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This document provides an overview of the types of configurations for your Oracle Communications Billing and Revenue Management (BRM) system. This document also describes the system requirements and procedures for installing and configuring your BRM system.

**Audience**

This document is intended for system administrators and those involved in planning BRM systems.

**Downloading Oracle Communications Documentation**

Product documentation is located on Oracle Technology Network:

http://docs.oracle.com

Additional Oracle Communications documentation is available from Oracle E-Delivery:

http://edelivery.oracle.com

**Documentation Accessibility**

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**Document Revision History**

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Part I provides information about getting started with your Oracle Communications Billing and Revenue Management (BRM) installation. It contains the following chapters:

- BRM Installation Overview
- BRM Software Compatibility
- Database Configuration and Tuning
- System Requirements
This document describes examples of basic configurations for your Oracle Communications Billing and Revenue Management (BRM) system. It also describes the high-level steps for installing and configuring your BRM system.

Before installing BRM, you need to know the following information:

- Basic BRM concepts. See "Introducing BRM" in BRM Concepts.
- BRM system architecture. See "BRM System Architecture" in BRM Concepts.
- Basic database administration concepts. See your database documentation.

About Planning and Installing a BRM System

To install and use BRM, you need to plan your system by performing the following tasks:

- Determine the services you want to provide; for example, email, telephony, and GSM wireless.
- Determine the type of events you want to rate and how you want to rate them; for example, real-time events and batch events.
- Determine whether you want your customers to prepay for the service or some services or post-pay for the services.
- Depending on the services you want to provide, the event types to rate, (real-time or batch), and the payment type (prepaid or postpaid), decide on the BRM system to install and configure.
- Choose the components you need to install.
- Install BRM and the optional component.
- Configure each component to point to its peer on the server side; for example, configure the CMs to point to the DMs and the DMs to point to the database.

Each BRM component includes a configuration file, such as a pin.conf, .reg, or .properties file, which you edit to set the environment variables and connection parameters. The configuration files include instructions for all the entries. See "Using Configuration Files to Connect and Configure Components" in BRM System Administrator’s Guide.

Downloading the BRM Applications Media Pack

To download the media pack from the Oracle E-Delivery Web site (https://edelivery.oracle.com):
1. Select the BRM Applications media pack for your platform from the Oracle E-Delivery Web site.
2. Download the software packages that you need from the media pack.
3. Extract the components that you need from the downloaded software.
4. Follow the installation procedure for each component that you need to install.

Types of BRM Systems

The type of BRM system you install depends on your business needs and the licensing agreement you have with Oracle. For more information on BRM system architecture, see "BRM System Architecture" in BRM Concepts.

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**Note:** For more information about UNIX platform and software compatibility, see "Overview of Hardware and Software Requirements".

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**A BRM Demonstration System**

For a simple demonstration system or a small application development environment, you can run all of the BRM components, including the database server, on a single computer as shown in Figure 1–1.

**Figure 1–1 Simple Demonstration System Configuration**

For example, you can use a demonstration system for testing your business policies and pricing plans. After you create test accounts, you can generate events to ensure that your pricing model is working correctly. For final pre-production testing, however, you should use a test system that mirrors your production system configuration.

**Important:** A single-computer configuration is not adequate for a typical production BRM system.

---

**A BRM Production System**

For best performance on a production system, you need to distribute the BRM components among several computers as shown in Figure 1–2.
By using this basic production configuration, you can expand your BRM system to meet your production needs. You can also add components while BRM is running.

- You can set up multiple machines that each run the Connection Manager (CM) and Data Manager (DM) to increase reliability and performance and to ensure that you continuously have at least one copy of the processes running.

- For additional reliability, you can also set up Connection Manager Master Processes (CMMPs) that route requests to an alternate CM when a CM fails. For more information on CMMPs, see “About Connection Manager Master Processes (CMMPs)” in BRM Concepts.

- You can use redundant subnets for CM and DM systems, and CMs and DMs can share the same subnet. The only access point is the BRM database, which can be replicated as needed.

The following examples show how you can distribute these components across multiple computers.

**Small Production System**

Figure 1–3 shows the minimum level of distributed components. This is a typical configuration for a small number of customers.

- All BRM client applications, such as Pricing Center, are installed on the same machine.

- The CM and DM are installed on the same machine to optimize performance.

- The database client is installed on the DM machine.

**Important:** If your database and DM are on separate machines, you must install the database client on the DM machine.

- The BRM database and Taxware database are installed on the same machine.
**Medium Production System**

Figure 1–4 shows a typical mid-size production system that uses multiple machines for the CM and DM. A CMMP is added to route connections from the client applications to the different CMs.

**A High-Availability Production System**

To install a high-availability system, you need to install and configure at least two of each component and make sure that each instance of a component connects to all
instances of its peer on the server side. This ensures that if one instance of a component fails, another one is available to process data.

For more information on setting up a high-availability system, see “Understanding a High-Availability System” in *BRM System Administrator’s Guide*.

**A BRM Multidatabase Production System**

Although BRM works well with a single database for BRM data, you can improve scalability and support load balancing by distributing BRM data among multiple databases as shown in Figure 1–5. In addition, the accounts and associated objects in one database continue functioning when another database is down.

*Figure 1–5  BRM Multidatabase Production System*

*Designing the Optimal Multidatabase System*

To optimize the benefits of a multidatabase system, you need to decide:

- How to split BRM applications among multiple host machines.
- How to split customer account data among multiple databases.
Optimizing Replication
When designing your multidatabase system, you need to define where the applications reside and how to split the data. To reduce contention at the primary database, Oracle recommends:

- Setting every application to connect to the primary database.

  **Important:** Any application or utility that directly changes the configuration data, such as Pricing Center, Configuration Center, and Developer Center, must be connected to the primary database.

- Distributing accounts among the secondary databases.

In this configuration, all accounts and associated data are stored in the secondary databases. Configuration, pricing, audit trail, and uniqueness data are stored and updated in the primary database and then replicated to the secondary databases at specified intervals.

  **Note:** For Oracle databases, BRM provides the additional option to store uniqueness objects in the primary database only and to not replicate them to the secondary database.

If the primary database goes down, you can still use RADIUS Manager to access accounts in the secondary databases. However, to ensure data integrity, you cannot make updates to the primary database when it is down.

Assigning Accounts to a Database
To set up account distribution for your multidatabase system, you must first understand that the multidatabase software assigns accounts to a particular database based on account hierarchy, database status, and database priority.

Account Hierarchy
The multidatabase software stores:

- All accounts of the same a brand in the same database.
- All **subordinate bill units** in the same database as their parent accounts.
- All sponsored accounts in the same database as their sponsor group.
- All accounts associated with a **device** in the same database as the device.

Therefore, the software assigns a subordinate account to the same database as the parent account, even if the database has a status of closed or unavailable.

  **Important:** In a multidatabase system, the Billing Provider and Content Provider reports are accurate only when each content provider account’s associated remittance objects, remittance events, content connector events, and user accounts are in the same database. If these are not all in the same database, some data will not be included in the reports.
Database Status
Databases are either open, closed, or unavailable. Open databases are always available for account creation. At installation time, only the primary database is set to open.

Closed databases are not used for account creation under most circumstances. Accounts are created in a closed database only if the account’s parent, branded, or sponsoring account belongs to that database or if all databases are closed. If all databases are closed, the multidatabase software chooses a closed database at random in which to create accounts and continues to create accounts in that database until a database becomes open. A database’s status can be changed to closed manually to limit the number of accounts created on the database, or it can be changed automatically by the multidatabase software when the database reaches a predefined maximum limit.

Unavailable databases are not used for account creation unless the database contains the account’s parent, sponsoring, or branded account. You can change a database’s status to unavailable at any time to suit your system requirements. You might do this, for example, to prevent accounts from being created on the primary database.

For information on how to set the database status, see “Setting Database Status” in *BRM System Administrator’s Guide*.

Database Priority
Database priority determines when customer accounts are created on a particular database, relative to other databases. The multidatabase software assigns accounts to an open database with the highest priority number. In the example shown in Figure 1–6, the multidatabase software assigns accounts to database 3 because it has the highest priority number of all open databases.

*Figure 1–6  Multidatabase Account Creation Based on Status and Priority*

If all databases have the same priority, the multidatabase software chooses an open database at random each time it assigns an account. This distributes accounts evenly across all databases.

For information on how to set the database priority, see “Setting Database Priorities” in *BRM System Administrator’s Guide*.

Setting Up a System Based on Event-Type Rating
After you determine whether you want your customers to prepay or postpay for one or more services and determine how to rate events (in real time, in batch, or in a combination of the two) you can set up your BRM system appropriately. A system that performs both types of rating is called a **convergent** system.

This section describes systems that are configured for the following:
Setting Up a System Based on Event-Type Rating

- Real-time rating (postpaid or prepaid events)
- Batch rating (postpaid events)
- Convergent rating (real-time rating and batch rating, and prepaid and postpaid events)

**Postpaid Real-Time Rating**

A basic BRM system to rate postpaid real-time events includes these components:

- Client applications, either provided by BRM, such as Customer Center, or custom client application, such as a CRM application that you develop.
- CM along with the necessary FMs.
- Real-time discounting pipeline, if your rating includes discounts.
- DM.
- Database.

Figure 1–7 shows a basic BRM system for rating postpaid real-time events:

*Figure 1–7  Basic Postpaid Real-Time Events Rating BRM System*

![Diagram of basic postpaid real-time events rating BRM system](image)

**Prepaid Real-Time Rating**

A basic BRM system to rate prepaid events includes these components:

- AAA Gateway Manager or a custom client application to listen to requests from the network and translate them to an flist and back to the network protocol.
- Service-specific client applications, such as GSM AAA Manager or GPRS AAA Manager.

---

**Note:** To support custom service types, install Services Framework AAA Manager.

- CM and Resource Reservation Manager.
- Real-time discounting pipeline, if your rating includes discounts.
- IMDB Cache DM.
- IMDB Cache for high throughput and low latency for processing prepaid AAA requests.
- Database.
Figure 1–8 shows a basic BRM system for rating prepaid events:

**Figure 1–8 Basic Prepaid Rating BRM System**

---

**Postpaid Batch Rating**

Batch events are not rated in real time. A basic BRM system to rate batch events in a pipeline includes the following components:

- Pipeline Manager.
- Pipeline Manager database.
- Rated Event (RE) Loader to load the rated events into the BRM database.

Figure 1–9 shows a basic BRM system for rating batch events:

**Figure 1–9 Basic Batch Rating BRM System**

---

**Convergent Rating**

A BRM system that handles prepaid and postpaid accounts and real-time event rating and batch event rating is called a *convergent* system. A *convergent* system requires the components for all types of rating. For example:

- Client applications.
- Service-specific client applications.
- Real-time discounting pipeline, if your rating includes discounts.
- CM along with the necessary FMs.
Installation Overview

- Resource Reservation Framework.
- Pipeline Manager and Pipeline Manager database.
- Rated Event Loader to load the rated events into the BRM database.
- Oracle DM and database.

Figure 1–10 shows a BRM system for rating both prepaid and postpaid (real-time and batch) events:

Figure 1–10 Convergent Rating BRM System

Convergent systems require objects to be stored in the BRM database, the pipeline memory, or both.

The pipeline memory consists of the DAT_AccountBatch and DAT_BalanceBatch modules. The DAT_AccountBatch module contains persistent account data that is stored in the database and the DAT_BalanceBatch module contains balance data that is stored in memory. This information is used during batch event processing.

