maintenance operations, maximizes supply chain performance, enhances safety, and improves regulatory compliance.

About ESRI ArcGIS (ArcGIS)

ESRI ArcGIS is a powerful geographic information system (GIS) that enables organizations to visualize, analyze, and manage spatial data. For utility operations, ESRI ArcGIS plays a cruicial role in asset management by providing real-time mapping, data-driven insights, and integration with enterprise systems. Utilities can leverage ESRI ArcGIS to track asset locations, monitor infrastructure conditions, and facilitate efficient decision-making.

About Oracle Integration Cloud (OIC)

Oracle Integration Cloud is a unified platform to integrate the applications, automate processes, and create applications.

The integrations can be quickly developed and activated between applications that can live in the cloud or on-premises. The lookups help to match application specific codes between the two applications.

Integration Insights and Stream Analytics helps to simplify and extract business metrics and create custom dashboards.

Supported Applications

The following applications are required/supported in the integration:

- Oracle Utilities Work and Asset Management

  Note that the on-premises versions (Oracle Utilities Work and Asset Management) may have limited functionality as they trail cloud-based versions (Oracle Utilities Work and Asset Cloud Service) due to the release frequency.
- Oracle Utilities Work and Asset Cloud Service
- Oracle Integration Cloud
- ESRI ArcGIS Enterprise V11.3

For specific application versions, refer to the *ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service Release Notes* included in this release. The documentation is available on the Integrations page on Oracle Help Center.

Chapter 2

Solution Architecture

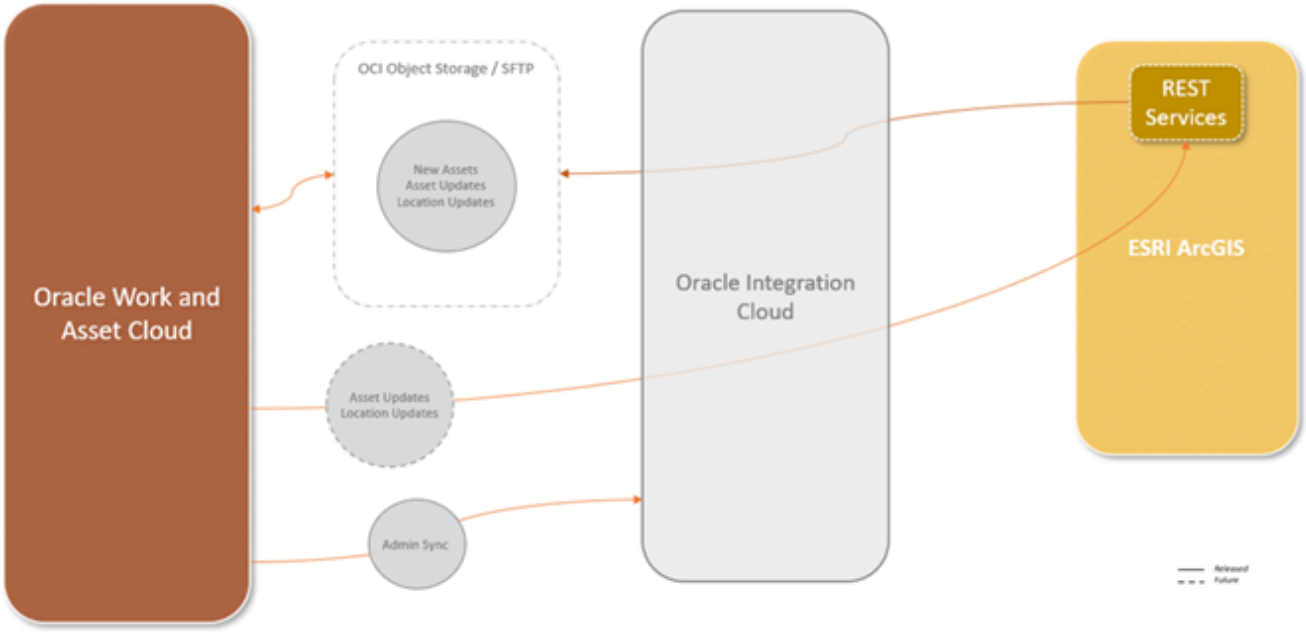
This chapter provides an overview of the application architecture used by the integration, including:

- Solution Diagram
- Business Flows

Solution Diagram

The technical aspects involved in ESRI ArcGIS integration to Oracle Utilities Work and Asset Cloud Service are:

- An integration between ESRI ArcGIS and Oracle Utilities Work and Asset Cloud Service.
- The integration layer is made up of integration processes deployed on Oracle Integration Cloud.
- It uses batch services and REST APIs to facilitate communication between the two applications.



Business Flows

The integration scope supports the following business processes:

- WACS OIC GISMapping Sync (Oracle Integration Cloud Scheduled Job)
- ArcGIS Asset Synchronization
  - ArcGIS WACS Asset Sync (Oracle Integration Cloud Scheduled Job)
  - ArcGIS WACS Initial Assets Sync (Oracle Integration Cloud Initiated)
  - ArcGIS WACS Incremental Assets Sync (Oracle Integration Cloud Initiated)
- Common Integration Flows (Internally Initiated)
  - Common OS Transfer (Oracle Integration Cloud Initiated)
  - Common FTP Transfer (Oracle Integration Cloud Initiated)
  - Common Notification Handler (Oracle Integration Cloud Initiated)

WACS OIC GISMapping Sync (Oracle Integration Cloud Scheduled Job)

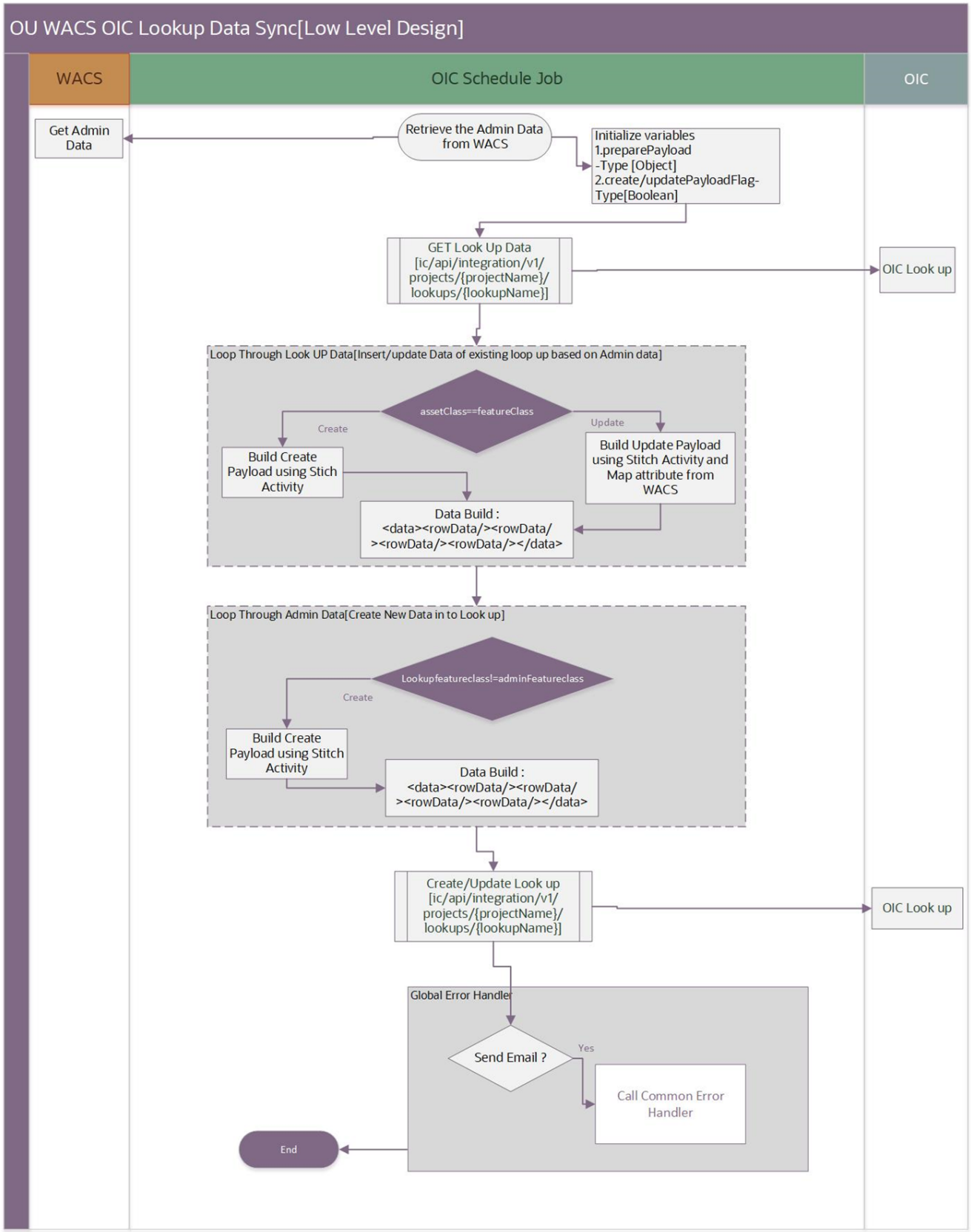
This integration flow is used to synchronize the WACS GIS Asset class and related attributes through the Oracle Utilities Work and Asset Cloud Service admin rest service into a lookup inside this Oracle Integration Cloud project.

The integration flow is run as a first step for asset synchronization. It inserts, updates, and deletes asset class information in the existing **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup.

The end user enters values in the **Query**, **RelativeURI**, and **ServerId** fields. See the Things to Remember chapter for more information about these fields.

The integration is initiated as a scheduled process or via ad-hoc run.

The following diagram shows a graphical representation of the flow:


OU WACS OIC Lookup Data Sync[Low Level Design]
WACS
OIC Schedule Job
OIC
Get Admin Data
Retrieve the Admin Data from WACS
Initialize variables
1.preparePayload
-Type [Object]
2.create/updatePayloadFlag-
Type[Boolean]
GET Look Up Data
[ic/api/integration/v1/
projects/{projectName}/
lookups/{lookupName}]
OIC Look up
Loop Through Look UP Data[Insert/update Data of existing loop up based on Admin data]
assetClass==featureClass
Create
Update
Build Create Payload using Stich Activity
Build Update Payload using Stitch Activity and Map attribute from WACS
Data Build :
<data><rowData/><rowData/
><rowData/><rowData/></data>
Loop Through Admin Data[Create New Data in to Look up]
Lookupfeatureclass!=adminFeatureclass
Create
Build Create Payload using Stitch Activity
Data Build :
<data><rowData/><rowData/
><rowData/><rowData/></data>
Create/Update Look up
[ic/api/integration/v1/
projects/{projectName}/
lookups/{lookupName}]
OIC Look up
Global Error Handler
Send Email ?
Yes
Call Common Error Handler
End

Business Processing

This scheduled integration process includes the following activities:

1. The Oracle Utilities WACS OIC GISMappings Sync flow is a scheduled integration. It operates asynchronously, allowing both manual execution and scheduling to retrieve the GIS Asset Class and Asset & Location field mapping information defined in the **W1-GISToWAMSyncMapping** extendable lookup in Oracle Utilities Work and Asset Cloud Service.
2. The process reads the existing **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup via Oracle Integration Cloud Rest APIs.
3. Each Active record in the **W1-GISToWAMSyncMapping** extendable lookup in Oracle Utilities Work and Asset Cloud Service is inserted into the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup table in Oracle Integration Cloud. If there is a change in the GIS Asset Class or Asset & Location field mappings in the Oracle Utilities Work and Asset Cloud Service extendable lookup, an update is made on the **AssetClass** and **Attribute** fields. When the record in the **OIC** lookup table is updated, any entries in **Query**, **RelativeURI**, and **ServiceId** are not updated or removed. If the record is removed in the **WACS** extendable lookup, the corresponding record in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup is removed.
4. Out of the box, the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup table is populated with a sample record. This record is removed when the flow is run.
5. Any unrecoverable errors thrown are handled by the global fault handler.
6. An optional email notification with error details is sent to the users configured in the **OUTL-BRT-ArcGIS_OFS_Email_ID** lookup.
7. Email notification is optional. Configure the email.flag property in the **OUTL-BRT-ArcGIS_OFS_ConfigProps** lookup to 'true' to receive email notifications when errors are encountered.
8. Error Handling:
    - If notification.type.email.flag in the **ArcGIS_WACS_ConfigProps** lookup is set to true', all errors will be sent to the respective email IDs configured in the **ArcGIS_WACS_Email_ID** lookup under "to".
        - **Functional errors**: The GISMappings Sync flow reports functional errors due size linit of the lookup column value which is more than 2K characters.
        - **Remote errors**:
            - The remote error will occur when the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup is accidently deleted from the project and the flow tries to access the lookup.
            - The remote error will occur when Oracle Utilities Work and Asset Cloud Service is down. An exception will be thrown, and the Oracle Integration Cloud instance will be marked as 'failed'.
        - After fixing the error, the flow can either be manually triggered or can wait for the next scheduled iteration.