You can configure your BRM system so only the required set of objects is loaded into pipeline memory. This reduces the load time during initialization and data synchronization operations and minimizes memory size. For more information, see "Optimizing BRM for Prepaid and Postpaid Convergence" in BRM System Administrator’s Guide.

Installation Overview

The BRM system uses a four-tier architecture. To set up this system, you must make sure that each component of the architecture connects to the other components. This section provides a high-level breakdown of the four-tier installation process.
High-Level Overview

To complete your four-tier BRM installation, follow these general steps.

1. Determine your hardware and software requirements.
   See "Overview of Hardware and Software Requirements".

2. Install your database.
   Refer to the Oracle documentation for information about installing your database.

3. Configure your database by using the directions in the appropriate guide.
   See "Installing and Configuring Oracle: Task List".

4. Install and configure the BRM software.
   See "Installing BRM".

5. Install the BRM client applications:
   - Installing BRM Client and Server Applications on UNIX
   - Installing BRM Client and Server Applications on Windows

6. Tune the BRM software for optimal performance.
   See "Improving BRM Performance" in BRM System Administrator’s Guide and "Database Configuration and Tuning".

Installing and Configuring a Localized Version of BRM

For general information about using a localized version of BRM, see "Using BRM in International Markets" in BRM Developer’s Guide.

Selecting the Database Character Encoding

For new BRM installations, use the appropriate database character sets when setting up your database.

For Oracle, select UTF8 for the standard character set and national character set.

If you are customizing BRM by adding your own fields or tables to the database, you must convert all data to UTF8 or Unicode.

BRM 7.4 does not support the AL32UTF8 character set.

Getting Help for Installing BRM

If you need technical assistance with installing BRM software, see "Getting Help with BRM Problems" in BRM System Administrator’s Guide.

What’s Next?

Now that you understand the various ways you can set up your BRM system, you need to know your hardware and software requirements. See "Overview of Hardware
What's Next?

and Software Requirements".
This document lists the software compatible with Oracle Communications Billing and Revenue Management (BRM) 7.4 server and client systems.

**Solaris**

This section describes the primary software components compatible with a BRM Solaris implementation.

**Operating System Versions**

Table 2–1 shows operating system compatibility for servers and clients:

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solaris 9 (32-Bit) and Solaris 9 (64-Bit)</td>
<td>Patches:</td>
</tr>
<tr>
<td></td>
<td>- 111722-04 (libms, lmsx, libm)</td>
</tr>
<tr>
<td></td>
<td>- 111711-08 (libC)</td>
</tr>
<tr>
<td></td>
<td>- 111712-08 (libCx)</td>
</tr>
<tr>
<td></td>
<td>- 111703-03 (fix for /usr/ccs/bin/sccs and make)</td>
</tr>
<tr>
<td></td>
<td>Required patches for Daylight Savings Time (DST) change in 2007:</td>
</tr>
<tr>
<td></td>
<td>- 112233-11</td>
</tr>
<tr>
<td></td>
<td>- 112335-03 or higher</td>
</tr>
<tr>
<td></td>
<td>- 112874-33 (libc) or higher</td>
</tr>
</tbody>
</table>

| Solaris 10 (32-Bit) and Solaris 10 (64-Bit) | Required patches for Daylight Savings Time (DST) change in 2007: |
|                                           | - 119254-06                                                          |
|                                           | - 122032-02                                                          |
|                                           | - 119689-07 (libc)                                                  |
Note: BRM can be customized on a 64-bit machine with the compiler’s 32-bit flag set. This produces 32-bit code that runs on 32-bit and 64-bit machines.

The following clients are supported on Solaris:

- Developer Center
- Self-Care Manager

Important: Pipeline Manager must be installed on 64-bit versions of supported operating systems.

Compilers

Table 2–2 shows supported compilers:

**Table 2–2  Supported Compilers**

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Studio 9</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Solaris Studio 10</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Solaris Studio 12 Update 1</td>
<td>Oracle Solaris Studio 12 Update 1 is certified with BRM 7.4 Patch Set 6 and later patch sets. You must install BRM 7.4 Patch Set 6 or later to use this compiler.</td>
</tr>
</tbody>
</table>

Note: On Solaris operating systems, BRM requires the Forte compiler with the appropriate operating system patches. For the list of patches you must install, see [http://www.oracle.com/technetwork/java/index.html](http://www.oracle.com/technetwork/java/index.html)

Database Servers

Table 2–3 shows compatible database servers:

**Table 2–3  Compatible Database Servers**

<table>
<thead>
<tr>
<th>Database server version</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle9i Database Release 2 (Oracle 9.2.0.8 and later patch levels) (Enterprise Edition only)</td>
<td>Supported on Solaris 32-bit and Solaris 64-bit. To partition your BRM database, you must use the Oracle Partitioning component. You must purchase a separate license for this component from Oracle. BRM supports the UTF8 character set.</td>
</tr>
<tr>
<td>Oracle Database 10g Release 2 (Oracle 10.2.0.1 and later patch levels) (Enterprise Edition only)</td>
<td>NA</td>
</tr>
</tbody>
</table>
Web Servers

Table 2–4 shows compatible Web servers:

Table 2–4  Compatible Web Servers

<table>
<thead>
<tr>
<th>Web server</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache 2.2.4</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Apache recommends upgrading to 2.2.x.

AIX

This section describes the primary software components compatible with a BRM AIX implementation.

Operating System Versions

Table 2–5 shows operating system compatibility for servers and clients:

Table 2–5  Compatible Operating systems

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM AIX Version 5.3.12 or later</td>
<td>You must update the libpthread.a threads library to which BRM links. Consult your IBM support contact for information on upgrading or applying a patch to this system-specific library.</td>
</tr>
<tr>
<td>IBM AIX Version 6.1</td>
<td>NA</td>
</tr>
</tbody>
</table>
Note: The following clients are supported on AIX:
- Developer Center
- Self-Care Manager

Compilers

Table 2–6 shows supported compilers:

Table 2–6  Supported Compilers

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>xlc 8</td>
<td>■ XL C/C++ Runtime 9.0.0.1.</td>
</tr>
<tr>
<td></td>
<td>■ C Set ++ Application 8.0.0.10.</td>
</tr>
<tr>
<td>xlc 9</td>
<td>■ For AIX 6.1.</td>
</tr>
</tbody>
</table>

Database Servers

Table 2–7 shows compatible database servers:

Table 2–7  Compatible Database Servers

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Oracle9i Database Release 2 (Oracle 9.2.0.6 and later patch levels) (Enterprise Edition only) | Supported on AIX 5.3.  
To partition your BRM database, you must use the Oracle Partitioning component. You must purchase a separate license for this component from Oracle.  
BRM supports the UTF8 character set. |
| Oracle Database 10g Release 2 (Oracle 10.2.0.1 and later patch levels) (Enterprise Edition only) | NA                                                                   |
| Oracle Real Application Clusters 10g               | Use Oracle Real Application Clusters 10g for high-availability configurations only. For scalability, use a multidatabase system. See "A BRM Multidatabase Production System".  
BRM supports the UTF8 character set. |
| Oracle Database 11g (Oracle 11.1.0.6 and later patch levels) (Enterprise Edition only) | NA                                                                   |
| Oracle Real Application Clusters 11g               | NA                                                                   |
| Oracle Database 11g Release 2 (Oracle 11.2.0.1 and later patch levels) (Enterprise Edition) | NA                                                                   |
| Oracle Database 12c Release 1 (Oracle 12.1.0.1 and later patch levels) (Enterprise Edition) | NA                                                                   |
Web Servers

Table 2–8 shows compatible Web servers:

<table>
<thead>
<tr>
<th>Web Server</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache 2.2.6</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Apache recommends upgrading to 2.2.x.

Linux

This section describes the primary software components compatible with a BRM Linux implementation.

Operating System Versions

Table 2–9 shows operating system compatibility for servers and clients:

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Enterprise Linux 4.5, AS release 4 (October Update 5) and higher 4.x updates</td>
<td>NA</td>
</tr>
<tr>
<td>Red Hat Enterprise Linux, (RHEL4.5), AS release 4 (Nahant Update 5) and higher 4.x updates</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Enterprise Linux 5 and higher 5.x updates</td>
<td>NA</td>
</tr>
<tr>
<td>RHEL5 and higher 5.x updates</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: The following clients are supported on Linux:

■ Developer Center
■ Self-Care Manager

Important: BRM must be installed on 64-bit versions of Linux for x86-based servers only. The one exception is for JCA Resource Adapter, which can be installed on 32-bit versions. See “Installing the BRM JCA Resource Adapter” in BRM JCA Resource Adapter.

Compilers

Table 2–10 shows supported compilers:

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>gcc version 3.4.6</td>
<td>Red Hat 3.4.6-8</td>
</tr>
<tr>
<td>gcc version 4.1.x</td>
<td>For Oracle Enterprise Linux 5 and REL5</td>
</tr>
</tbody>
</table>
Database Servers

Table 2–11 shows compatible database servers:

<table>
<thead>
<tr>
<th>Database server version</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle9i Database Release 2 (Oracle 9.2.0.6 and later patch levels) (Enterprise Edition only)</td>
<td>Supported on Oracle Enterprise Linux 4.5 and Oracle Enterprise Linux 5. To partition your BRM database, you must use the Oracle Partitioning component. You must purchase a separate license for this component from Oracle. BRM supports the UTF8 character set.</td>
</tr>
<tr>
<td>Oracle Database 10g Release 2 (Oracle 10.2.0.1 and later patch levels) (Enterprise Edition only)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Real Application Clusters 10g</td>
<td>Use Oracle Real Application Clusters 10g for high-availability configurations only. For scalability, use a multidatabase system. See “A BRM Multidatabase Production System”. BRM supports the UTF8 character set.</td>
</tr>
<tr>
<td>Oracle Database 11g (Oracle 11.1.0.6 and later patch levels) (Enterprise Edition only)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Real Application Clusters 11g</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Database 11g Release 2 (Oracle 11.2.0.1 and later patch levels) (Enterprise Edition)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Database 12c: Release 1 (Oracle 12.1.0.1 and later patch levels) (Enterprise Edition)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Web Servers

Table 2–12 shows compatible Web servers:

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache 2.2.4</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Apache recommends upgrading to 2.2.x.

HP-UX IA64

This section describes the primary software components compatible with a BRM HP-UX IA64 implementation.
Operating System Versions

Table 2–13 shows operating system compatibility for servers and clients:

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX IA64 11i Version 2.0 (B.11.23)</td>
<td>Required patches:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHSS_34040 11.23 linker + fdp cumulative patch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHSS_34885 C Compiler</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHSS_34856 aC++ Compiler (A.06.12)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHSS_35055 aC++ patch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHCO_34599 lib (c) cumulative patch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHCO_34669 for Daylight Savings Time (DST)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHCO_36098 tztab cumulative patch</td>
<td></td>
</tr>
<tr>
<td>HP-UX IA64 11i Version 3 (B.11.31)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>On HP-UX IA64 11.00</td>
<td>Required patch:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ PHSS_24303</td>
<td></td>
</tr>
</tbody>
</table>

Note: BRM can be customized on a 64-bit machine with the compiler’s 32-bit flag set. This produces 32-bit code that runs on 32-bit and 64-bit machines.