Technical Details

The following table describes the integration processes and the respective ESRI ArcGIS and Oracle Utilities Work and Asset Cloud Service artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU WACS OIC GISMappings Sync
Integration Process Identifier	OUTL-BA-WACS_OIC_GISMAPPING
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Utilities Adapter)	scheduled / ad-hoc OU REST WACS for ArcGIS-WACS
Target Connection (Rest Adapter)	OU REST OIC for ArcGIS-WACS
OIC API(s)	/ic/api/integration/v1/projects/{projectId}lookups/{lookupName}
Local Integrations	OU Common Notification Handler

Lookups Referenced

The following table describes customized properties referenced in the integration. For more information about the lookup properties, refer to Configuring Lookups, Error Handling, and Email Notifications.

DVM	Property
OUTL-BRT-ArcGIS_WACS_ConfigProps	notification.type.email.flag
OUTL-BRT-ArcGIS_WACS_AssetClass	• AssetClass • Attributes • Query • RelativeURL • ServerId
OUTL-BRT-ArcGIS_WACS_Email_ID	• Recipient • To

ArcGIS Asset Synchronization

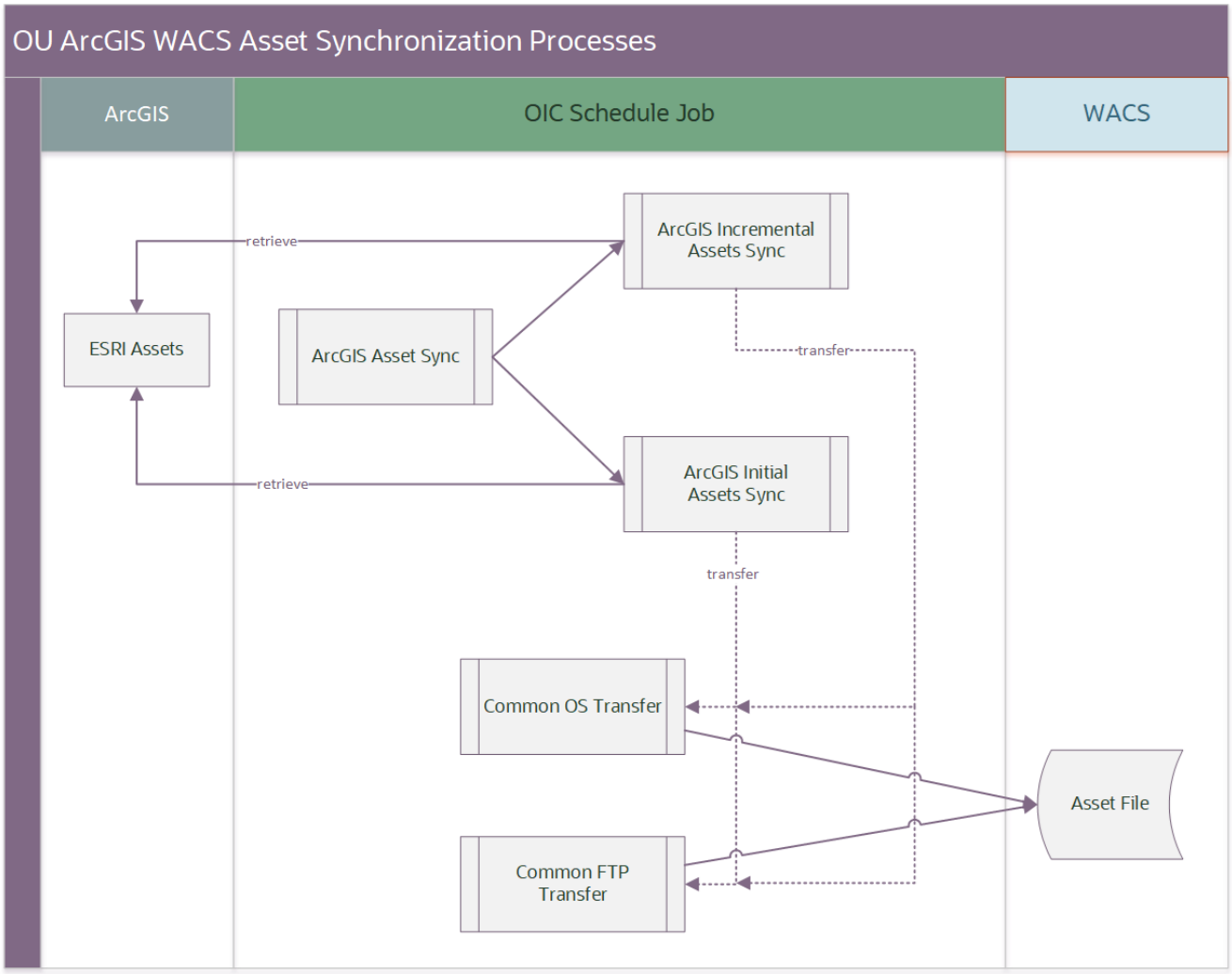
Assets in ArcGIS are synchronized to Oracle Utilities Work and Asset Cloud Service as initial and incremental synchronizations. These synchronizations are initiated from the OU ArcGIS WACS Asset Sync scheduled parent flow. This flow, in turn, calls the Initial and Incremental child flows to perform bulk or incremental synchronizations.

The child integrations will retrieve the data from ESRI ArcGIS and will place the files in the on-premises FTP Server or in an OCI Object Storage location based on the configuration.

The synchronization is handled by the following Oracle Integration Cloud integration flows depending on the file transfer preference:

- ArcGIS WACS Asset Sync (Oracle Integration Cloud Scheduled Job)
  - ArcGIS WACS Initial Assets Sync (Oracle Integration Cloud Initiated)
  - ArcGIS WACS Incremental Assets Sync (Oracle Integration Cloud Initiated)
- Common OS Transfer (Oracle Integration Cloud Initiated)
- Common FTP Transfer (Oracle Integration Cloud Initiated)

The following diagram shows the synchronization-related processes:



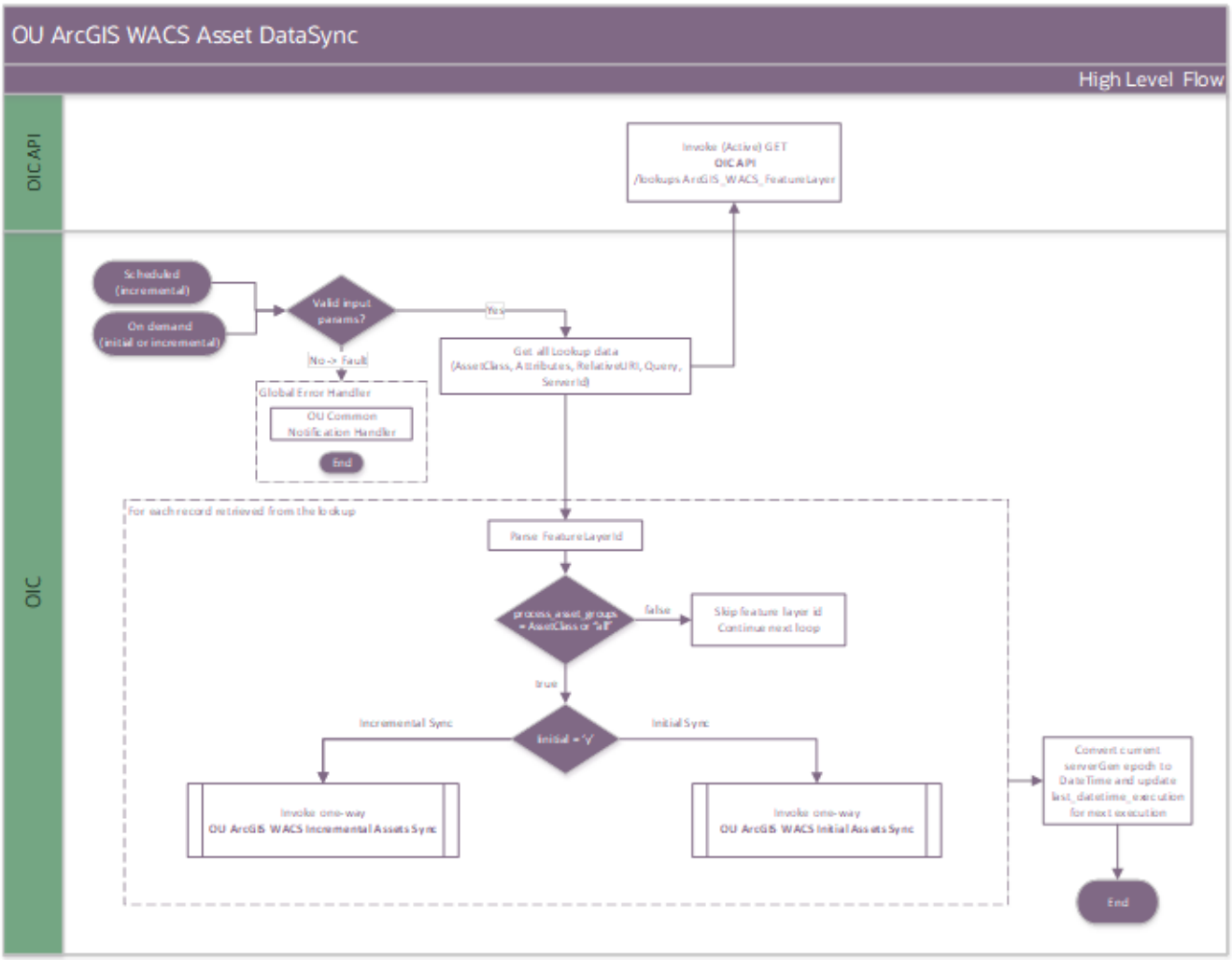
ArcGIS WACS Asset Sync (Oracle Integration Cloud Scheduled Job)

This integration process retrieves the Asset classes information stored in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup table and initiates the child integrations to retrieve the assets from ESRI ArcGIS.