The following clients are supported on HP-UX IA64:

- Developer Center
- Self-Care Manager

Compilers

Table 2–14 shows supported compilers:

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>aCC B3910B A.06.12 [Aug 03 2006]</td>
<td>For 11i V2 (B.11.23)</td>
<td></td>
</tr>
<tr>
<td>cc C.11.23.12 (A.06.12) [Aug 2006]</td>
<td>For 11i V2 (B.11.23)</td>
<td></td>
</tr>
<tr>
<td>aCC B3910B A.06.12 [Aug 03 2006]</td>
<td>For 11i V3 (B.11.31)</td>
<td></td>
</tr>
<tr>
<td>cc C.11.23.12 (A.06.12) [Aug 2006]</td>
<td>For 11i V3 (B.11.31)</td>
<td></td>
</tr>
</tbody>
</table>

Database Servers

Table 2–15 shows compatible database servers:
Windows

2-8  BRM Installation Guide

Table 2–15  Compatible Database Servers

<table>
<thead>
<tr>
<th>Database server version</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle9i Database Release 2 (Oracle 9.2.0.6 and later patch levels) (Enterprise Edition only)</td>
<td>Supported on 64-bit HP-UX IA64 only. To partition your BRM database, you must use the Oracle Partitioning component. You must purchase a separate license for this component from Oracle. BRM supports the UTF8 character set.</td>
</tr>
<tr>
<td>Oracle Database 10g Release 2 (Oracle 10.2.0.1 and later patch levels) (Enterprise Edition only)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Real Application Clusters 10g</td>
<td>Use Oracle Real Application Clusters 10g for high-availability configurations only. For scalability, use a multidatabase system. See &quot;A BRM Multidatabase Production System&quot;. BRM supports the UTF8 character set.</td>
</tr>
<tr>
<td>Oracle Database 11g (Oracle 11.1.0.6 and later patch levels) (Enterprise Edition only)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Real Application Clusters 11g</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Database 11g Release 2 (Oracle 11.2.0.1 and later patch levels) (Enterprise Edition)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle Database 12c Release 1 (Oracle 12.1.0.1 and later patch levels) (Enterprise Edition)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Web Servers

Table 2–16 shows compatible Web servers:

Table 2–16  Compatible Web Servers

<table>
<thead>
<tr>
<th>Web Server</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache 2.2.8</td>
<td>NA</td>
</tr>
<tr>
<td>Apache 2.2.10</td>
<td>NA</td>
</tr>
</tbody>
</table>

Windows

This section describes the primary software components compatible with a BRM Windows implementation.

Operating System Versions

BRM clients run on the following Windows operating systems:

- Windows 2003
- Windows XP SP3
- Windows Vista Business Type (32-bit)
- Windows 7

**Note:** Windows 7 is certified with BRM 7.4 Patch Set 7 and later patch sets. You must install BRM 7.4 Patch Set 7 or later to use this operating system.

### Compilers

Table 2–17 shows supported compilers for client development:

**Table 2–17  Supported Compilers for Client Development**

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Visual Studio .NET, Version 13.10.3077</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Web Servers

Table 2–18 shows compatible Web servers:

**Table 2–18  Compatible Web Servers**

<table>
<thead>
<tr>
<th>Web server</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache 2.2.4</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Note:** Apache recommends upgrading to 2.2.x.

### Web Browsers

Table 2–19 shows compatible Web browsers.

**Table 2–19  Compatible Web Browsers**

<table>
<thead>
<tr>
<th>Browser</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Internet Explorer 7.0</td>
<td>NA</td>
</tr>
<tr>
<td>Mozilla Firefox 3.0.1</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Other Compatible Software

Table 2–20 provides compatibility information for other applications needed to create a complete customer management and billing solution for your business:

**Note:** With BRM 7.4 Maintenance Patch Set 2, the OpenSSL software is no longer part of the BRM patch set installation package. For BRM, Oracle recommends that you use the OpenSSL software bundled with the host operating system.
### Table 2–20  Other Compatible Software

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA Protocol Standard</td>
<td>Diameter RFC 3588 and 4006</td>
<td>NA</td>
</tr>
<tr>
<td>AAA Protocol Standard</td>
<td>Radius RFC 2865, 2866, and 2869</td>
<td>NA</td>
</tr>
<tr>
<td>ACE</td>
<td>ACE 5.5.1</td>
<td>For all platforms.</td>
</tr>
<tr>
<td>AES</td>
<td>AES issue date: 29/07/2002</td>
<td>NA</td>
</tr>
<tr>
<td>Agentpp</td>
<td>Agent++ version 1.4.14</td>
<td>NA</td>
</tr>
<tr>
<td>Agentpp</td>
<td>Agent++ version 3.5.26</td>
<td>NA</td>
</tr>
<tr>
<td>Agentpp</td>
<td>snmp++ version 3.2.20</td>
<td>NA</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Axis2/Java 1.6.2</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Tomcat version 5.5.27</td>
<td>NA</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Tomcat version 6.0.18</td>
<td>Only supported for Self-Care Manager on Solaris. Self-Care Manager is not compatible with Tomcat in a clustered environment. Self-Care Manager should not have the <code>&lt;distributable /&gt;</code> element set in the <code>web.xml</code> file.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Tomcat version 7.0.42</td>
<td>Support added in BRM 7.4 Patch Set 20. Only supported for Self-Care Manager on Solaris and Linux. Self-Care Manager is not compatible with Tomcat in a clustered environment. Self-Care Manager should not have the <code>&lt;distributable /&gt;</code> element set in the <code>web.xml</code> file.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xalan-C++ 1.10</td>
<td>NA</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xalan-C++ 1.11</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xalan-Java 2.7.1</td>
<td>NA</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xalan-Java 2.7.2</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xerces-C++ 2.7.0</td>
<td>For all platforms.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xerces-C++ 3.1.1</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xerces-J (Java) 2.6.2</td>
<td>Only JCA Resource Adapter uses Xerces version 2.9.1.</td>
</tr>
<tr>
<td>Apache Foundation</td>
<td>Xerces-J (Java) 2.11.0</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Borland</td>
<td>JBuilder 2008 Release 2</td>
<td>NA</td>
</tr>
<tr>
<td>HP</td>
<td>OpenCall 3.2</td>
<td>NA</td>
</tr>
</tbody>
</table>
| HP | HP OpenView | The BRM 7.4 Certified Smart Plug-in for HP OpenView is supported with the following components:  
  ■ HP OpenView Operations Management Server: 8.33  
  ■ HP OpenView Operations Agent: 8.33  
  ■ HP OpenView Performance Agent: 4.7  
  ■ HP OpenView Performance Manager: 8.2 |
<p>| IBM | Rational Purify 7.0.0.0_012 | Only for Solaris. |</p>
<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install Shield</td>
<td>Install Shield Multi-Platform 5.0.2</td>
<td>NA</td>
</tr>
<tr>
<td>LDAP</td>
<td>Oracle 10g Database Release 2</td>
<td>Client and Server.</td>
</tr>
<tr>
<td>LDAP</td>
<td>Oracle 11g Database</td>
<td>Client and Server.</td>
</tr>
<tr>
<td>LDAP</td>
<td>Oracle 11g Database Release 2</td>
<td>Client and Server.</td>
</tr>
<tr>
<td>LDAP</td>
<td>Netscape 5.0 and 5.5</td>
<td>Server only.</td>
</tr>
<tr>
<td>LDAP</td>
<td>Netscape 5.5 and 6.1</td>
<td>Server only.</td>
</tr>
<tr>
<td>OpenSSL</td>
<td>OpenSSL 0.9.8</td>
<td>For Linux: OpenSSL 0.9.8 For AIX, Solaris, and HP-UX IA64: OpenSSL 0.9.8a</td>
</tr>
<tr>
<td>Oracle</td>
<td>Application Integration Architecture for Communications 2.4</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Application Integration Architecture for Communications 2.5.x</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Application Integration Architecture for Communications 11.1</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Application Integration Architecture for Communications 11.2</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Business Intelligence Publisher 10.1.3.4</td>
<td>Supported on Windows only. Requires patch 11266018. Download and install the patch from Oracle Metalink.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Business Intelligence Publisher 11.1.1.7</td>
<td>Support added in BRM 7.4 Patch Set 18.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Java JDK 1.5.0_09</td>
<td>AIX: 1.5 (SR5) IBM J9 VM</td>
</tr>
<tr>
<td>Oracle</td>
<td>jswt.jar 4_2_36, from JDeveloper 10.1.3</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Java Runtime Environment (JRE) 1.4.2_06</td>
<td>JRE 1.4.2_06 is supported only for BI Publisher.</td>
</tr>
<tr>
<td>Oracle</td>
<td>JRE 1.5.0_09</td>
<td>AIX: 1.5 (SR5) IBM J9 VM</td>
</tr>
<tr>
<td>Oracle</td>
<td>Java JDK 1.6</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>JRE 1.6</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>JRE 1.7.0_13</td>
<td>JRE 1.7.0_13 is certified with BRM 7.4 Patch Set 17 and later patch sets. You cannot have JRE 1.7.0_13 preinstalled during the installation of base BRM 7.4 software.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Oracle Help for Java 4.2.7 and 5.0</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>Remote Diagnostic Agent (RDA) 4.15</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle</td>
<td>RDA 4.21</td>
<td>RDA 4.21 is included in the Third-party installation package from BRM 7.4 Patch Set 7. It includes the RDA S997CUST module, which collects customer-specific information.</td>
</tr>
</tbody>
</table>
### Table 2–20  (Cont.) Other Compatible Software

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle</td>
<td>RDA 8.03</td>
<td>Support added in BRM 7.4 Patch Set 21 on Solaris and Linux.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2 on AIX and HP-UX IA64.</td>
</tr>
<tr>
<td>Oracle</td>
<td>WebLogic Version 9.1</td>
<td>WebLogic 9.1 is supported only for Self-Care Manager.</td>
</tr>
<tr>
<td>Oracle</td>
<td>WebLogic Version 10.3</td>
<td>WebLogic 10.3 is supported only for JCA Resource Adapter.</td>
</tr>
<tr>
<td>Oracle</td>
<td>GlassFish Server 3.1</td>
<td>GlassFish Server 3.1 is supported only for JCA Resource Adapter.</td>
</tr>
<tr>
<td>Paymentech</td>
<td>96 Byte Batch Version 1.7.1</td>
<td>Requires Paymentech Manager.</td>
</tr>
<tr>
<td>Paymentech</td>
<td>Online Authorization Version 6.0 v1</td>
<td>Requires Paymentech Manager.</td>
</tr>
<tr>
<td>Paymentech</td>
<td>120 Byte Batch Version 3.0.0</td>
<td>Requires Paymentech Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>120 Byte Batch Version 3.0.0 is certified with BRM 7.4 Patch Set 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and later patch sets. You must install BRM 7.4 Patch Set 2 or later to use this version of Paymentech.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>120 Byte Batch Version 3.0.0 Revision 4.2 is certified with BRM 7.4 Patch Set 3 and later patch sets. You must install BRM 7.4 Patch Set 3 or later to use this version of Paymentech.</td>
</tr>
<tr>
<td>Paymentech</td>
<td>Online Authorization Version 7.4 v3</td>
<td>Requires Paymentech Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Online Authorization Version 7.4 v3 is certified with BRM 7.4 Patch Set 2 and later patch sets. You must install BRM 7.4 Patch Set 2 or later to use this version of Paymentech.</td>
</tr>
<tr>
<td>Perl</td>
<td>Perl 5.8.0</td>
<td>NA</td>
</tr>
<tr>
<td>Perl</td>
<td>Perl 5.18.2</td>
<td>Support added in BRM 7.4 Patch Set 21 on Solaris and Linux.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2 on AIX and HP-UX IA64.</td>
</tr>
<tr>
<td>Roaming Standard</td>
<td>TAP 3.11</td>
<td>NA</td>
</tr>
<tr>
<td>Roaming Standard</td>
<td>RAP 1.4</td>
<td>NA</td>
</tr>
<tr>
<td>Roaming Standard</td>
<td>CIBER 2.5</td>
<td>NA</td>
</tr>
<tr>
<td>Rogue Wave</td>
<td>Rogue Wave 9.x</td>
<td>For Linux: Rogue Wave Ed9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For AIX, Solaris, and HP-UX IA64: Rogue Wave Ed9.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Objective Grid 9.03.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Objective Toolkit 8.03.</td>
</tr>
<tr>
<td>Rogue Wave</td>
<td>Stingray Studio 11.1</td>
<td>Support added in BRM 7.4 Maintenance Patch Set 2.</td>
</tr>
<tr>
<td>Taxware</td>
<td>Taxware Sales and Use 3.5.4 (32-bit)</td>
<td>Requires Taxware Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not supported on HP-UX IA64.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not tested on AIX 6.1.</td>
</tr>
</tbody>
</table>
### Table 2–20  (Cont.) Other Compatible Software