The integration can be run as a scheduled integration with the following scheduled parameters:

- **Full_sync**: Performs a full or incremental asset synchronization. A full synchronization is done for the first time. The value either contains a "N"(Incremental sync) or a "Y"(Full/Initial sync).
- **Last_incremental_execution_datetime**: Sets the starting date and time from which to retrieve the ESRI ArcGIS assets data. The last incremental execution datetime contains the last date and time when the incremental synchronization was executed and is reset after each performed execution. This applies only to incremental synchronization. The format for this value is "YYYY-MM-DD HH:mm" in a 24-hour notation.
- **Max_records_per_file**: Specifies the maximum number of records to be include in each file.
- **AssetClasses_to_process**: Used to run specific asset classes from the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup table. This parameter is a comma separated list of asset classes. Specify "ALL" if all the asset classes in the lookup needs to be run. The default value is "ALL".

The following diagram shows a graphical representation of the Delete Activities integration process:



Business Processing

The integration process includes the following activities:

1. Initialization phase
    - This is a scheduled integration. It operates asynchronously, allowing both manual execution and scheduling.
    - Parameters set during each run dictate the how and what to synchronize:
        - **Full_sync**: Defaults to "N" or set to "Y".
        - **Last_incremental_execution_datetime**: Set in the YYYY-MM-DD HH:mm 24-hour format. This value is reset after the last execution.
        - **Max_records_per_file**: Specifies the number of records to be included in each file.
        - **AssetClasses_to_process**: List of comma separated asset classes to be processed. The default value is "ALL".

      Note: If the parameters are left empty, the last value of the parameter it was executed with is taken. If the parameters are empty on the very first run, the default values are taken.
2. Validate the parameters set for execution. The integration will stop processing and call the Common Notification Handler if any parameters are incorrectly set.
3. Read and loop through the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup table. This lookup will be refreshed by the OU WACS OIC GISMappings Sync integration.
4. If the "AssetClasses_to_process" parameter is ALL or contains the specific asset classes from the lookup, then the flow depending on the "Full_sync" parameter passes the request to either of the following:
    - OU ArcGIS WACS Initial Assets Sync
    - OU ArcGIS WACS Incremental Assets Sync
5. Error handling

   An email is triggered based on the "notification.type.email.flag" property value in the **OUTL_BRT_AccGIS_WACS_ConfigProps** lookup.
    - Business errors due to incorrect parameters will trigger an email request. It contains an invalid parameter with the value provided as well with correct information.
    - Errors due to faults being triggers will also trigger the email request.
    - Faults can occur due to failing to reach the child integrations, or errors during processing.
    - Oracle Cloud Integration instance in the above cases is marked as "Failed".
6. Emails are also sent when configuration errors on the **OUTL-BRT-ArcGIS_WACS_AssetClass** are encountered. In this case, the Oracle Cloud Integration instance is successful, and it is the user's responsibility to correct the configuration errors and retry the particular asset classes.
7. The email requests are forwarded to the "OU Common Notification Handler" flow.

Technical Details

The following table describes the integration processes and the respective ESRI ArcGIS and Oracle Utilities Work and Asset Cloud Service artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU ArcGIS WACS Assets Sync
Integration Process Identifier	OUTL-BA-ARCGIS_WACS_ASSETS_SYNC
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	scheduled / ad-hoc OU REST OIC for ArcGIS-WACS
Target Connection (Rest Adapter)	OU REST OIC for ArcGIS-WACS
OIC API(s)	/ic/api/integration/v1/projects/{projectId}lookups/{lookupName}
Local Integrations	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync • OU Common Notification Handler

Lookups Referenced

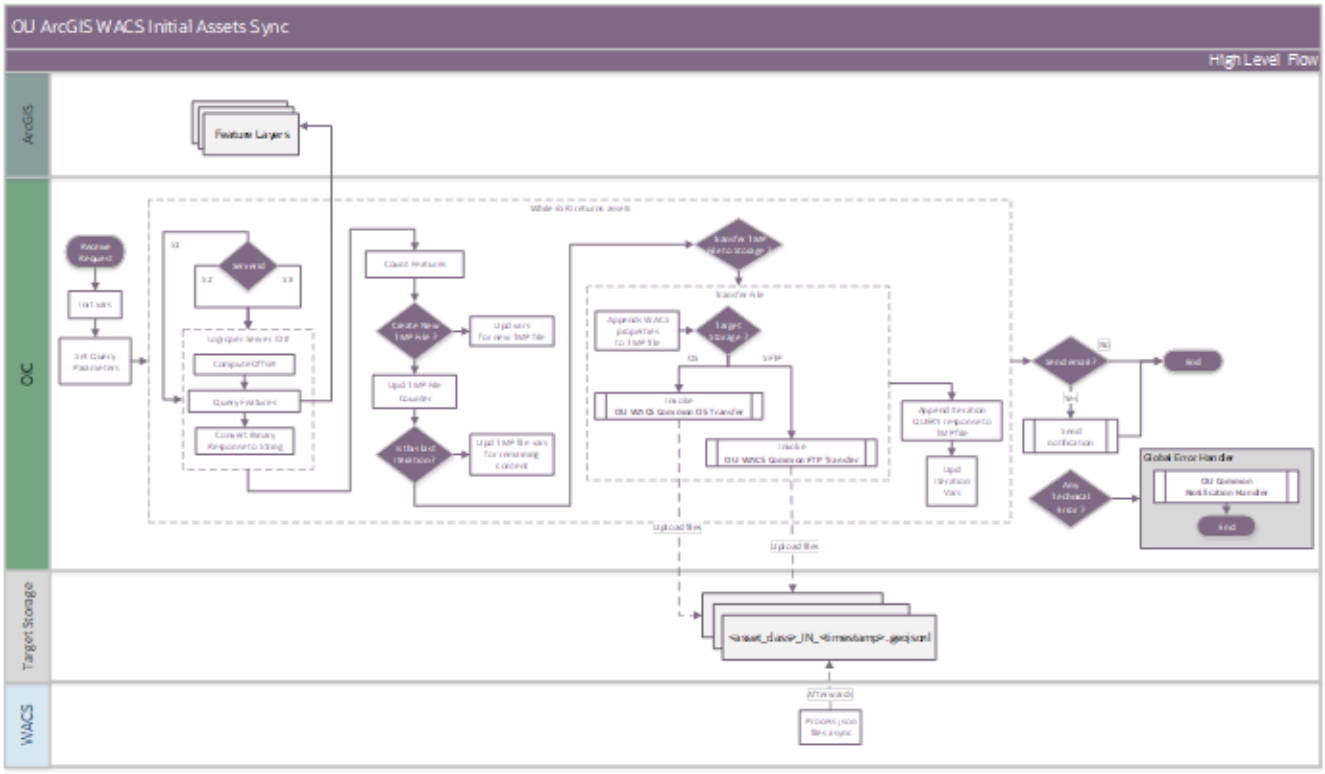
The following table describes customized properties referenced in the integration. For more information about the lookup properties, refer to Configuring Lookups, Error Handling, and Email Notifications.

DVM	Property
OUTL-BRT-ArcGIS_WACS_ConfigProps	• notification.type.email.flag
OUTL-BRT-ArcGIS_WACS_AssetClass	• AssetClass • Attributes • Query • RelativeURI • ServerId
OUTL-BRT-ArcGIS_WACS_Email_ID	• Recipient • to

ArcGIS WACS Initial Assets Sync (Oracle Integration Cloud Initiated)

This process receives an internal request from ArcGIS WACS Asset Sync to retrieve all features with specific attributes from ESRI ArcGIS. The retrieved data is stored in the GeoJSONL files that are uploaded to Oracle Utilities Work and Asset Cloud Service to process.

The following diagram shows a graphical representation of the integration process:



Business Processing

The integration process includes the following activities:

1. Initialization phase
    a. Initializes variables from the incoming request retrieved and Oracle Integration Cloud lookups.
    b. Defines parameters for querying the ESRI ArcGIS servers (up to three connections/servers identified by ServerId; S1, S2, and S3, defined in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup).

    Note: Assets can be stored across different ESRI ArcGIS portals. The incoming request includes the **ServerId** field, specifying which portal to use. This integration supports up to three configurable ESRI ArcGIS servers with server connection "S1" as the default. Expanding beyond three portals required cloning and customizing the project.
2. Execute the Feature Extraction Loop.
    a. Iterates over assets, retrieving feature details via ESRI Query API calls.

b. Handles pagination, updates counters, and ensures correct batch sizes.

- Batch size is defined by the sync.initial.maxresult.count property in the **OUTL-BRT-ArcGIS_WACS_ConfigProps** lookup. This value should match or be less than the "Maximum Number of Records Returned by Server" setting in the ESRI ArcGIS Server Manager's **Parameters** page for each Feature Server Layer. The default value is 2000 records.
- The number of iterations is determined by the records returned by the API response. If the API does not return any records the iteration stops.. The number of features are counted using getFeaturesCount javascript.

c. Response from Query API is read as binary. This response is enhanced to include Assetclass and action by passing it through getCustomGeoJSON javascript function.

3. Manage File Transfer

   a. Transfers completed files to the target storage, as specified by the wacs.file.target.transfer.pref property in the **OUTL-BRT-ArcGIS_WACS_ConfigProps** lookup.

   b. If target storage is "os" (Object Storage), it calls the Common OS Transfer child integration process.

   c. If the target storage is "ftp" (FTP), it calls the Common FTP Transfer child integration process.

4. Business Notification Email

   a. If the notification.email.process.complete.flag is set to 'true', a completion email on successful completion with the files and record count information, is sent to the respective email IDs configured in the the **ArcGIS_WACS_Email_ID** lookup.

5. Error Handling

   If the notification.type.email.flag in the **ArcGIS_WACS_ConfigProps** lookup is set to 'true', all errors will be sent to the respective email IDs configured in the **ArcGIS_WACS_Email_ID** lookup under "to".

   a. **Functional errors**: ESRI ArcGIS reports functional errors due to invalid parameters or data.

   b. **Remote errors**: Technical errors, such as ESRI ArcGIS is not available.

6. When errors occur:

   a. An exception will be thrown, and the Oracle Integration Cloud instance will be marked as 'failed'.

   b. After fixing the error, the flow can either be manually triggered or can wait for the next scheduled iteration.

Technical Details

The following table describes the integration processes and the Oracle Integration Cloud artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU ArcGIS WACS Initial Assets Sync
Integration Process Identifier	OUTL-BA-ARCGIS_WACS_ASSETS_INIT
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	OU REST for ArcGIS-WACS
Target Connection (Rest Adapter)	• OU REST ArcGIS for ArcGIS-WACS • OU REST ArcGIS for ArcGIS-WACS S2 • OU REST ArcGIS for ArcGIS-WACS S3 • OU REST OIC for ArcGIS-WACS
Local Integrations	OU Common Notification Handler

Lookups Referenced

The following table describes customized properties referenced in the integration. For more information about the lookup properties, refer to Configuring Lookups, Error Handling, and Email Notifications.

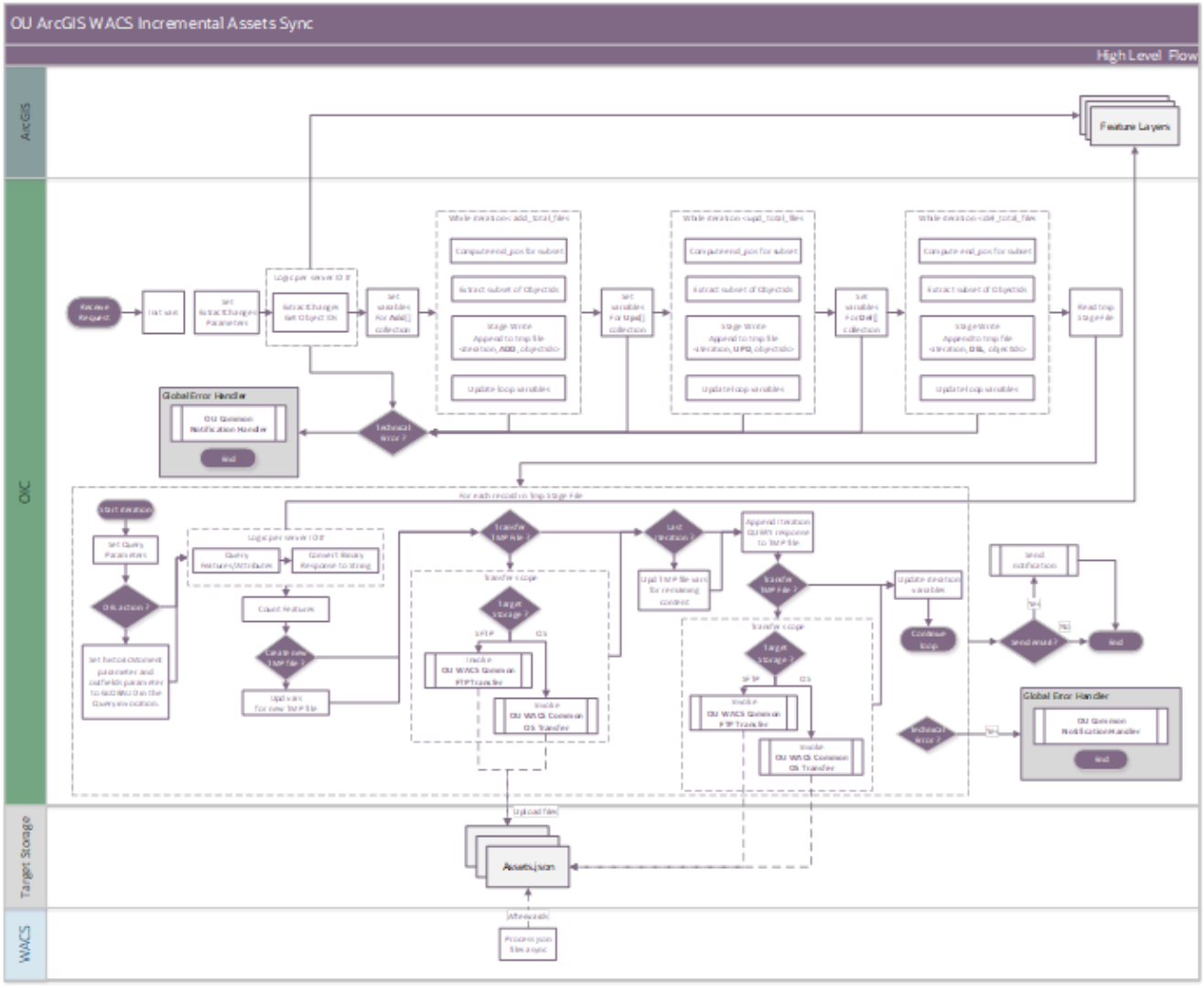
DVM	Property
OUTL-BRT-ArcGIS_WACS_ConfigProps	• notification.type.email.flag • notification.email.process.complete.flag • wacs.file.target.transfer.pref • wacs.os.namespace • wacs.os.bucket.assetsync • wacs.projectedcoordinatesystem.wkid • sync.initial.maxresult.count • sync.increment.objectid.count
OUTL-BRT-ArcGIS_WACS_Email_ID	• Recipient • to

ArcGIS WACS Incremental Assets Sync (Oracle Integration Cloud Initiated)

This process receives an internal request from ArcGIS WACS Asset Sync to retrieve all features with specific attributes from ESRI ArcGIS that have changed within a defined period. The defined period is mostly defined as the last execution date time. This will retrieve ESRI ArcGIS changes from that time on.

The retrieved data is stored in a GeoJSONL files that are uploaded to Oracle Utilities Work and Asset Cloud Service to process.

The following diagram shows a graphical representation of the integration process:



Business Processing

The integration process includes the following activities:

1. Initialization phase
    a. Initializes variables from the incoming request retrieved and Oracle Integration Cloud lookups.
    b. Defines parameters for querying the ESRI ArcGIS servers (up to three connections/servers identified by ServerId; S1, S2, and S3).

Note: Assets can be stored across different ESRI ArcGIS portals. The incoming request includes the **ServerId** field, specifying which portal to use. This integration supports up to three configurable ESRI ArcGIS servers with server connection "S1" as the default. Expanding beyond three portals required cloning and customizing the project.

c. Sets up tracking variables for files, asset counts, and synchronization details.

2. Retrieve updated asset data.
   a. Invokes the ESRI ExtractChanges API to get the ObjectIDs for the updated, added, and deleted features. This API is invoked with "returnIdsOnly = true" to get only the ObjectIds.
   b. The API returns results only if the specified attributes are updated and within the modification timestamps.
   c. Stores response data in a global variable for further processing.
   d. The ObjectIds are stored in a Stage file for additions, updates, and deletions. The ObjectIds are batched based on the sync.increment.objectid.count configuration property.
3. Process added assets
   a. Iterates through the "adds" collection, grouping ObjectIds into batches.
   b. Stores the ObjectIds in temporary stage files for later retrieval.
4. Process updated assets
   a. Identifies modified assets based on specified fields set in the **Attributes** column in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup.
   b. Group the object IDs into batches and stores them in the Stage files.
5. Process deleted assets
   a. Retrieves the deleted object IDs and groups them into batches.
   b. Stores the object IDs in temporary stage files for later retrieval.
6. Query and retrieve asset details
   a. Reads the stage files and retrieves asset details from the ESRI ArcGIS server connections (according to ServerId field: S1, S2, S3).
   b. Constructs and executes queries with the appropriate filters and formatting.
   c. Response from Query API is read as binary. This response is enhanced to include Assetclass and action by passing it through getCustomGeoJSON javascript function. Results are appended to the temporary files.
7. Manage file creation
   a. Creates new files when the record limit per file is reached.
   b. During the last iteration, a new file will be created to store any remaining records, even if the record limit is not reached.
8. Manage file transfer
   a. Transfers the completed files to the target storage, as specified by the wacs.file.target.transfer.pref property in the **OUTL-BRT-ArcGIS_WACS_ConfigProps** lookup.

b. If the target storage is "os" (Object Storage), it calls the Common OS Transfer child integration process.

c. If the target storage is "ftp" (FTP), it calls the Common FTP Transfer child integration process.

9. Business notification email

   a. If the **notification.email.process.complete.flag** is set to 'true', on successful completion, a completion email with files and record count information, is sent to the respective email IDs configured in the **ArcGIS_WACS_Email_ID** lookup.

10. Error Handling

    If the **notification.type.email.flag** in the **ArcGIS_WACS_ConfigProps** lookup is set to 'true', all errors will be sent to the respective email IDs configured in the **ArcGIS_WACS_Email_ID** lookup under "to".

    a. **Functional errors**: ESRI ArcGIS reports functional errors due to invalid parameters or data.

    b. **Remote errors**: Technical errors, such as ESRI ArcGIS is not available.

11. When errors occur:

    a. An exception will be thrown, and the Oracle Integration Cloud instance will be marked as 'failed'.

    b. After fixing the error, the flow can either be manually triggered or can wait for the next scheduled iteration.

Technical Details

The following table describes the integration processes and the artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU ArcGIS WACS Incremental Assets Sync
Integration Process Identifier	OUTL-BA-ARCGIS_WACS_ASSETS_INCR
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	OU REST for ArcGIS-WACS
Target Connection (Rest Adapter)	• OU REST ArcGIS for ArcGIS-WACS • OU REST ArcGIS for ArcGIS-WACS S2 • OU REST ArcGIS for ArcGIS-WACS S3 • OU REST OIC for ArcGIS-WACS • OU REST OIC for ArcGIS-WACS
Local Integrations	OU Common Notification Handler

Lookups Referenced

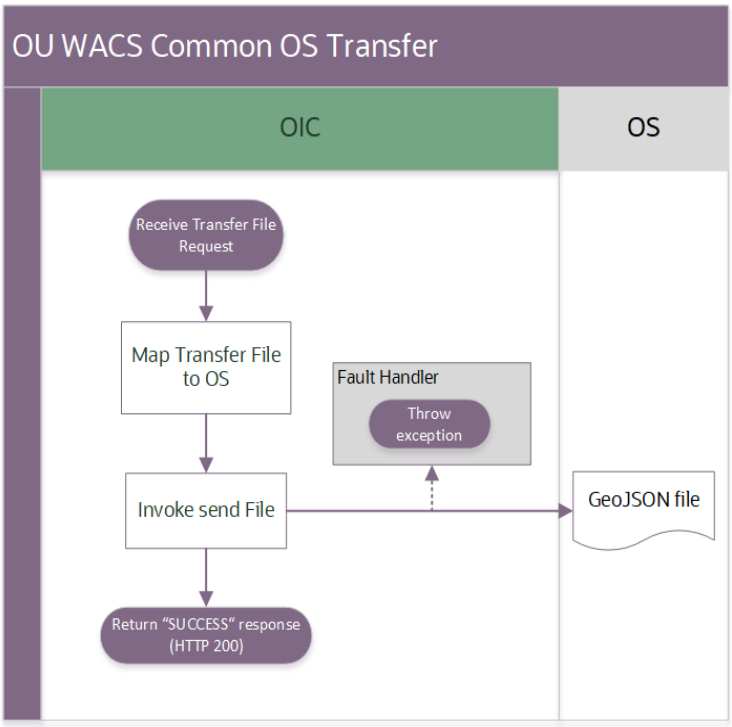
The following table describes customized properties referenced in the integration. For more information about the lookup properties, refer to Configuring Lookups, Error Handling, and Email Notifications.

DVM	Property
OUTL-BRT-ArcGIS_WACS_ConfigProps	• notification.type.email.flag • notification.email.process.complete.flag • wacs.file.target.transfer.pref • wacs.ftp.directory.assetsync • wacs.projectedcoordinatesystem.wkid • sync.initial.maxresult.count • sync.increment.objectid.count
OUTL-BRT-ArcGIS_WACS_Email_ID	• Recipient • to

Common OS Transfer (Oracle Integration Cloud Initiated)

This integration process receives a request to transfer the attached file reference to an Oracle Integration Cloud Object Storage location from where Oracle Utilities Work and Asset Cloud Service will process them.

The following diagram shows a graphical representation of the integration process:



Business Processing

The integration process deployed on Oracle Integration Cloud is exposed as a REST API and perform the following activities:

1. Map the incoming request to the Object Storage REST API.
2. Initiate the file transfer.
3. Error handling:
    - The instance will throw a fault to the initiating integration to handle this error.
    - The status of this Oracle Integration Cloud instance is marked as 'Failed'.