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Software</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxware</td>
<td>WorldTax 2.6.2</td>
<td>Requires Taxware Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not supported on HP-UX IA64.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not tested on AIX 6.1.</td>
</tr>
<tr>
<td>Vertex</td>
<td>Communications Tax Q Series (CTQ) 2.00.x</td>
<td>Requires Vertex Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not tested on AIX 6.1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support for CTQ Series 1.01.06 is provided with BRM 7.4 Patch Set 9 and later patch sets. You must install BRM 7.4 Patch Set 9 or later to use CTQ Series 1.01.06.</td>
</tr>
<tr>
<td>Vertex</td>
<td>Sales Tax Q Series (STQ) 4.x</td>
<td>Requires Vertex Quantum Manager or Vertex Manager.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP-UX IA64 is supported with the ISAM database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not tested on AIX 6.1.</td>
</tr>
<tr>
<td>Webstart</td>
<td>Webstart version 1.5</td>
<td>NA</td>
</tr>
</tbody>
</table>
This document provides database configuration guidelines for configuring your BRM database.

For information on installing Oracle Communications Billing and Revenue Management (BRM), see "BRM Installation Overview".

**Generic Database Configuration**

The basic steps to create a BRM database are as follows:

- Selecting the Storage Device Type
- Estimating the Database Size
- Assigning Disks for the Operating System and for BRM
- Assigning Storage for Log Files, Rollback Segments, and Temporary Storage
- Selecting the Storage Model
- Creating Tablespace Storage
- Mapping Tablespaces to Logical Devices
- Creating Tablespaces
- Running Configuration Scripts to Create the BRM Database

**Selecting the Storage Device Type**

Databases can be stored in raw devices (partitions) or files. Raw devices provide the best performance for most workloads, but file systems are easier to administer because of the availability of system administration utilities. However, depending on your system, the performance when using files can be almost equal to the performance when using raw partitions. For example, this is true of some disk arrays that are available.

In general, databases are stored in raw partitions on large systems.

**Estimating the Database Size**

The objects that require the most storage space in a default BRM installation are accounts, bills, and events. The tables that correspond to these objects are also the ones with the most activity:

- `ACCOUNT_T`
- `ACCOUNT_BALANCE_T`
Service objects also require a lot of storage:

- SERVICE_T

Your customizations might create additional large tables. For example, if you store a lot of account profile data, you need to account for data in the ACCOUNT_PROFILES_T table.

Your estimate should not include space gained by archiving.

It takes about 17 to 18 GB of disk space for one million accounts. Activities such as billing, invoicing, and rating result in the most disk space used.

**International Version Sizing Considerations**

English databases store VARCHARs as one byte per character. Localized versions of BRM store these strings in UTF8 format. The number of bytes per character in this case can vary between 1 and 6. All internally generated strings are in English, and therefore, remain 1 byte per character. The main example would be POID type. On the other hand, any character string that can be manipulated by BRM GUI tools can vary in size, for example, names, addresses, descriptions, and notes. To size the database, you need to determine roughly what percentage of the database consists of these strings that can vary in size.

**Assigning Disks for the Operating System and for BRM**

Allocate separate disks for the BRM software, operating system, and operating system SWAP space. These disks should not be used for any other purpose.

**Assigning Storage for Log Files, Rollback Segments, and Temporary Storage**

Use separate disks for redo log files, rollback segments, and temporary space. Do not use the disks for any other purpose.

The redo, rollback, and temporary storage database objects are not created or modified by the BRM configuration scripts. Use a separate script to create these objects.

To determine the amount of storage that is used for redo logs, rollback segments, and temporary space, use the following guidelines.

**Assigning Storage for Redo Log Files**

The redo log files are the most heavily used objects in the database system. You usually create two redo logs.

The redo log files should be large enough to avoid excessive switching between log files. Each switch triggers a checkpoint, which slows performance. For most implementations, the size of each redo log file should be 1 to 5 GB.
If you are not using database archiving, you can put both redo logs on one disk. If you are using archiving, you should use at least two redo logs, on separate disks. When archiving, the redo log files should be large enough to enable each redo log file to be fully archived before it has to be active. You can increase the number of redo log files to allow enough space for archiving.

**Assigning Storage for Rollback Segments**

Rollback segments are the second-most used objects in Oracle databases. All rollback segments can be in a single tablespace. The number of rollback segments should be approximately equal to the number of Data Manager (DM) back ends.

To prevent the growing and shrinking of rollback statements, use the following declaration:

```sql
SQL> init 256K next 256K minextents 20 optimal 5120K
```

**Assigning Storage for Temporary Storage**

Temporary storage should be three to four times the size of the largest table (usually EVENT_T). In most cases, 1 GB is enough, since simulation programs and BRM do not sort this table.

**Note:** By default, temporary storage is TEMP.

**Selecting the Storage Model**

Choose a storage model based on the total size of your database, which you can determine by summing your data, index, rollback, and temporary tablespaces.

- Use **Test** for test or demonstration databases smaller than 700 MB.
- Use **Small** for test or demonstration databases smaller than 1.5 GB.
- Use **Medium** for databases smaller than 30 GB.
- Use **Large** for databases larger than 30 GB.

You set the storage option at installation by editing the `pin_setup.values` file. For more information, see "Installing BRM".

During installation, BRM tables are created using one of the storage models. Therefore, the default storage clause is not used at installation. (The default storage clause specifies the storage parameters to use if no storage clause is provided.) However, if you create custom tables, you must specify a storage clause, or else the default storage clause is used.

**Creating Tablespace Storage**

Tablespace storage is created from physical disks, however, the unit of storage assigned to a tablespace is a logical device (also called a logical drive or volume). A logical device can be an entire disk, a set of disks, or part of a disk.

You usually use a volume manager, a hardware-specific utility, or a hardware-level RAID manager to create logical devices. (Use either a volume manager or a RAID manager, but not both.) A disadvantage with using a RAID solution is the lack of controller redundancy.
There are various types of logical devices, for example, striped (RAID0), RAID1, and RAID5. Which one you choose depends on requirements for performance, availability, and price:

- RAID0 has the best performance and price, but provides no fault tolerance.
- RAID1 and RAID5 provide increased availability, but with reduced performance, especially for write operations.
- RAID0+1 provides the performance advantage of striping, and the availability of mirroring. However, the cost is higher because you use twice as much disk space.

Before determining the number of tablespaces and how to assign them to logical devices, determine the number of available logical devices.

The number of logical devices that can be created on an UNIX system depends on the number and size of stripes used to construct each logical device. Each logical device is normally constructed from several 32 KB or 64 KB stripes made over four to seven physical disks using a volume manager. Each logical device consists of multiple stripes over the same set of disks. One or more logical devices can be created on one set of disks. Fewer than four disks may be used in small- or medium-sized databases.

For best performance:

- Assign all logical devices created over the same set of disks to the same tablespace.
- Each logical device should be on independent disks and controller, usually 6 to 14 disks per controller. Only three or four disks per tablespace would still be a good configuration.

Indexes occupy approximately one third of the space required by the database. A good initial size for a tablespace is 2 GB. Logical devices can then be added in 2 GB or larger increments. Logical devices smaller than 2 GB can lead to reduced performance due to maintenance overhead, although they may be required in smaller databases where the number of available disks is limited. The ability to create logical devices larger than 2 GB is dependent upon disk size and number of disks.

If possible, create very large (10 GB) initial tablespaces instead of small (less than 2 GB) tablespaces. Use the Tables Sheet and Indexes Sheet to determine the size of these initial tablespaces.

From the `pin_tables.values` file, determine which tables map to which tablespaces. Then sum the storage required for the tablespace. This can be done for the larger tables and tablespaces. The smaller tablespaces do not need more than a few Gigabytes for their initial storage. See "Tablespace Priorities".

The size of the database, in turn, determines the minimum number of disks required for the database. Remember to take into account disk space required for other purposes, for example, the operating system, BRM, log files, temporary storage, and swap files.

You should have enough disks to avoid performance bottlenecks. In addition, you can increase performance by spreading the most-used tables over multiple disks.

---

**Note:** You can add disks and logical devices at any time after BRM has been installed.

---

After determining the number of disks available for the database, divide the tablespaces among those disks.
Half of the remaining space will be used for mirroring. Put mirrors on different disks than their corresponding tables and indexes. The number of mirror logical devices will be equal, in number and size, to their corresponding table and index logical devices.

After allocating disk space for mirrors, divide the remaining disk space using the ratio of 2:1 between tables and indexes. That is, two-thirds of the space will be used for table logical devices and one-third of the space will be used for index logical devices.

**Note:** The logical devices may not be the same size, because some tablespaces will be more active than others. See “Tablespace Priorities”.

Create the logical devices over the remaining physical disks using the above guidelines. The next step is mapping tablespaces to logical devices.

### Mapping Tablespaces to Logical Devices

Logical-to-physical table and index mapping is defined in the `BRM_Home/setup/scripts/pin_tables.values` file, where `BRM_Home` is the directory in which you installed BRM. This file lists 36 logical tablespaces for indexes and 36 logical tablespaces for data.

In the default BRM installation, all 72 BRM logical tablespaces map to two separate physical tablespaces: one for all the tables ($PIN_CONF_DM_DB_TABLES_GROUP) and one for all the indexes ($PIN_CONF_DM_DB_INDEX_GROUP). When you install BRM, the physical tablespace names PIN00 and PINX00 are substituted for the configuration variable names in the file.

The default logical-to-physical tablespace mappings defined in the `pin_tables.values` file are:

**Default Tablespaces for Data**

```plaintext
$PIN_CONF_TBLSPACE0 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE1 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE2 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE3 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE4 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE5 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE6 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE7 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE8 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE9 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE10 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE11 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE12 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE13 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE14 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE15 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE16 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE17 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE18 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE19 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE20 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE21 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE22 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE23 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE24 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE25 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
```
$PIN_CONF_TBLSPACE26="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE27="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE28="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE29="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE30="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE31="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE32="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE33="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE34="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE35="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;
$PIN_CONF_TBLSPACE36="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP$;

Default Tablespaces for Indexes

Note: You can customize the tablespaces to improve performance.

$PIN_CONF_TBLSPACEX0="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX1="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX2="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX3="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX4="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX5="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX6="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX7="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX8="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX9="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX10="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX11="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX12="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX13="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX14="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX15="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX16="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX17="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX18="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX19="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX20="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX21="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX22="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX23="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX24="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX25="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;
$PIN_CONF_TBLSPACEX26="$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP$;

Note: You can customize the tablespaces to improve performance.