Technical Details

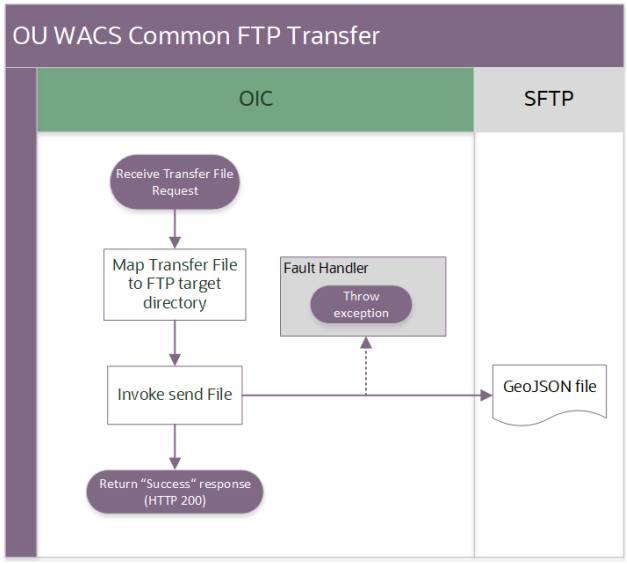
The following table describes the integration processes and the artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU WACS Common OS Transfer
Integration Process Identifier	OUTL-BA-WACS_OS_TRANSFER
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	OU REST for ArcGIS-WACS
Target Connection (Rest Adapter)	OU REST WACS Object Storage for ArcGIS-WACS

Common FTP Transfer (Oracle Integration Cloud Initiated)

This integration process receives a request to transfer the attached file reference to an SFTP content storage location from where Oracle Utilities Work and Asset Cloud Service will process them.

The following diagram shows a graphical representation of the integration process:



Business Processing

The integration process deployed on Oracle Integration Cloud is exposed as a REST API and perform the following activities:

1. Map the incoming request to the FTP Adapter.
2. Initiate the file transfer.
3. Error handling:
    - The instance will throw a fault to the initiating integration to handle this error.
    - The status of this Oracle Integration Cloud instance is marked as 'Failed'.

Technical Details

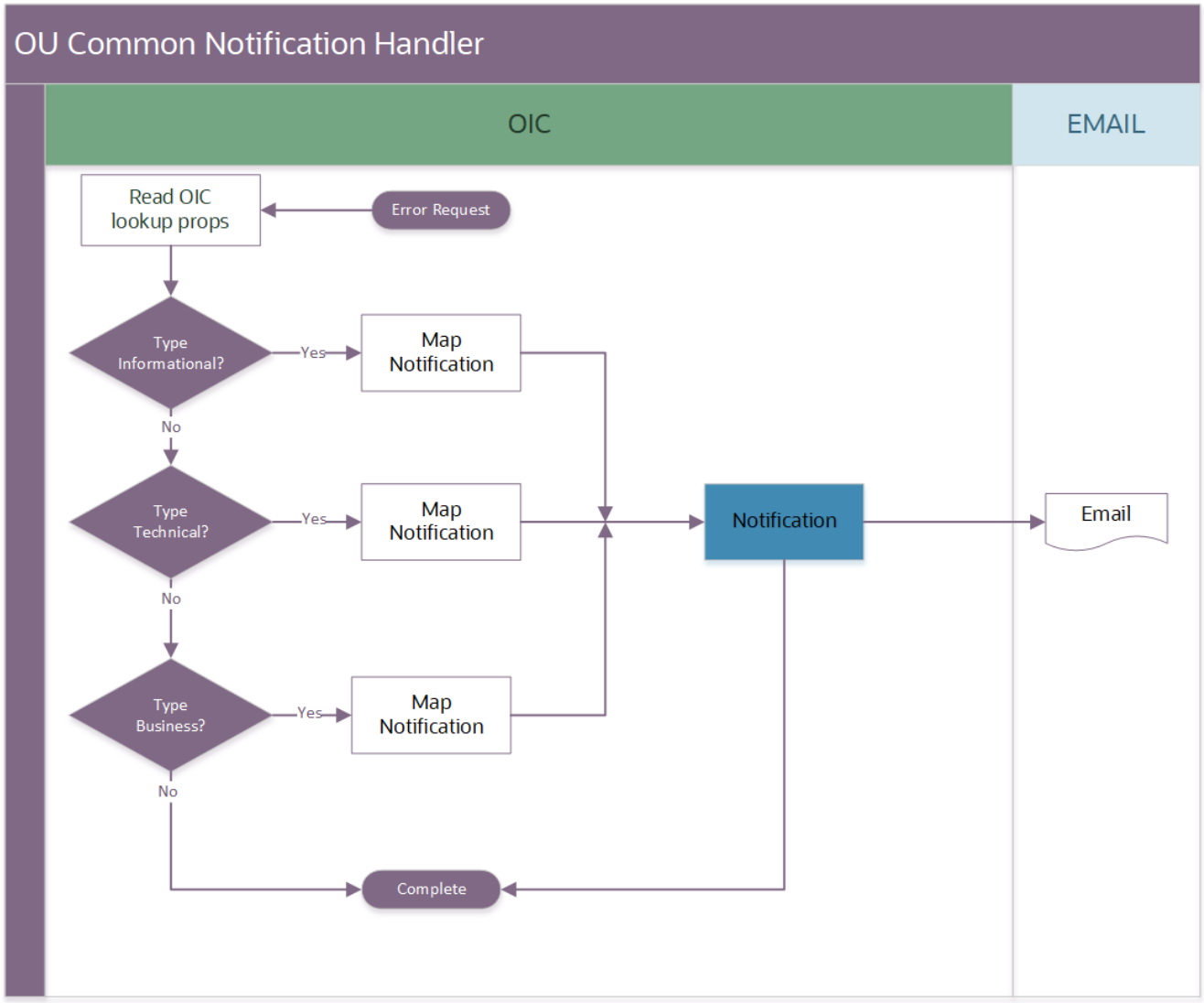
The following table describes the integration processes and the artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU WACS Common FTP Transfer
Integration Process Identifier	OUTL-BA-WACS_FTP_TRANSFER
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	OU REST for ArcGIS-WACS (rest)
Target Connection (Rest Adapter)	OU FTP WACS for ArcGIS-WACS (adapter)

Common Notification Handler (Oracle Integration Cloud Initiated)

This integration process is used to send email notification in case of errors in Oracle Integration Cloud.

The following diagram shows a graphical representation of the integration process:



Business Processing

The integration process deployed on Oracle Integration Cloud is exposed as a REST API and perform the following activities:

1. Map the incoming request to the FTP Adapter.
2. Initiate the file transfer.
3. Error handling:
    - The instance will throw a fault to the initiating integration to handle this error.
    - The status of this Oracle Integration Cloud instance is marked as 'Failed'.

Technical Details

The following table describes the integration processes and the artifacts used in this integration process:

Artifacts	Value
Integration Process Name	OU Common Notification Handler
Integration Process Identifier	OUTL-BA-COMMON_NOTIF_HNDLR
Integration Project Name	OU ESRI ArcGIS WACS
Source Connection (Rest Adapter)	OU REST for ArcGIS-WACS
Target Connection (Rest Adapter)	OIC Notification action
OIC API(s)	n/a
Local Integrations	n/a

Lookups Referenced

The following table describes customized properties referenced in the integration. For more information about the lookup properties, refer to Configuring Lookups, Error Handling, and Email Notifications.

DVM	Property
OUTL-BRT-ArcGIS_WACS_Email_ID	• Recipient • to

Chapter 3

Configuring Oracle Utilities Work and Asset Cloud Service

This chapter explains about setting up the web services catalog and extendable lookup necessary for the integration used by Oracle Utilities Work and Asset Cloud Service. It includes:

- Managing Catalog Services
- External System
- Master Configuration Setup
- ESRI ArcGIS to WAM/WACS Extendable Lookup Mapping
- Batch Jobs

Managing Catalog Services

The catalog service is used by Oracle Integration Cloud to communicate with the respective application. It is configured in the **Catalog URL** field in the Oracle Integration Cloud connection page of Adapters.

To configure the catalog service for this integration process:

1. Login to Oracle Utilities Work and Asset Cloud Service.
2. Navigate to the **Web Service Catalog** page either from the **Admin** menu or the **Search** menu.
3. Select **REST** and add the following REST webservices to the catalog.

Service Type	Service Name	Description
Inbound Web Service (Rest)	W1-GISIntegrationConfiguration	Get GIS Integration Configuration

> **Important!** Please note that Oracle Utilities Work and Asset Cloud Service Integration to Oracle Field Service is a prerequisite for this integration. For information about configurations, refer to the *Oracle Utilities Work and Asset Cloud Service Integration to Oracle Field Service Configuration Guide* available on the Integrations page on Oracle Help Center.

For more information about Oracle Utilities Work and Asset Cloud Service configurations, refer to the Oracle Utilities Work and Asset Cloud Service documentation available on Oracle Help Center.

External System

Configure an external system record for the GIS system. In this integration, there is no need to configure any Outbound Message Types or Message Senders. This is required in the Master Configuration Setup to process the synchronization requests that are created as part of the process.

Master Configuration Setup

This section describes the following master configurations that set up to process the synchronization requests:

- ESRI WAM Integration Master Configuration
- Master Data Synchronization Configuration
- Seeder Sync Request Master Configuration

ESRI WAM Integration Master Configuration

ESRI WAM Integration master configuration objects dictate the Map Viewer integration with the Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service application.

- **ESRI Integration On/Off**: Determines whether or not the integration is in use within your system. This required value provides a quick way to disable key features of the integration.
- **External System**: Identifies the external system for ESRI ArcGIS Server.
- **Timeout Threshold Hours**: Sets the number of hours after which the outbound synchronization messages should timeout.
- **Default Number of Records in Results Grid**: The maximum number of results records displayed in the **Asset** and **Work** tabs in the Map Viewer when the features are selected.
- **Default Asset Effective Date/Time**: The default value to use during creation of assets in the GIS data synchronization for the asset disposition.
- **Map Notes**: The name of the map layer considered when the share widget is opened (example: redlining) are performed in the Map Viewer.
- **GIS Projected Coordinate Systems**: Used to hold the value of projected coordinate system. This is important to make sure the proper coordinate model is used in your map.
- **Default Out of Service Location**: When the GIS features that were previously synchronized to Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service are deleted in the GIS system, the corresponding assets are retired and moved to this location on the next synchronization of these changes to Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service. The original location of these retired assets is deactivated.

  Similarly, when the GIS features that were previously synchronized to Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service are marked as 'abandoned' in the GIS system, the corresponding assets are retired and moved to this location when the asset type configuration does not allow such assets to be retired in place.
- **Abandoned Asset GIS Field/Value**: A GIS feature is considered 'abandoned' if it has the **Abandoned GIS** field/value combination specified in the GIS system. The system assumes the life cycle status or related field/value is already configured in GIS to identify abandoned features. The **GIS** field and value are the one that marks a GIS feature as abandoned in the GIS system.

  Note: The system assumes an abandoned GIS feature retains its GIS unique identifier as it remains key to the synchronization process between the systems.
- **Work Location Business Object**: Defines the Work Location Business Object that will be used when a pin drop is used on the GIS Map Viewer to specify the work location.
- **Related ESRI Layer**: The name of the map layer considered for turning the Work Locations layer on/off in the GIS Map Viewer.
- **Outbound Message Type**: Defines the outbound message type that will be used to send supplemental work locations to ESRI ArcGIS.
- **Selected Asset**: The color configured here is used to select the Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service

mapped assets in the ESRI ArcGIS Map Viewer when drawing a graphic using select options within the **Asset** and **Work** tabs.

- **Highlighted Asset**: The color configured here is used to highlight a particular asset feature on the GIS viewer when hovering over the record item in the results on the **Asset** and **Work** tabs.
- **Assets with no Work**: The color configured here is used to represent the Oracle Utilities Work and Asset Management/Oracle Utilities Work and Asset Cloud Service mapped assets that do not have any linked work.
- **Highlight Related Assets**: The color configured here is used to highlight the assets that are associated with an activity record in the **Work** tab. The related assets for an activity can be highlighted using the **Highlight** icon that appears for each of the activity records in the **Work** tab results.
- **Specific Webmaps for Asset Types**: Allows for more specific definition of Web Maps based on Asset Type when you are using multiple web maps. This is useful when a specific Asset Type can only be displayed on a particular web map.

Master Data Synchronization Configuration

FK Reference	Initial Sync Key Reference View	Ongoing Sync Key Reference View	External System	Identifier Type
W1-ASLO	W1_INI_NODE_VW	W1_ON_NODE_VW	<GIS External System>	W1GI
W1-ASSET	W1_INI_ASSET_VW	W1_ON_ASSET_VW	<GIS External System>	W1GI
W1-NODE	W1_INI_NODE_VW	W1_ON_NODE_VW	<GIS External System>	W1GI

Seeder Sync Request Master Configuration

External System	Maintenance Object	Initial Sync Request BO	Ongoing Sync Request BO	Ongoing Sync Key Reference View	Identifier Type
<GIS External System>	W1-ASSET	W1-InitialSyncRequestAsset	W1-OngoingSyncRequestAsset	W1_ON_ASSET_VW	W1GI
<GIS External System>	W1-NODE	W1-InitialSyncRequestLocation	W1-OngoingSyncRequestLocation	W1_ON_NODE_VW	W1GI

ESRI ArcGIS to WAM/WACS Extendable Lookup Mapping

The product can be configured to support various mapping approaches between the ESRI ArcGIS features and assets. The following are high level guidelines to consider when designing such mapping:

- Analyze your GIS asset classes. Determine which asset classes should be synchronized.
- Determine which GIS fields should be synchronized.
- Determine if the value mapping is needed for some GIS values.

Extend the base asset location business object if custom GIS location details need to be supported. Use asset attributes when possible, to store GIS asset related details. Define corresponding non-tracked Asset Types and Asset Location Types.

For each synchronized asset class define the following:

- Custom value mapping extendable lookups for specific GIS field values that may need to be mapped to different values.
- A GIS to Oracle Utilities Work and Asset Cloud Service/Oracle Utilities Work and Asset Management extendable lookup.

Note that the W1-GISIntegrationConfiguration Inbound Web Service (REST) will provide the asset class mappings details of GIS to Oracle Utilities Work and Asset Cloud Service/Oracle Utilities Work and Asset Management extendable lookup. It is used to configure the Asset Sync lookup in Oracle Integration Cloud.

Batch Jobs

The following batch processes need to be run in sequence to load all data:

Step	Batch Code	Description	Additional Parameters
1	W1GISUPL	GIS File Upload	• **fileName**: Name of the file or files to be uploaded. For multiple files, the parameter supports the "glob" syntax for using wildcard characters. • **filePath**: The file path where the output should be placed.
2	W1-CMSYN	Composite Sync Request	• **State**: PENDING • **BO**: W1-CompositeSyncReqGISAsset
3	W1-SIOPE	Ongoing Sync Request - Pending	• **State**: PENDING • **BO**: W1-OngoingSyncRequestLocation
4	W1-SIOPE	Ongoing Sync Request - Pending	• **State**: PENDING • **BO**: W1-OngoingSyncRequestAsset

Chapter 4

Importing, Configuring, and Testing Integration Connections

This chapter explains the process for importing the connections, packages, and files needed for the integration and the configuration of these connections imported through the packages. After a successful import and configuration, the chapter lists out steps to help test the connections. It includes the following sections:

- Importing the Oracle Integration Cloud Project Based Accelerator Package from Oracle Cloud Marketplace
- Verifying the Project Import
- Configuring Connections in Oracle Integration Cloud
- Configuring Agent (if applicable)

Importing the Oracle Integration Cloud Project Based Accelerator Package from Oracle Cloud Marketplace

All integration artifacts are shipped into a single package (.car) file.

To import a pre-built integration from Oracle Cloud Marketplace:

1. Launch the Oracle Cloud Marketplace portal.
2. Click **Applications**.
3. Search for "ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service".
4. Browse through the list of applications and select the pre-built integration package to import.
5. Click **GetApp**.
6. Review and accept "Oracle Standard Terms and Restrictions".
7. Click **Next**. My Oracle Support portal opens.
8. From the integration artifacts table, download the Integration OIC Accelerator Project (.car) file.
   - OUTL-BA-ARCGIS_WACS-01.25.0400.car
9. Perform the following steps before importing the new project based accelerator package (.car) into your Oracle Integration Cloud instance:
   a. Take a backup of the existing customized integrations and lookups.
   b. Perform cleanup by deactivating and deleting the existing flows, connections, lookups, libraries used in the integration and the .par package file.

   If your previous pre-built integration was package based (.par file):
   - It is visible on the **Design-Packages** page in your Oracle Integration Cloud instance.
   - On the **Design-Integrations** page, the individual integrations of the imported package file are designated with an Accelerator and BUILT BY ORACLE message is displayed.
10. In the **Navigation** pane, click **Projects**.
11. Click **Add**.
12. Select **Import Project** and drag-and-drop the .car file downloaded from Oracle Cloud Marketplace.

    Note: Make sure to select the Anyone can edit, view, and monitor checkbox.
13. The new project will show up in the list but with the "Configured" status due to the connections not being completed yet.
14. Click **Project Edit** and follow the verification and configuration steps mentioned in the sections.
15. If all configuration is complete, click **Activate** in the Design UI. You can also activate the latest deployment plan using the **Deploy** screen.

Verifying the Project Import

To verify the project import was successful:

1. Verify whether the following integrations are imported successfully as seen in the **Integrations** section of the project:
   - OU WACS OIC GISMappings Sync(1.25.400)
   - OU ArcGIS WACS Assets Sync(1.25.400)
   - OU ArcGIS WACS Initial Assets Sync(1.25.400)
   - OU ArcGIS WACS Incremental Assets Sync(1.25.400)
   - OU Common Notification Handler(1.25.400)
   - OU WACS Common OS Transfer(1.25.400)
   - OU WACS Common FTP Transfer(1.25.400)
2. Verify whether the following connections are imported successfully as seen in the **Connections** section of the project:
   - OU REST for ArcGIS-WACS
   - OU REST OIC for ArcGIS-WACS
   - OU REST WACS for ArcGIS-WACS
   - OU REST WACS Object Storage for ArcGIS-WACS
   - OU FTP WACS for ArcGIS-WACS
   - OU REST ArcGIS for ArcGIS-WACS
   - OU REST ArcGIS for ArcGIS-WACS S2
   - OU REST ArcGIS for ArcGIS-WACS S3
3. Make sure that the following lookups are imported successfully as seen in the **Lookups** section of the project:
   - OUTL-BRT-ArcGIS_WACS_ConfigProps
   - OUTL-BRT-ArcGIS_WACS_Email_ID
   - OUTL-BRT-ArcGIS_WACS_AssetClass
4. Make sure the following libraries are imported successfully as seen in the **Libraries** section of the project:
   - getFeaturesCount
   - getCustomGeoJSON

Configuring Connections in Oracle Integration Cloud

After the packages are imported and verified, the respective connections must be configured.

This section describes the procedure to set up the following connections:

- Configuring OU REST for ArcGIS-WACS
- Configuring OU REST OIC for ArcGIS-WACS

- Configuring OU REST WACS for ArcGIS-WACS
- Configuring OU REST WACS Object Storage for ArcGIS-WACS
- Configuring OU FTP WACS for ArcGIS-WACS
- Configuring OU REST ArcGIS for ArcGIS-WACS (and for S2,S3)

Configuring OU REST for ArcGIS-WACS

This connection is used to create local Oracle Integration Cloud integration REST entry points that can be invoked from internal or external applications.

To configure the connection:

1. Select **OAuth 2.0** or **Basic Authentication**.
2. Verify if the **Role** value is "Trigger".
3. Click **Save**.

Note that this connection is used by the following integrations:

- OU ArcGIS WACS Initial Assets Sync
- OU ArcGIS WACS Incremental Assets Sync
- OU Common Notification Handler
- OU WACS Common OS Transfer
- OU WACS Common FTP Transfer

Configuring OU REST OIC for ArcGIS-WACS

This connection is used to communicate with Oracle Integration itself using REST adapter.

To configure the connection:

1. Select the REST API Base URL from the **Connection Type** drop-down list.
2. Enter the API URL in the **Connection URL** field.

   Example: https://{OIC-Instance}:{OIC-Host}
3. From the **Security Policy** drop-down list, select **OAuth Client Credentials**.
4. Configure the **Access Token URI**, **Client ID**, and **Client Secret** fields respectively from the OIC instance.
5. In the **Optional Security** field, configure the following:
   - Scope
   - Client Authentication as "Send client credentials as basic auth header"
6. On the **Connection** page, click **Test**.
7. After the connection is tested successfully, click **Save**.

Note that this connection is used by the following integrations:

- OU WACS OIC GISMappings Sync
- OU ArcGIS WACS Assets Sync

- OU ArcGIS WACS Initial Assets Sync
- OU ArcGIS WACS Incremental Assets Sync

Configuring OU REST WACS for ArcGIS-WACS

This connection is used to communicate with Oracle Utilities Work and Asset Cloud Service using the Oracle Utilities adapter.

To configure the connection:

1. On the Connection page, add the Oracle Utilities Work and Asset Cloud Service application's catalog to the **CatalogURL** field.

   Example: https://{host}:{port}/ouaf/rest/ouaf/openapi/iws/catalog

2. On the **Security Policy** tab, select the appropriate security policy. For more information on the supported security policies, see the Oracle Utilities Adapter documentation at: https://docs.oracle.com/en/cloud/paas/application-integration/utilities-adapters/create-oracle-utilities-adapter-connection.html
3. In the Oracle Utilities Work and Asset Management on-premises version, configure the agent in the connection.
   a. In the **Agent Group** section, click **Configure Agents**.
   b. Select the agent group from the list created in **Creating an Agent Group**.
4. On the **Connection** page, enter the username and password. Click **Test** to test the connection.
5. After the connection is tested successfully, click **Save**.

Note that this connection is used by the following integrations:

- OU WACS OIC GISMappings Sync

Configuring OU REST WACS Object Storage for ArcGIS-WACS

This connection is used to communicate with Oracle Infrastructure Cloud Object Storage Services using the REST adapter.

To configure the connection:

1. On the **Connection Properties** section, enter the object storage API endpoint in the **Connection URL** field.

   The Connection URL follows this format: https://objectstorage.{region}.oraclecloud.com

   Refer to the Oracle Cloud Infrastructure documentation/API Reference and Endpoints to see the Object Storage Service API and endpoints at: https://docs.oracle.com/en-us/iaas/api/

2. In the **Security** section:
   a. Select the **OCI Signature Version 1** security policy.
   b. Provide the following Object Storage information:
      - Tenancy OCID
      - User OCID

- Upload the private key
- Fingerprint (obtained from object storage after register the public key for the appropriate user)

For more information, refer to the *Object Storage Setup Guide 20C* at: https://docs.oracle.com/cd/F35460_01/index.htm

3. After the connection is tested successfully, click **Save**.

Note that this connection is used by the following integrations:

- OU WACS Common OS Transfer

Configuring OU FTP WACS for ArcGIS-WACS

This connection is used to communicate with Oracle Utilities Work and Asset Management (on-premises application) FTP Server using the FTP adapter.

To configure the connection:

1. In the **Connection Properties** section, enter the **FTP Server Host Address** and the **FTP Server Port**.
2. Expand **Optional Properties**, then select **Yes** for the **SFTP Connection**.
3. In the **Security** section, select the applicable security policy for your FTP server.

   Example: Select the **FTP Server Access** policy on the **Security Policy** tab, and enter the username and password for the FTP server.