To map logical and physical devices, you modify the entries in the right-hand column. You can edit the file before or after creating the logical devices, however, you must create logical and physical tablespaces before running the pin_setup script that uses the values in the pin_tables.values file.
Tablespace Priorities
BRM tablespaces are ranked according to highest level of activity. Table 3–1 shows the default priority:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Table</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tablespace5</td>
<td>tablespace15</td>
</tr>
<tr>
<td>2</td>
<td>tablespace0</td>
<td>tablespace14</td>
</tr>
<tr>
<td>3</td>
<td>tablespace15</td>
<td>tablespace1</td>
</tr>
<tr>
<td>4</td>
<td>tablespace1</td>
<td>tablespace0</td>
</tr>
<tr>
<td>5</td>
<td>tablespace6</td>
<td>tablespace7</td>
</tr>
<tr>
<td>6</td>
<td>tablespace2</td>
<td>tablespace11</td>
</tr>
<tr>
<td>7</td>
<td>tablespace3</td>
<td>tablespace5</td>
</tr>
<tr>
<td>8</td>
<td>tablespace7</td>
<td>tablespace12</td>
</tr>
<tr>
<td>9</td>
<td>tablespace4</td>
<td>tablespace9</td>
</tr>
<tr>
<td>10</td>
<td>tablespace8</td>
<td>tablespace6</td>
</tr>
<tr>
<td>11</td>
<td>tablespace14</td>
<td>tablespace13</td>
</tr>
<tr>
<td>12</td>
<td>tablespace13</td>
<td>tablespace2</td>
</tr>
<tr>
<td>13</td>
<td>tablespace12</td>
<td>tablespace3</td>
</tr>
<tr>
<td>14</td>
<td>tablespace10</td>
<td>tablespace10</td>
</tr>
<tr>
<td>15</td>
<td>tablespace11</td>
<td>tablespace4</td>
</tr>
<tr>
<td>16</td>
<td>tablespace9</td>
<td>tablespace8</td>
</tr>
</tbody>
</table>

In most cases you should not change table to tablespace mappings. Instead, change the tablespace priorities, the number of logical priorities, or both. Your goal should be to maintain the best performance based on your customizations and customer usage patterns.

If you need to change table-to-tablespace mapping, use the same tablespace for tables whose sizes are a function of different parameters. In this way, tables grow at different rates, resulting in more efficient space allocation within one tablespace. If tablespaces aren’t large enough, they fill up and an error is returned to BRM. This usually happens with the event tables first.

For best results, 36 tablespaces have been provided for data and another 36 tablespaces for indexes in the `pin_tables.values` file. Depending on your installation size, available hardware, and the functionality you are implementing, such as using the Rated Event (RE) Loader, some or all of these tablespaces may be used for database. BRM recommends the use of at least 18 tablespaces for data and another 16 for indexes.

**Important:** If you are using RE Loader, you may need additional tablespaces for related tables.

If there are fewer than 72 logical devices, you can choose your own method to map the logical tablespaces to the smaller number of physical tablespaces. For example, you can allocate a few physical tablespaces to the highest-priority logical tablespaces, and
allocate the remaining logical tablespaces using round-robin. Or, you can simply map all tablespaces using round-robin.

For example, assume that you have 6 logical devices for tables, and 4 logical devices for indexes. These 10 logical devices are mapped to 10 physical tablespaces. The two highest priority tablespaces are mapped to their own physical tablespaces, using the priorities defined in the priority table. The remaining 30 logical tablespaces are then mapped to the remaining tablespaces using round-robin. To do this, first assign the physical tablespace to the physical tablespace configuration variable:

```
#========================================================
# default tablespace or filegroup names
#========================================================
$PIN_CONF_DM_DB_TABLES_GROUP = "pin00";
$PIN_CONF_DM_DB_TABLES_GROUP1 = "pin01";
$PIN_CONF_DM_DB_TABLES_GROUP2 = "pin02";
$PIN_CONF_DM_DB_TABLES_GROUP3 = "pin03";
$PIN_CONF_DM_DB_TABLES_GROUP4 = "pin04";
$PIN_CONF_DM_DB_TABLES_GROUP5 = "pin05";
$PIN_CONF_DM_DB_INDEX_GROUP = "pinx00";
$PIN_CONF_DM_DB_INDEX_GROUP1 = "pinx01";
$PIN_CONF_DM_DB_INDEX_GROUP2 = "pinx02";
$PIN_CONF_DM_DB_INDEX_GROUP3 = "pinx03"
```

Then change the default logical tablespace to physical tablespace mapping as follows, using the priority table:

**For Data:**

```
$PIN_CONF_TBLSPACE0 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP1";
$PIN_CONF_TBLSPACE1 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP3";
$PIN_CONF_TBLSPACE2 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP5";
$PIN_CONF_TBLSPACE3 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP2";
$PIN_CONF_TBLSPACE4 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP4";
$PIN_CONF_TBLSPACE5 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP";
$PIN_CONF_TBLSPACE6 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP4";
$PIN_CONF_TBLSPACE7 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP3";
$PIN_CONF_TBLSPACE8 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP5";
$PIN_CONF_TBLSPACE9 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP3";
$PIN_CONF_TBLSPACE10 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP5";
$PIN_CONF_TBLSPACE11 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_TABLES_GROUP2";
...  
...  
**For Indexes:**

```
$PIN_CONF_TBLSPACEX0 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP3";
$PIN_CONF_TBLSPACEX1 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP2";
$PIN_CONF_TBLSPACEX2 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP3";
$PIN_CONF_TBLSPACEX3 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP";
$PIN_CONF_TBLSPACEX4 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP2";
$PIN_CONF_TBLSPACEX5 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP2";
$PIN_CONF_TBLSPACEX6 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP4";
$PIN_CONF_TBLSPACEX7 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP1";
$PIN_CONF_TBLSPACEX8 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP3";
$PIN_CONF_TBLSPACEX9 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP";
$PIN_CONF_TBLSPACEX10 = "$PIN_CONF_TABLESPACE_ID $PIN_CONF_DM_DB_INDEX_GROUP1";
```
The details on changing configuration variables in the configuration scripts can be found in the comments in those scripts.

In test installations, where the total number of disks is constrained on the database server, it is often easier to configure a single tablespace or file group for data (PIN00) and one for indexes (PINX00). For example, if a database system has 12 physical drives available for data and indexes, you could configure the database as follows:

- Create 3 logical volumes (E:, F:, G:) of 4 striped drives
- Create the data tablespace PIN00 using a datafile on E: and F:
- Create the index tablespace PINX00 using a datafile on G:
- Map all the $PIN_CONF_TBLSPACE* entries to PIN00 and all the $PIN_CONF_TBLSPACEX* entries to PINX00

Since there are not enough disks to practically separate tablespaces into distinct logical volumes, it makes sense from a performance perspective to manage just 2 tablespaces. This way the operating system will manage the underlying parallel I/O operations.

Be sure to assign custom tables (new tables created for new objects that are not part of the default BRM installation) to explicit tablespaces. These can be new tablespaces that you create or existing ones. If you do not make a tables pace assignment for these tables, the new tables will go into a default tablespace which may cause performance or storage problems as the new tables grow or are accessed.

Creating Tablespaces

Create the actual tablespaces before running the pin_setup configuration script since they require existing tablespaces. Only the two default tablespaces need to be created if you have not edited the pin_tables.values file to assign tables to non-default tablespaces.

Running Configuration Scripts to Create the BRM Database

See "Installing and Configuring the Oracle Database" for information about creating the BRM database.

Configuring Oracle Databases

For information about configuring the Oracle database, see the Oracle documentation. To increase performance, experiment with database configuration options, for example, increase the number of processes, rollbacks, shared pool size, index space, shared memory, and buffers.

Examine the init.ora parameters in TPC-C full disclosure reports for your hardware platform. Compare those parameters with your installation. Understand why the examples might be different than your values, and experiment with different values.

Table 3–2 provides guidelines for some of the Oracle and operating system configuration options.
Table 3–2  Guidelines for Some Oracle Configuration Options

<table>
<thead>
<tr>
<th>Configuration Options</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>_b_tree_bitmap_plans</td>
<td>Set to FALSE for all BRM system configurations. This improves BRM database performance.</td>
</tr>
<tr>
<td>disk_async_io</td>
<td>Set to TRUE to allow asynchronous database updates. Using async I/O means that you only have one dbwriter process.</td>
</tr>
<tr>
<td>block size</td>
<td>Use a minimum 8KB block size for the database.</td>
</tr>
<tr>
<td>cursor_space_for_time</td>
<td>Set to TRUE to increase performance, although this uses slightly more disk space in the SGA.</td>
</tr>
<tr>
<td>db_block_buffers</td>
<td>In general, the size of the SGA should be less than or equal to one-half of real memory. The two major components of the SGA are shared_pool_size and db_block_buffers. In other words, the SGA in bytes is roughly equal to (shared_pool_size + (db_block_buffers * db_block_size)). Set the shared_pool_size to approximately 10 to 12 MB. On larger systems, you can set it to be twice as large. To find the optimal value for db_block_buffers, divide the size of available shared memory minus shared_pool_size by db_block_buffers. The amount of RAM available on the database server sets an upper bound on the size of the SGA. The SGA should be roughly one-half of the available RAM. SGAs can be up to 2 GB for large installations. The number of buffers (db_block_buffers) can be up to approximately 300000 on large installations. Sample value setting for the db_block_buffers parameter: 340000. Sample value setting for the shared_pool_size parameter: 30000000.</td>
</tr>
<tr>
<td>db_writer_processes</td>
<td>You can improve I/O performance by increasing the number of DB writer processes from the default, single process. Setting db_writer_processes between 5 and 10 (for the largest systems) can improve I/O throughput. If db_writer_processes is set, dbwr_io_slaves must not be specified.</td>
</tr>
<tr>
<td>DML locks</td>
<td>Use 5000 for DML locks for very heavy workloads. Sample value setting for the dml_locks parameter: 5000.</td>
</tr>
<tr>
<td>freelist and pctfree</td>
<td>Consider creating tablespaces with additional room for inserting. The storage parameters are pctfree and freelist. Although using freelists requires more disk and memory, insert speed is greatly enhanced. The default is 1. The most active tables should be in tablespaces with at least 10 – 20 freelists, depending upon the size of the installation.</td>
</tr>
<tr>
<td>log_buffer</td>
<td>Set the log_buffer option to approximately 2 MB. Sample value setting for the log_buffer parameter: 2621440.</td>
</tr>
<tr>
<td>log_checkpoint_interval</td>
<td>Make the log_checkpoint_interval higher for performance and lower for recoverability. The log_checkpoint_interval should be set to 3600 for small workloads. A much larger number should be used for large configurations. The performance impact for checkpointing can be up to 20%.</td>
</tr>
<tr>
<td>logfile</td>
<td>Set the size of the logfile parameter to be between 1 and 5 GB for better performance. Configure at least two log groups and put them on the fastest disks in the system.</td>
</tr>
</tbody>
</table>
The shared_pool_size is not the size of available shared memory. The SGA mainly consists of two pools (shared_pool_size and db_block_buffers) whose combined size is roughly the size of the SGA. The size of shared memory should be bigger than the result of the following formula:

\[
\text{shared_pool_size} + (\text{db_block_buffer} \times \text{db_block_size})
\]

**Example of a Large-Scale Oracle Installation**

Table 3–3 shows the tablespace mapping to physical array groups for a large-scale Oracle installation.

**Table 3–3  Tablespace mapping to physical array groups**

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>Array Group (LUN)</th>
<th>Storage Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN05</td>
<td>$c0d1</td>
<td>20G</td>
</tr>
<tr>
<td>PIN00</td>
<td>$c1d2</td>
<td>20G</td>
</tr>
<tr>
<td>PIN15</td>
<td>$c2d1</td>
<td>20G</td>
</tr>
<tr>
<td>PIN01</td>
<td>$c3d1</td>
<td>20G</td>
</tr>
<tr>
<td>PIN06</td>
<td>$c0d3</td>
<td>15G</td>
</tr>
<tr>
<td>PIN02</td>
<td>$c1d4</td>
<td>15G</td>
</tr>
</tbody>
</table>
Using Rule-Based Optimization versus Cost-Based Optimization

If you have not partitioned the event tables in your Oracle database, you can use rule-based optimization or cost-based optimization. If you have partitioned the tables, you can use only cost-based optimization.

### Table 3–3 (Cont.) Tablespace mapping to physical array groups

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>Array Group (LUN)</th>
<th>Storage Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN03</td>
<td>$c2d3</td>
<td>15G</td>
</tr>
<tr>
<td>PIN07</td>
<td>$c3d3</td>
<td>15G</td>
</tr>
<tr>
<td>PIN04</td>
<td>$c0d5</td>
<td>15G</td>
</tr>
<tr>
<td>PIN08</td>
<td>$c1d6</td>
<td>15G</td>
</tr>
<tr>
<td>PIN14</td>
<td>$c2d5</td>
<td>15G</td>
</tr>
<tr>
<td>PIN13</td>
<td>$c3d5</td>
<td>15G</td>
</tr>
<tr>
<td>PIN12</td>
<td>$c0d7</td>
<td>15G</td>
</tr>
<tr>
<td>PIN10</td>
<td>$c1d8</td>
<td>15G</td>
</tr>
<tr>
<td>PIN11</td>
<td>$c2d7</td>
<td>15G</td>
</tr>
<tr>
<td>PIN09</td>
<td>$c3d7</td>
<td>15G</td>
</tr>
<tr>
<td>PINX15</td>
<td>$c0d9</td>
<td>10G</td>
</tr>
<tr>
<td>PINX14</td>
<td>$c1d10</td>
<td>10G</td>
</tr>
<tr>
<td>PINX01</td>
<td>$c2d9</td>
<td>10G</td>
</tr>
<tr>
<td>PINX00</td>
<td>$c3d9</td>
<td>10G</td>
</tr>
<tr>
<td>PINX07</td>
<td>$c0d11</td>
<td>10G</td>
</tr>
<tr>
<td>PINX11</td>
<td>$c1d12</td>
<td>10G</td>
</tr>
<tr>
<td>PINX05</td>
<td>$c2d11</td>
<td>10G</td>
</tr>
<tr>
<td>PINX12</td>
<td>$c3d11</td>
<td>10G</td>
</tr>
<tr>
<td>PINX09</td>
<td>$c0d13</td>
<td>10G</td>
</tr>
<tr>
<td>PINX06</td>
<td>$c1d14</td>
<td>10G</td>
</tr>
<tr>
<td>PINX13</td>
<td>$c2d13</td>
<td>10G</td>
</tr>
<tr>
<td>PINX02</td>
<td>$c3d13</td>
<td>10G</td>
</tr>
<tr>
<td>PINX03</td>
<td>$c0d15</td>
<td>10G</td>
</tr>
<tr>
<td>PINX10</td>
<td>$c1d0</td>
<td>10G</td>
</tr>
<tr>
<td>PINX04</td>
<td>$c2d15</td>
<td>10G</td>
</tr>
<tr>
<td>PINX08</td>
<td>$c3d15</td>
<td>10G</td>
</tr>
<tr>
<td>RBS00</td>
<td>$c4d0</td>
<td>10G</td>
</tr>
<tr>
<td>RBS01</td>
<td>$c4d2</td>
<td>10G</td>
</tr>
<tr>
<td>REDO_LOGS1</td>
<td>$c5d0 10G</td>
<td>NA</td>
</tr>
<tr>
<td>REDO_LOGS2</td>
<td>$c5d2 10G</td>
<td>NA</td>
</tr>
<tr>
<td>SYSTEM</td>
<td>$c5d4</td>
<td>1G</td>
</tr>
<tr>
<td>TEMP</td>
<td>$c5d6</td>
<td>10G</td>
</tr>
</tbody>
</table>
BRM indexes are designed to work best when you use rule-based optimization. To specify rule-based optimization, enter this line in the init.ora initialization file:

OPTIMIZER_RULE=RULE

The alternative to using rule-based optimization is using CHOOSE optimization. This is the default optimization method, however, it requires some initialization and maintenance to achieve consistently high performance.

Setting OPTIMIZER_RULE=CHOOSE in the init.ora file forces Oracle to use a cost-based optimization algorithm when tables in the query have statistics and the rule-based optimization when they do not. Cost-based optimization uses the actual relationship between data. To support cost-based optimization (which can be enabled by specifying HINTs in the query or running ANALYZE on a table), statistics must be updated by analyzing the actual data in the tables. This operation can take a very long time on large tables, such as the event tables. Cost-based optimization is used when an SQL statement accesses partitioned tables or indexes; rule-based optimization is not available for partitioned tables and indexes.

In addition, using ANALYZE requires table statistics to be periodically updated. Unless this occurs, the optimizer can choose a poorly performing access path, even though an index exists. In other words, the optimizer could actually skip an index if statistics are not updated.

---

**Important:** After ANALYZE has been run on a table or set of tables, cost-based optimization will be used. If the statistics are not kept up-to-date, the optimizer may not choose the best access plan and performance will be impacted.

---

**About Oracle Parallel Server**

Oracle Parallel Server (OPS) is a version of Oracle that runs on a cluster. A single database is accessed via multiple host systems, each of which is running its own instance of Oracle. This configuration can be used for high availability or performance. This configuration is not necessarily the best configuration for high availability because other solutions based on a cluster and a single Oracle instance are easier to install and administer. With strong DBA expertise, however, OPS may be an option. If OPS is used, single active instance (primary node/backup node) mode is recommend.

From a performance standpoint, an OPS configuration is not recommended for BRM installations where write workloads are predominate. An OPS installation can get much better performance than a single instance on read-only or read-mostly workloads such as basic authentication and authorization or basic Customer Service Representative operations. However, performance for write workloads, like event processing, is only slightly better than using a single instance. For increased performance and scalability, consider using a multidatabase system. See “A BRM Multidatabase Production System”.

**About Using Virtual Columns**

Oracle Database 11g, by default, supports virtual columns (columns whose values are defined by an expression, are computed when you query the data, and are not physically stored in the database). You can use virtual columns in the BRM database if you have Oracle Database 11g (or later).

Implementations of BRM have shown that a high percentage of the BRM database storage space can be used by the event tables. BRM can use virtual columns in a way
that results in space savings for event records. To enable virtual columns in the BRM database, you convert event classes (/event and its subclasses) in the BRM schema. The savings in database storage applies to event data that the system creates after the virtual columns are generated (not to existing event data). Virtual column functionality is transparent to BRM.

For information about virtual columns in general, see the Oracle Database documentation.

For information on generating virtual columns on BRM event tables, see the discussion on enabling virtual columns in BRM System Administrator’s Guide.

**Maintaining a BRM Database**

You monitor and maintain the BRM database with standard database tools. For example, you can set up your database software to generate log files. For more information, see the documentation for your database software.

You can also use the sar utility to monitor performance.

---

**Important:** Do not use SQL statements to insert, delete, or update BRM tables or objects. Always use the Portal Communications Module (PCM) interface, which guarantees the integrity of the BRM database.

For information about managing a multidatabase system, see "Managing a Multidatabase System" in BRM System Administrator’s Guide.

**Maintaining the Connection to the Database**

If the connection to the database fails, BRM automatically attempts to reconnect, using the database name listed in the configuration file for the Data Manager. If BRM can reestablish the connection, BRM generally restarts the operation. If BRM was in the middle of a transaction, BRM reports a PIN_ERR_STORAGE error in the log file for the Data Manager. If BRM cannot reestablish the connection, it reports a PIN_ERR_STORAGE_DISCONNECT error.

If BRM is running on an Oracle Parallel Server (OPS) to increase fault tolerance, the OPS database appears to a DM to be multiple logical databases, each with a different host name, or SID. For the DM to be able to reconnect to a surviving host after a failure of one host, you must configure the DM to look for all hosts in an OPS system:

1. Open the Data Manager configuration file (BRM_Home/sys/dm_oracle/pin.conf).
2. For each host in the OPS system, add an sm_database configuration entry below the existing entry.
   
   See the guidelines for that entry in the configuration file.

The Data Manager looks for OPS hosts in the order in which they appear in the configuration file.

For more information on failure recovery, see "Four-Tier Architecture and Failure Recovery” in BRM Concepts.
Scheduling Backups

You should back up the database every night. You can choose a backup solution from your database manufacturer or from a third party.

To keep your database running at all times, ready to respond to real-time events, use the database online backup utilities for routine backups.

You should also back up your system files (programs, scripts, source code, and documentation) and your data files and keep the backups in a secure, offsite location. To be safe, you should keep at least three iterations of your system backups and at least one month’s worth of daily backups. Storage media are usually less expensive than customer problems.

Verify the data and system backup files to ensure that you can recover the data. At times, this secondary system can also serve as a fully functional test system. If BRM releases a patch that can significantly affect your installation, it is important to try it on a test system before installing it in your production system.

---

**Important:** The only way to verify the data and system backup files is to restore them to another location to ensure that there are no errors in reading, writing, or formatting.

---

Monitoring Database Space

Before you installed BRM, you set up your database based on estimates of the size of tables for your business activity. The planning process also included forecasts of how fast the tables would grow. You should monitor the growth of tables, not only to make sure you maintain enough space on your system but also to check for unexpected growth that would indicate some problem.

On a typical production system, you should check tables monthly. As part of this audit, you should match rows in each of the tables against the expected rows. If you spot discrepancies, checking the individual tables shows where the unexpected growth is coming from. For a list of the BRM tables, see "Storable Class-to-SQL Mapping" in BRM Developer’s Reference.

If you are running a multidatabase system, you can use growth information to revise your scheme for distributing accounts among your various databases. See "Setting Database Priorities" in BRM System Administrator’s Guide.

Monitoring Oracle Tablespace Usage

You should monitor the growth of tables so that you can add more extents or datafiles before the tablespaces are filled. For information about adding datafiles to tablespaces, you should make a quick check of the free space remaining in the tablespaces. For example, you can use this SQL command:

```
SQL> select * from user_free_space;
```

This command produces data about the available blocks and bytes for each tablespace. Your database administrator should provide a maximum value. If a tablespace grows past that maximum, you (or an automated script) should notify the database administrator for remedial action.

Monitoring SQL Statements

You can collect debugging information by gathering the SQL statements generated by dm_oracle processes. The statements appear in the DM log file, not the DM pinlog file.
To get the SQL statements for a specific operation or sequence of events:

1. In the environment from which the `dm_oracle` will be started, set the environment variable DM_DEBUG3 to 0xFFFF003F:

   Using the c-shell (`csh`):
   ```
   setenv DM_DEBUG3 0xFFFF003F
   ```

   Using the korn shell (`sh/ksh`):
   ```
   DM_DEBUG3=0xFFFF003F
   export DM_DEBUG3
   ```

2. Clear the old log file.

3. Start the Oracle DM.

4. Run the DM operation you are debugging to generate SQL statements.

5. Stop the Oracle DM.

6. Use the `grep` command on the Oracle DM log file for the "SQL_STMT" string.

7. Unset the DM_DEBUG3 environment variable. Otherwise, subsequent DM operations generate huge log files.

   Using the c-shell (`csh`):
   ```
   unsetenv DM_DEBUG3
   ```

   Using the korn shell (`sh/ksh`):
   ```
   unset DM_DEBUG3
   ```

### Rebuilding Indexes

The structure of indexes influences the speed at which BRM can find records in the database. While you are using BRM in a production environment, especially when there is intensive inserting in the database, these indexes can become unbalanced, impeding access to BRM records. For best efficiency, rebuild the indexes frequently. For example, if you have a heavily used production system, you might want to rebuild the indexes weekly.

---

**Caution:** Do not delete any of the standard BRM indexes without first consulting Oracle. Removing an index can lead to serious performance problems. Also, do not delete or change any of the standard stored procedures. Otherwise, the Data Manager might malfunction.

---
This document describes the hardware and software required for a Oracle Communications Billing and Revenue Management (BRM) system.

**Important:** Before you configure your system, see "Improving BRM Performance" in *BRM System Administrator’s Guide* and "Database Configuration and Tuning". These documents contain information on configuring hardware and software for optimal performance with BRM. They also contain a detailed description of memory configuration for the Connection Manager (CM) and Data Manager (DM) on all platforms.

### Overview of Hardware and Software Requirements

Running BRM requires the following:

- A compatible operating system. See "Operating System Requirements".
- Available disk space. See "Disk Space Requirements".
- Database software. See "Database Requirements".
- Network connections. See "Network Requirements".

### Operating System Requirements

The BRM software is available for the HP-UX IA64, Linux, AIX, and Solaris operating systems. To determine which versions of each operating system are currently supported by BRM, see "BRM Software Compatibility".

**Important:** Depending on the operating system you use, you may be required to apply patches before installing BRM. Ensure that you read about required patch information at "BRM Software Compatibility".

### Disk Space Requirements

This section describes the disk space requirements for BRM server processes and applications.

**BRM Server**

Table 4–1 shows disk space requirements for the BRM server processes:
Overview of Hardware and Software Requirements

Table 4–1  Server Disk Space Requirements

<table>
<thead>
<tr>
<th>BRM System Component</th>
<th>Required Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRM server</td>
<td>300 MB</td>
</tr>
</tbody>
</table>
| BRM database         | 2 to 5 GB per 10,000 customers per year.  
  **Note:** This requirement varies greatly with the number of accounts and the amount of activity. |

For information on determining your database requirements, see "Database Configuration and Tuning”

BRM Applications

Table 4–2 shows the details of the applications that BRM supports on the UNIX platform:

Table 4–2  Applications supported by BRM on Unix

<table>
<thead>
<tr>
<th>Application</th>
<th>Type</th>
<th>Required disk space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Care Manager</td>
<td>Server application</td>
<td>3 MB</td>
</tr>
<tr>
<td>Developer Center</td>
<td>Developer tools</td>
<td>12 MB</td>
</tr>
</tbody>
</table>

Other BRM client applications are supported on Windows. See "Required Disk Space for BRM Windows Applications” for more information.

BRM Service Integration Components

To install optional service integration components such as RADIUS Manager or GSM Manager, you need 60 MB of disk space.

Database Requirements

BRM supports Oracle databases on HP-UX IA64, Linux, AIX, and Solaris platforms.

To run BRM with an Oracle database, you require the following:

- Oracle Enterprise Edition.
- UTF8 database character set.
- (Optional) Oracle Partitioning. You need this to partition the event tables in your BRM database. See "Partitioning Database Tables” in BRM System Administrator’s Guide.

To determine which versions of the Oracle software are currently supported by BRM, see "BRM Software Compatibility”.

Network Requirements

To set up networking and communications channels, you need TCP/IP. You also need a permanent IP address for each computer that hosts a BRM process or application.

Any kind of network connection that supports TCP/IP supports BRM, for example, local area network, virtual private network, and PPP.
TCP/IP
BRM requires TCP/IP on every machine that runs a BRM component, including custom client programs.

**Important:** BRM also needs very large bandwidth to handle traffic between the Data Manager (DM) and the database. For more information, see "Database Configuration and Tuning".

IP Addresses
Every computer that runs a BRM component, including the database server, must have its own unique IP address.

**Important:** BRM uses IP addresses to identify specific machines, so IP addresses cannot be dynamically allocated.

Additional Requirements
You need additional software packages to create a complete customer management and billing solution for your business. These packages allow you to take best advantage of BRM functionality:

- Internet software
- Credit card processing software
- Tax calculation software
- Invoice formatting software
- Compilers

For a list of third-party software supported by BRM, see "BRM Software Compatibility".
Part II describes how to install Oracle Communications Billing and Revenue Management (BRM) server and client components. It contains the following chapters:

- Installing and Configuring the Oracle Database
- Installing the Third-Party Software
- Installing BRM
- Installing a Multischema or Multidatabase System
- Installing and Configuring BRM with IMDB Cache Manager
- Installing BRM Client and Server Applications on UNIX
- Installing BRM Client and Server Applications on Windows
- Installing Tax Calculation Managers
- Installing Paymentech Manager
- Troubleshooting the BRM Installation
- Installing Multiple BRM Instances on One System for Testing
- Uninstalling BRM
- Installation Utilities
Installing and Configuring the Oracle Database

This chapter:

- Describes how to configure your Oracle database to work with the Oracle Communications Billing and Revenue Management (BRM) system.
- Provides a task list to help you make configuration choices when installing Oracle.
- Contains the pre-installation procedures for installing your BRM system.

This chapter is intended for network administrators, technicians, database administrators, and engineers who install and configure the Oracle software for use with BRM. The person installing the software should be familiar with the following topics:

- UNIX commands and the UNIX operating system
- Database installation and configuration
- Network Management Systems
- SQL*Plus
- A UNIX text editor, such as vi or vuepad.

Collecting Information before Installing Oracle

You will need the following documents while installing and configuring the Oracle software:

- Oracle documentation:
  - Oracle9i or Oracle 10g or Oracle 11g operating system installation documentation
- The current release notes for your Oracle software
- The Oracle Administrator’s Guide for instructions on configuring the network
- A UNIX operating system reference guide.

Information to Note during Oracle Installation

As you install the Oracle software, record important information, such as your system ID (SID) and database alias, in the Table 5–1. You will need this information later, when you install BRM.
Before Installing Oracle

Before installing Oracle on your system, make sure:

- Your system meets the minimum hardware and software requirements.
  
  See "System Requirements".

- You have all software required to run BRM with an Oracle database.
  
  See "Database Requirements".

- You planned your Oracle database according to the guidelines in "Improving BRM Performance" in BRM System Administrator’s Guide and "Database Configuration and Tuning".

### Installing and Configuring Oracle: Task List

This section explains how to install and configure your Oracle database for BRM.

---

**Note:** These lists are not a substitute for the Oracle documentation or the most recent release notes for the database.

---

Installing Oracle for BRM includes these major tasks:

1. **Installing the Oracle Software**
2. **Creating your BRM Database**
3. **Setting Environment Variables**
4. **Setting Your Database for BRM**

### Installing the Oracle Software

Install Oracle according to the instructions in the Oracle documentation. When you install the software, pay particular attention to the following requirements.

- Install the Oracle **Enterprise Edition**.
- Choose a **Customized** installation. This option lets you configure Oracle with the UTF8 database character set.

---

<table>
<thead>
<tr>
<th>Required Information</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host name of the Oracle database server</td>
<td>NA</td>
</tr>
<tr>
<td>IP address of the Oracle database server</td>
<td>NA</td>
</tr>
<tr>
<td>Port number of the Oracle database server</td>
<td>NA</td>
</tr>
<tr>
<td>User login name and password (the BRM defaults are pin and pin)</td>
<td>NA</td>
</tr>
<tr>
<td>SID for the BRM database name (the BRM default is pindbhostname)</td>
<td>NA</td>
</tr>
<tr>
<td>Oracle database alias/Global Database Name (for example, pindbhostname.BRM.com)</td>
<td>NA</td>
</tr>
</tbody>
</table>
Installing and Configuring Oracle: Task List

Installing and Configuring the Oracle Database

To configure discounts in BRM, install the following Oracle components:

- **Oracle XML DB.** For more information, see the Oracle documentation.
- **Oracle XML Developer's Kit (XDK).** For more information, see the Oracle documentation.

To partition the event tables in your BRM database, you must install the Oracle **Partitioning** component. See "Partitioning Database Tables" in *BRM System Administrator’s Guide*.

Creating your BRM Database

Create your database by using the Oracle Database Configuration Assistant, which can be started automatically by the Oracle installer or started manually. If you start it manually, make sure you choose the **Custom** option.

As you create your database, pay particular attention to the following:

- Specify a **Global Database Name** using the format `DatabaseName.DomainName`, where `DatabaseName` is the database name and `DomainName` is the network domain in which the database is located. For example, `pindbhostname.brn.com`. Most BRM databases use a `DatabaseName` of `pindbhostname`, but you can use another name.

  **Note:** You can modify your machine’s default domain name in the `$ORACLE_HOME/network/admin/sqlnet.ora` file. For information, see your Oracle documentation.

- Specify a **System Identifier (SID)** for your database. For clarity, it should be the same as your Oracle database name. Most BRM databases are named `pindbhostname`, but you can use another name.

- Set the **Character Set** and **National Character Set** to **UTF8**.

For detailed instructions on how to create your database, see the Oracle documentation.

Setting Environment Variables

Set the 32-bit environment variables as shown in **Table 5–2:**

**Table 5–2  Environment Variables Setting for 32 bit**

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD_LIBRARY_PATH (Solaris and Linux)</td>
<td>$ORACLE_HOME/lib32</td>
</tr>
</tbody>
</table>
Set the 64-bit environment variables as shown in Table 5–3:

### Table 5–3  Environment Variables Setting for 64 bit

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD_LIBRARY_PATH_64</td>
<td>$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>LD_LIBRARY_PATH</td>
<td>$ORACLE_HOME/lib</td>
</tr>
<tr>
<td>SHLIB_PATH</td>
<td>$ORACLE_HOME/lib32</td>
</tr>
</tbody>
</table>

Setting Your Database for BRM

You have the option to configure your database manually or let the BRM installer configure your database automatically. Set up your database using one of the following options:

- Using the BRM Installer to Configure Your Database for Demonstration Systems
- Configuring Your Database Manually for Demonstration Systems
- Configuring Your Database Manually for Production Systems

#### Using the BRM Installer to Configure Your Database for Demonstration Systems

The BRM installer provides the option to automatically configure your database for demonstration or development systems. The installer configures your database by creating one data, one index, and one temporary tablespace; creating the BRM user; and granting connection privileges to the BRM user. If you want the BRM installer to configure your database, your Oracle installation is complete and you can go directly to "Installing BRM".

#### Configuring Your Database Manually for Demonstration Systems

To configure your database so that it uses additional or larger tablespaces than those created automatically by the BRM installer, you must perform these general tasks:

- Creating BRM Tablespaces
- Creating the BRM User for Oracle

#### Creating BRM Tablespaces

For a simple demonstration BRM system, you must create a minimum of three tablespaces for BRM. The following section shows the steps required to create the following tablespaces:

- **pin00** (for data)
Installing and Configuring Oracle: Task List

- **pinx00** (for indexes)
- **PINTEMP** (for a temporary tablespace)

To create your tablespaces:

1. Create a directory for the tablespaces, such as `/u02/oradata/pindb`. This directory is referred to as `table_location`.

2. Connect to the Oracle database with SQL*Plus:
   ```sql
   % sqlplus system/manager@DatabaseAlias
   ```

3. Create the data, index, and temporary tablespaces, making sure:
   - Data tablespaces are at least 600 MB with an extent (“next”) size of 64 KB.
   - Index tablespaces are at least 400 MB with an extent size of 64 KB.
   - Temporary tablespaces are at least 100 MB with an extent size of 64 KB.

   ```sql
   SQL> create tablespace pin00 datafile 'table_location/pin00.dbf'
   size 600M reuse autoextend on default
   storage ( initial 64K next 64K pctincrease 0 );
   Tablespace created.
   