   For more information about the supported security policies, see the Create an FTP Adapter Connection section in the Using the FTP Adapter with Oracle Integration 3 documentation available on Oracle Help Center.
4. Configure the appropriate **Agent Group**, if applicable.
5. On the **Connection** page, click **Test**.
6. After the connection is tested successfully, click **Save**.

   Make sure the FTP server is set up and configured in Oracle Utilities Work and Asset Management (on-premises application).

Note that this connection is used by the following integrations:

- OU WACS Common FTP Transfer

Configuring OU REST ArcGIS for ArcGIS-WACS (and for S2,S3)

This connection is a generic connection to connect to Assets feature layer published either on Enterprise Server using the REST adapter.

If you have multiple ESRI ArcGIS portals, repeat this configuration for connection S2 and S3.

The feature layers are accessed as REST APIs in the Oracle Integration Cloud flows using these connections. They can be accessed using the **OAuth2 Client Credentials** security policy if the portal server is federated to **OAuth Custom Two Legged Flow** through the ESRI ArcGIS generateToken API.

To use OAuth Client Credentials as a security policy:

1. On the **Connection** page, from the **Connection Type** drop-down list, select **REST API Base URL**.
2. Enter "https://<hostName>:<port>/<webadapter>/" in the **Connection URL** field.
3. Under **Optional** properties, do not configure the **TLS** version.
4. From the **Security Policy** drop-down list, select **OAuth Client Credentials**.
5. Configure the **Access Token URI**, **Client ID**, and **Client Secret** fields respectively in the ESRI ArcGIS portal.

   The **Access Token URI** is the portal access token URI. Example: https://<host>:<port>/arcgis/sharing/rest/oauth2/token
6. Open the following **Optional Security** fields and configure:
   - **Client Authentication** as "client_credentials_in_body"
7. On the **Connection** page, click **Test**.
8. After the connection is tested successfully, click **Save**.

   Note that the client credentials are configured via the ESRI ArcGIS portal under the content via the Developer Credentials application. For more information, see the Introduction to app authentication in the Security and authentication guide on the esri Developer portal.

To use **OAuth Custom Two Legged Flow** as the security policy:

1. On the **Connection** page, from the **Connection Type** drop-down list, select **REST API Base URL**.
2. Enter https://<hostName>:<port>/<webadapter>/ in the **Connection URL** field.
3. Under **Optional properties**, do not configure the TLS version.
4. From the **Security Policy** drop-down list, select **OAuth Custom Two Legged Flow**.
   a. On the **Access Token Request** field, enter the following curl command:

      -X POST https://<hostname : port> /arcgis/admin/generateToken -H "Content-Type: application/x-www-form-urlencoded" -d "f=json&username=username&password=password&client=requestip&expiration=120"

      Note:

      - Since this API does not return a refresh token, there is no automatic refresh of token when the token expires. To overcome that, set the expirations to a long period. Token expiration period can be set to maximum of one year. This number is represented in minutes.
5. On the **Connection** page, click **Test**.

6. After the connection is tested successfully, click **Save**.

   Note that this connection is used by the following integrations:

   - OU ArcGIS WACS Initial Assets Sync
   - OU ArcGIS WACS Incremental Assets Sync

Configuring Agent (if applicable)

Create an agent group in Oracle Integration Cloud and install agent on the on-premises server before creating/activating an integration in which messages are exchanged between the on-premises applications and Oracle Integration Cloud. The agent related configurations are needed only if the server points to an on-premises application.

This section includes:

Possible Combinations

The possible combination of an agent group is:

- Oracle Utilities Work and Asset Cloud Service on-premises and Oracle Field Service

Creating an Agent Group

Create an agent group in Oracle Integration Cloud before running the agent installer. When the on-premises agent is installed in the environment, the on-premises agent is associated with the agent group identifier. Only one on-premises agent can be associated with an agent group.

For a single Oracle Integration Cloud instance, you can create up to five agent groups. Creating the agent group also creates the necessary queues required for message exchange.

To create an agent group:

1. Login to Oracle Integration Cloud.
2. On the **Home** page, navigate to **Integration** > **Agents**.
3. Click **Create Agent Group**.
4. Enter the following information and then click **Create**.
   - Agent Group Name
   - Identifier

     Note: The agent group name and identifier must be same.
   - Description

Downloading Agent Installer

Download the agent installer from Oracle Integration Cloud and run the installer to install the on-premises agent in your local environment. During the installation, associate the agent with the Agent Group Identifier generated when creating an agent group in Oracle Integration Cloud.

For more information on agent installer, refer to the **Download and Run the Connectivity Agent Installer** section in the Oracle Integration Cloud documentation.

Installing On-Premises Agent

To install an on-premises agent:

1. Login to Oracle Integration Cloud.
2. On the **Home** page, navigate to **Integration** > **Agents**.
3. Click **Download**.
4. Select **Connectivity Agent**.
5. Select **Save File** when prompted to save the file to a directory location on your on-premises host.
6. Navigate to that directory and unzip **oic_connectivity_agent.zip**.
7. Change the file permissions to be executable.
8. Download the Oracle Utilities Work and Asset Cloud Service certificate and upload it to agent. Run the following command from the agent Home directory.

   ```
   keytool -import -file directoryPath/sample.crt -alias
   SampleCert - keystore <Agent_Home>/agenthome/agent/cert/
   keystore.jks
   ```

9. Modify **InstallerProfile.cfg** to include the following information.
   a. Provide the oic_URL value with the OIC SSL host name.

      Example: https://OIC_host:OIC_port

   b. Provide the agent_GROUP_IDENTIFIER. It should be the Agent Group Identifier generated when creating an agent group created in Oracle Integration Cloud.

   c. Set the proxy parameters if the connectivity agent is used with a proxy in the on-premises environment.

   d. Set the JAVA_HOME property to the directory/folder where JDK is installed.

      Note: Before running the connectivity agent installer, perform the steps in the Oracle Utilities Adapter with Oracle Integration documentation.

   e. Run the connectivity agent installer from the command prompt.

      ```
      java -jar connectivityagent.jar
      ```

   f. Provide the Oracle Integration Cloud credentials when prompted.

   g. Wait for a successful installation message to appear.

After the installation is complete, an agent instance is created to interact with Oracle Integration Cloud.

To verify if the agent instance was created:

1. Navigate to **Integration** > **Agents** in Oracle Integration Cloud.
2. Check if the agent count for your **Agent Group** is increased by one.
3. Click the number to view the agent details.

For more details, refer to Oracle Integration Cloud documentation.

Chapter 5

Configuring Lookups, Error Handling, and Email Notifications

This chapter focuses on the lookups configuration, handling business and technical errors, sending email notifications, and customizations in this integration. It includes the following sections:

Configuring Lookups

The following table lists the lookups that are part of this integration.

Lookup Name	Integration Name	Purpose
OUTL-BRT-ArcGIS_WACS_ConfigProps	• OU WACS OIC GISMappings Sync • OU ArcGIS WACS Assets Sync • OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync	Generic properties used in the integrations business logic and mappings.
OUTL-BRT-ArcGIS_WACS_Email_ID	• OU WACS OIC GISMappings Sync • OU ArcGIS WACS Assets Sync • OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync • OU Common Notification Handler	Provide email information to send the notification.
OUTL-BRT-ArcGIS_WACS_AssetClass	• OU WACS OIC GISMappings Sync • OU ArcGIS WACS Assets Sync	AssetClass information that have been refreshed from Oracle Utilities Work and Asset Cloud Service and adapted by the customer ESRI ArcGIS implementation.

Editing Lookups

To edit a lookup:

1. Login to Oracle Integration for Cloud.
2. Navigate to **Projects**.
3. Select the project and then navigate to the **Lookups** section of the project.
4. Select the lookup to edit.
5. Make the necessary changes.
6. Click **Save** and **Close**.

Configuration Properties

The **OUTL-BRT-ArcGIS_WACS_ConfigProps** lookup contains the properties that can be defaulted in the integration. It also contains a flag to enable email notifications.

Property Name	Sample Value	Description	Used in Integration Process Name
wacs.file.target.transfer.pref	os	Defines the WACS file location preference. Valid values: os | ftp	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
wacs.os.namespace	wacsnamespace	WACS Object Storage namespace serves as a container for all WACS related buckets and objects. Required to be populated when WACS is in the cloud, wacs.file.transfer.pref = 'os'.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
wacs.os.bucket.assetsync	ArcGIS_AssetSync	Define the bucket name where the Asset Sync extract files should be dropped in the WACS Object Storage by OIC. Required to be populated when WACS is in the cloud, wacs.file.transfer.pref = 'os'.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
wacs.ftp.directory.assetsync	/scratch/ AcrGIS_AssetSync	WACS FTP directory where the Asset extract files are dropped by OIC. Required to be populated when WACS is on-premises, wacs.file.transfer.pref is = 'ftp'.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
notification.type.email.flag	true	If the value is set to 'true', email notification will be sent out for errors. Valid values: true | false Default: true	• OU WACS OIC GISMappings Sync • OU ArcGIS WACS Assets Sync • OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync

Property Name	Sample Value	Description	Used in Integration Process Name
notification. email.process.complete.flag	true	If the value is set to 'true', email notification will be sent when Asset files have been created and dropped in the respective location. Valid values: true|false Default: true	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
wacs.projectedcoordinatesystem.wkid	4326	This property is used to configure the coordinates system [wkid] which will be used to retrieve the geometry coordinates in the specified system format.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
sync.initial.maxresult.count	2000		• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync
sync.increment.objectid.count	1000		• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync

The **OUTL-BRT-ArcGIS_WACS_Email_ID** lookup contains the properties that can be defaulted in the integration. It also contains a flag to enable email notifications.

Property Name	Sample Value	Description	Used in Integration Process Name
from	ArcGIS_WACS@email.com	Defines the 'from' email address on the notifications.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync • OU Common Notification Handler
to	errorDist@myCy.com	The email address(es) who should receive any error notification. Multiple emails can be configured by putting comma to separate the email IDs. These are likely the administrators or users who maintain the applications.	• OU WACS OIC GISMappings Sync • OU ArcGIS WACS Assets Sync • OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync

Property Name	Sample Value	Description	Used in Integration Process Name
to.process.notification	bizDist@myCy.com	The email address(es) of who should receive notification when the processing has completed. Multiple emails can be configured by including comma to separate the email IDs. These are likely the business or application users.	• OU ArcGIS WACS Initial Assets Sync • OU ArcGIS WACS Incremental Assets Sync

The **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup contains the assets that are configured in Oracle Utilities Work and Asset Cloud Service and are located in ESRI ArcGIS. It also contains customizable columns that relate to ESRI ArcGIS locations.

This lookup is primarily refreshed by the OU WACS OIC GISMappings Sync integration and adapted to the customer ESRI ArcGIS implementation.

Column Name	Sample Value	Description	Comments
AssetClass	Pump_Centrifugal	Name of the Asset stored in WACS.	Updated by the synchronization flow.
Attributes	LIFECYCLESTATUS,GLOBALID	Attributes associated with the asset	Updated by the synchronization flow.
Query			
RelativeURI	relative1/FeatureServer/501	URI from this asset feature. It has to end as: /FeatureServer/{ID}	ID after the FeatureServer is required to be retrieved in the ESRI ArcGIS portal.
ServerId	S1	ESRI ArcGIS portal instance	Used to direct to the appropriate configured connections documented in Chapter 4: Importing, Configuring, and Testing Integration Connections.

Error Handling

This section provides information about the different ways used to handle errors in the integration and also resubmitting the instances after rectifying the errors.

- Summary of Integration Error Handling

Summary of Integration Error Handling

There are different errors and can be handled in a different way. These are the common types of errors, and all emails are being send via the OU Common Notification Handler integration.

Technical Fault

This fault occurs when there is a data mismatch or any Xpath related error. On this error, the flow immediately goes to global fault handler and the fault is sent back to the respective system.

Remote Fault

This fault occurs when the target system is down. When this error occurs the flow immediately goes to global fault handler and the fault is sent back to the respective system.

Business Fault

This fault occurs only when the business fault occurs in the target system due to invalid data. When this error occurs, the fault is sent back to the respective system as part of immediate response.

Errors in Integration Processes

Integration Process: OU WACS OIC GISMappings Sync

Type of Error	Action	Notification Type	Retry
The attribute size is more than 2k characters.	• Process stops. • OIC instance is marked as 'failed'.	Business Error Email (Code 400)	Make sure the size of attributes are less than 2k characters. Or, remove the attributes that are more than 2k characters from the WACS mappings lookup data. Reschedule the execution in OIC.
Remote fault: • WACS is down. • Lookup is not available in OIC.	• Process stops. • OIC instance is marked as 'failed'.	Remote Error Email	• Verify that the lookup OUTL-BRT-ArcGIS_WACS_AssetClass is present in OIC. • Verify that the WACS is down or not. • Reschedule execution in OIC.

Integration Process: OU ArcGIS WACS Assets Sync

Type of Error	Action	Notification Type	Retry
Incorrect parameters	• Process stops. • OIC instance is marked as 'failed'.	Business Error Email	Reschedule the execution in OIC.
Remote fault	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Activate the OU ArcGIS WACS Initial Assets Sync or OU ArcGIS WACS Incremental Assets Sync integrations. • Reschedule the execution in OIC.

Type of Error	Action	Notification Type	Retry
Unexpected Error	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Review the error email and correct the issue. • Reschedule the execution in OIC.

Integration Process: OU ArcGIS WACS Initial Assets Sync

Type of Error	Action	Notification Type	Retry
Incorrect Attributes, URL	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email (Code 400)	Attributes in the OIC lookup should not be modified manually. For invalid URL, verify the connection details and RelativeURI in OUTL-BRT_ArcGIS_WACS_AssetClass. Reschedule the execution in OIC.
Remote fault	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Verify the OIC connection to the ESRI ArcGIS server. • Activatee the OU WACS Common OS Transfer or OU WACS Common FTP. • Reschedule the execution in OIC.
Unexpected Error	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Review the error email and correct the issue. • Reschedule the execution in OIC.

Integration Process: OU ArcGIS WACS Incremental Assets Sync

Type of Error	Action	Notification Type	Retry
Incorrect Attributes, URL	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email (Code 400)	Attributes in the OIC lookup should not be modified manually. For invalid URL, verify the connection details and RelativeURI in OUTL-BRT_ArcGIS_WACS_AssetClass. Reschedule the execution in OIC.
Remote fault	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Verify the OIC connection to the ESRI ArcGIS server. • Activatee the OU WACS Common OS Transfer or OU WACS Common FTP. • Reschedule the execution in OIC.

Type of Error	Action	Notification Type	Retry
Unexpected Error	• Process stops. • OIC instance is marked as 'failed'.	Technical Error Email	• Review the error email and correct the issue. • Reschedule the execution in OIC.

Integration Process: OU WACS Common OS Transfer

Type of Error	Action	Notification Type	Retry
All faults	• Process stops. • OIC instance returns the fault and is marked as 'failed'.	N/A	Retry the OU ArcGIS WACS Initial Assets Sync or OU ArcGIS WACS Incremental Assets Sync integration.

Integration Process: OU WACS Common FTP Transfer

Type of Error	Action	Notification Type	Retry
All faults	• Process stops. • OIC instance returns the fault and is marked as 'failed'.	N/A	Retry the OU ArcGIS WACS Initial Assets Sync or OU ArcGIS WACS Incremental Assets Sync integration.

Integration Process: OU Common Notification Handler

Type of Error	Action	Notification Type	Retry
All faults	• Process stops. • OIC instance returns the fault and is marked as 'failed'.	N/A	N/A

Email Notifications

This pre-built integration includes a configurable email notification.

To receive an email notification:

1. Login to Oracle Integration Cloud.
2. Navigate to **Integrations** > **Lookups**.
3. Edit the **OUTL-BRT-ArcGIS_WACS_ConfigProps** lookup.
4. Change the **email.flag** property value to 'true'.

5. Edit the **OUTL-BRT-ArcGIS_WACS_Email_ID** lookup.
   a. In the **from** field, enter the email ID to receive an email from.
   b. In the **to** field, enter the email ID(s) to send the email to. This field can be a comma separated email addresses list.

      Note: In the **OUTL-BRT-ArcGIS_WACS_Email_ID** lookup, do not edit the values provided under the **Recipient** column.

Chapter 6

Activating and Testing the Integration Flows

This section provides an overview of how integration flows are activated and tested. It includes the following sections:

- Prerequisites
- Activating Integration Flows

Prerequisites

Make sure the catalog in Oracle Utilities Work and Asset Cloud Service is configured completely to activate an integration process.

Activating Integration Flows

To activate the integration flows:

1. Login to Oracle Integration Cloud.
2. From **Home** page, navigate to the integration to activate.
3. Drag the slider for that integration. When prompted to enable tracing, click **Yes** to view the instances.
4. Click **Activate**.

The integration takes time to get activated. The activated integration appears at the top of the integrations list.

Chapter 7

Customizations

In Oracle Integration Generation 3, you can extend (customize) an integration in an accelerator project by adding and configuring an extension group. An extension group enables you to extend your integration by adding invoke connections; stitch, for-each, switch, map, and integration actions; and global variables to the integrations in your accelerator project.

For more details on how to perform these changes, refer to the Manage a Project section in Using Integrations in Oracle Integration 3.

In addition, a knowledge base article is available at: https://support.oracle.com/epmos/faces/DocumentDisplay?_afrLoop=407954934694303&id=3017378.1&_adf.ctrl-state=611abf54g_77

Chapter 8

Monitoring and Troubleshooting

This chapter provides information about monitoring and troubleshooting the integration. It includes the following:

- Oracle Utilities Work and Asset Cloud Service
- Oracle Integration Cloud

Oracle Utilities Work and Asset Cloud Service

This section provides information about monitoring Oracle Utilities Work and Asset Cloud Service.

Oracle Utilities Work and Asset Error Logs

The following error logs can be monitored for Oracle Utilities Work and Asset Management:

- Errors related to the online integration invocation from Oracle Utilities Work and Asset Management are stored in the WACS_ENVIRONMENT_NAME/logs/ or WAM_ENVIRONMENT_NAME/logs/system folder.

  Example: V24001_WAM_ORA_WLS/logs/system\

For more information about errors and notifications, and accessing cloud logs, refer to the Oracle Utilities Work and Asset Cloud Service documentation on Oracle Help Center.

Oracle Integration Cloud

This section focuses on the monitoring Oracle Integration Cloud and troubleshooting any issues that occur during the integration activation.

Monitoring Integration Flows

Integration flows are monitored using the following:

- Project (for project based instances)
- Observability (for non project based instances)

To monitor the integration flows within a project:

1. Login to Oracle Integration Cloud.
2. Click **Projects**. On the navigation pane, click the relevant project.
3. Navigate to the **Observe** menu.
4. You can check:
   a. **Integrations** to view the counts of various status of instances created per integration flows.
   b. **Instances** to see instances of integrations of the project.
   c. **Future runs** to see all the runs scheduled or started for scheduled integrations.
   d. **Audit** to view and download design-time audit logs.

For more information, refer to the Monitor Integrations in a Project section in Using Integrations in Oracle Integration 3.

To monitor the integration flows outside the project through Oracle Integration Cloud Observability menu option:

1. Login to Oracle Integration Cloud.
2. Click Observability on the menu.
3. Select any of the following as required:
    - **Dashboards**: To monitor the complete dashboard of integration.
    - **Integrations**: To monitor each integration.
    - **Instances**: To monitor instance and flow trace/activity stream of the integration.
    - **Error**: To monitor the integrations in 'error' state. Re-submit the asynchronous integration flows.

Troubleshooting

To troubleshoot the errors in the workflow through the generated instances, you can set tracing level to DEBUG to generate detailed logs.

To enable DEBUG:

1. Select **Configure Activation** and then select the **Tracing Level** to be 'DEBUG'.
2. Run the integration and check the activity stream which now will include the runtime log details of the flow.
3. If an activation fails, the **Integrations** page displays an error message.

Some of the sample cases are as follows:

- For any connectivity errors while activating the integration, make sure the trigger connection is successful. Test the connection and refresh the metadata, and then activate the integration.
- If the integration (Oracle Utilities Work and Asset Cloud Service initiated flows) is activated for the first time, ensure the Oracle Utilities Work and Asset Cloud Service catalog is configured accurately.

Appendix A

Things to Remember, Limitations, and Workarounds

This chapter highlights important information you need to note to use this integration:

- Multiple Portal Servers
- ESRI ArcGIS APIs
- ESRI ArcGIS API Processing
- ArcGIS Errors

Multiple Portal Servers

OU ArcGIS WACS Initial Assets Sync and OU ArcGIS WACS Incremental Assets Sync are configured out of the box to support three ESRI ArcGIS portal servers.

Each of the Asset class in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup can point to any of the three servers. Each of the servers are represented by serverIds S1, S2, and S3. Note that the integration flows consider **only** these three IDs.

The connection OU REST ArcGIS for ArcGIS-WACS is invoked when the **ServerId** field in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup is "S1" or empty.

OU REST ArcGIS for ArcGIS-WACS S2 is invoked when the **ServerId** field is "S2".

OU REST ArcGIS for ArcGIS-WACS S3 is invoked when the **ServerId** field is "S3".

If the portal server support is needed other than three connections, clone the project.

ESRI ArcGIS APIs

- **Query** field in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup represents the SQL filter statement for filtereing the features retrieved. Make sure the syntax specified in the **Query** field of the lookup as specified in the documentation for "where" parameter.

  https://developers.arcgis.com/rest/services-reference/enterprise/query-feature-service-layer/

- Extract Changes is another ESRI ArcGIS API invoked in the integration flows. This API requires to enable the **ChangeTracking** capability. For Enterprise geodatabase-based feature services published from ESRI ArcGIS Pro 2.2 or later, the ChangeTracking capability requires all layers and tables to be either archive enabled or branch versioned and have globalid columns.

  For more information, see https://developers.arcgis.com/rest/services-reference/enterprise/extract-changes-feature-service/.

ESRI ArcGIS API Processing

The OU ArcGIS WACS Assets Sync flow iterates over each row in the **OUTL-BRT-ArcGIS_WACS_AssetClass** lookup and initiates an Incremental/Initial sync flow asynchronously. Each of the instance of the Incremental/Initial flow work independently to process the respective feature layer.

To accommodate multiple invocations to work parallelly, each feature service in the ESRI ArcGIS Enterprise server must be configured with adequate number of instances and suitable timeouts periods.

ArcGIS Errors

ESRI ArcGIS APIs generates the "Unable to complete operation" error code 400 for various reasons, such as:

- Wrong attribute names specified in the AssetClass lookup table.
- The query syntax does not conform to the standards. Refer to the ESRI ArcGIS documentation to make sure the correct syntax is used.

For information about the limitations and workarounds in this integration and in the respective applications, and the known issues, see the *ESRI ArcGIS Integration to Oracle Utilities Work and Asset Cloud Service Release Notes* included in this release. The document is available on the Integrations page on Oracle Help Center.