   SQL> create tablespace pinx00 datafile 'table_location/pinx00.dbf'
   size 400M reuse autoextend on default
   storage ( initial 64K next 64K pctincrease 0 );
   Tablespace created.
   
   SQL> create temporary tablespace PINTEMP tempfile
   'table_location/PINTEMP.dbf'
   size 100M reuse autoextend on maxsize unlimited
   storage (initial 64K next 64K pctincrease 0);
   Tablespace created.
   ```

**Creating the BRM User for Oracle**

Create a new BRM user who can access the Oracle database. The Oracle DM gains access to the Oracle database by using the Oracle user **pin**. This Oracle user owns all the tables created and used by BRM.

```
Important: If you are installing a multidatabase system, the primary and secondary databases must use the same user name. Otherwise, multidatabase installation will fail.
```

Usually, the BRM databases are set up at the SQL*Plus command prompt with the username and password **pin**, but you can choose another name and password.

1. Connect to the Oracle database with SQL*Plus:
   ```sql
   % sqlplus system/manager@DatabaseAlias
   ```

2. Create the Oracle user **pin**, grant the user the resource to connect to Oracle with the username **pin**, and allow **pin** access to the **pin00** and **PINTEMP** tablespaces:
   ```sql
   SQL> create user pin identified by password;
   ```
User created.

SQL> grant resource, connect to pin;
Grant succeeded.

SQL> alter user pin default tablespace pin00;
User altered.

SQL> alter user pin temporary tablespace PINTEMP;
User altered.

3. Type exit to exit SQL*Plus.

Configuring Your Database Manually for Production Systems

If you want to create a production system, you must create multiple tablespaces for the BRM data and indexes. For information on how to estimate your database size, create multiple tablespaces, and map the tablespaces to BRM tables, see “Database Configuration and Tuning”.

Installing the Database and Oracle Data Manager on Separate Machines

If you are installing your Oracle database and Oracle Data Manager (DM) on separate machines, you must perform the following on the machine containing the Oracle DM:

1. Install the Oracle database client.

   Important: For BRM installation to be successful, you must:
   - Install an Oracle8i database client, even if you installed Oracle9i on your database server.
   - Install the 32-bit version of the Oracle database client, even if you installed the 64-bit version of Oracle on your database server.

2. Modify the $ORACLE_HOME/network/admin/tnsnames.ora file to include entries for connecting to your BRM database.

3. Use SQL*Plus to ensure that you can connect to your database.

   For information, see the Oracle documentation.

Modifying Your Oracle Database Installation

If you installed your Oracle database before referring to this document and accepted the default options, your database installation might have defaulted to an unsupported character set, such as US7ASCII. If this occurred, you must move your data to a UTF8 database:

   Caution: After you create a database, you cannot change the character set.

To export your existing data to a UTF8 database:
1. Back up your existing database. See your Oracle documentation for details.

2. Uninstall your existing database. See your Oracle documentation for this information.

3. Create a new Oracle UTF8 database.
   See “Creating your BRM Database”.

4. Use the Oracle Import utility to import your existing data to the new UTF8 database.
   See your Oracle documentation for more information.

What’s Next?

Now that you have installed the database server software, you can install the BRM Server and client applications. See “Installing BRM” and “Installing BRM Client and Server Applications on UNIX”.

Installing the Third-Party Software

This document describes how to install the Third-Party software.

About the Third-Party Software

The Third-Party package includes Remote Diagnostic Agent (RDA), Perl libraries, and JRE to enable the installation of BRM software packages that use the InstallShield MultiPlatform (ISMP) installation method.

Note: You only need to install the Third-Party package once, before the installation of the first package that uses ISMP installation.

Installing the Third-Party Software

Caution: Do not install the software as the root user. Installing the software as the root user causes the installation to fail.

To install the Third-Party software package:

1. Download the 7.4_ThirdParty_platform_32_opt.extension installation file to a temporary directory (temp_dir).

   where:
   - **platform** is the operating system type. Use HP-UX IA64, Linux, Solaris, or AIX.
   - **extension** is the appropriate extension for the platform type. Use bin for UNIX.

2. Go to the temp_dir directory.

3. Run the Third-Party software installation program.

   Note: You can use the -console parameter to run the installation in command-line mode. To use the graphical user interface (GUI) for installation, make sure you have X Windows installed in your computer.

4. When prompted, enter the directory where you want to install the Third-Party software. The default directory is opt/portal/ThirdParty.

5. The install location and the RDA, JRE and Perl features are displayed. Click Next to install the Third-Party package at the specified location.
6. After the installation completes, the installation program displays a message reminding you to execute the source command:

   Bash shell:
   % source source.me.sh

   C shell:
   % source source.me.csh

7. To finish the installation, click Finish.
   The Third-Party package is now installed.

**Uninstalling the Third-Party Software**

To uninstall the Third-Party package, run `uninstaller/ThirdParty/uninstaller.bin` from the directory in which the Third-Party software is installed. The default directory is `opt/portal/ThirdParty`. 
This chapter describes how to install Oracle Communications Billing and Revenue Management (BRM) on HP-UX IA64, Linux, AIX, or Solaris.

This chapter is for network administrators, database administrators, and engineers who install and configure the BRM software. The person installing the software should be familiar with the following topics:

- UNIX administration commands and the UNIX operating system
- Database configuration
- Network system management
- A UNIX text editor, such as `vi` or `vuepad`

**Important:** For instructions on installing optional components, such as RADIUS Manager or GSM Manager, see the documentation for those components.

### Preparing for BRM Installation

To install BRM, you need the following:

- A directory with sufficient space for the Third-Party software and the BRM software (at least 440 MB).
- A user ID, such as `pin`, with the privileges to access the files under your BRM home directory and to execute BRM and third-party applications.

**Important:** The user ID must also:

- Belong to the `pin` group.
- Restrict file access from other operating system users.
- Not have `root` access privileges.
- Have password protections that prevent unauthorized access.

**Important:** On the system on which you are installing BRM, make sure that Java 1.7 is not installed. You can install Java 1.7 after installing the base BRM software.
Preparing for BRM Installation

- The BRM-related information that you noted when installing your database.
  See "Information to Note during Oracle Installation".

  **Important:** If you are installing BRM on a HP-UX IA64 system, make sure you disable the memory window because BRM shares files for 32- and 64-bit applications from the same address space.

Granting Execute Permission for dbms_lock

Before you install BRM, you must grant execute permission to pin_user for dbms_lock. This ensures that all BRM stored procedures are successfully loaded into the database when the pin_setup script for BRM is run:

1. Log in to your database as user SYS:

   ```
   % sqlplus "sys/password@databaseAlias as sysdba"
   ```

   where:

   password is the Oracle database user password.

databaseAlias is the Oracle database alias.

2. Grant execute privileges to pin_user:

   ```
   SQL> grant execute on dbms_lock to pin_user
   ```

Installing the SNMP Software

BRM uses the Simple Network Management Protocol (SNMP) to configure some system components.

**Note:** SNMP is an optional component.

**Note:** If you have a previous installation of the SNMP Third-Party software that is sharing the same BRM_Home directory with your BRM installation, you must first uninstall the existing SNMP software and reinstall it in a directory other than BRM_Home. You should ensure that the SNMP Third-Party package shipped along with this patch is not installed in the BRM_Home directory and not in the same directory as the previous installation. This is to ensure that the 32-bit library file shipped along with this patch does not overwrite the 64-bit SNMP library file.

To install the SNMP software, do the following:

1. Install the Third-Party software package.
   See "Installing the Third-Party Software".

2. Download the software to a temporary directory (`temp_dir`).
Important:

- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see “Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

3. Go to the directory where you installed the Third-Party package and source the source.me file.

Caution: You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

Bash shell:

source source.me.sh

C shell:

source source.me.csh

4. Go to the temp_dir directory and enter the following command:

7.4_SNMP_3rd_party_tool_platform_64_opt.bin

Note: You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

5. Follow the instructions displayed during installation. The default installation directory for the SNMP Third-Party package is opt/ifw.

The SNMP Third-Party software is now installed.

Installing and Configuring a BRM Demonstration System

The instructions in this section assume that you are installing all of the BRM components, including the database, on a single computer as shown in Figure 7–1.

Figure 7–1 Single Machine BRM Installation
The procedures for installing a demonstration system include:

1. Setting the BRM User’s Environment
2. Installing a BRM Demonstration System
3. Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables
4. Running the pin_setup Script
5. (Optional) Changing Your Database Partitions
6. Loading the Tailor-Made Stored Procedure

**Setting the BRM User’s Environment**

Create a BRM user and set the user’s environment before installing BRM.

1. Set the following environment variable for BRM in the `.cshrc` file as shown in Table 7–1:

   - `NLS_LANG` set to `American_America.UTF8`.
   - **Important:** You must use `American_America` as the language and territory, regardless of your locale, and the `UTF8` character set.

   The other environment variables are set during installation. See "BRM Environment Variables".

2. Update the environment for the current shell session:

   ```
   % source .cshrc
   ```

**Referencing Environment Variables in pin.conf Files**

To prepare for migrating `pin.conf` files to other systems or platforms at a future time, you can reference certain environment variables from within the `pin.conf` files, as in this example:

```
- cm fm_module %{PIN_HOME}/lib.fm_utils/$(LIBRARYEXTENSION) fm_utils_config fm_utils_init pin
```

For more information, see "Preparing for Platform Migration by Using Variables in pin.conf Files" in *BRM System Administrator’s Guide*.

**Installing a BRM Demonstration System**

This section describes how to install a BRM demonstration system.

---

**Important:** If you are installing BRM to replace an identical release (for example, to restore a clean version of the package), you must first uninstall the existing installation. See "Uninstalling BRM".

---

To install BRM:

1. If the Third-Party software package isn’t installed already, install it.

   See "Installing the Third-Party Software".

2. Log in as user `pin`. 
% su - pin

Caution: Do not install as user root.

3. Download the software to a temporary directory (temp_dir).

Important:
- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages”.


5. Go to the directory where you installed the Third-Party package and source the source.me file.

Caution: You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

Bash shell:

source source.me.sh

C shell:

source source.me.csh

6. Go to the temp_dir directory where you downloaded the BRM software package and enter the following command:

7.4_Portal_Base_platform_32_opt.bin

Note: You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

7. During installation, follow the instructions shown in Table 7–2. Your responses are written to the BRM_Home/setup/pin_setup.values file.
Table 7–2 Prompt Descriptions

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directory name:</strong></td>
<td>Enter the directory in which to install BRM. The default is <code>/opt/portal/7.4</code>.</td>
</tr>
</tbody>
</table>
| **Setup type:**                     | Enter the type of installation you prefer. The default is Typical.  
  - Enter Typical for development and production systems.  
  - Enter Demo for test or demonstration systems. This is the quickest option and asks you the least number of questions.  
  - Enter Custom for production systems. The installer lets you install a subset of the BRM components. |
| **Select the database type:**       | Select the database server version. For example:  
  - Oracle 9i  
  - Oracle 10g  
  - Oracle 11g |
| **Create BRM Database Tables?**     | Enter whether you want the installer to create default tablespaces for you. Enter No to create custom tablespaces manually. You must create your tablespaces before you run the `pin_setup` script.  
  **Caution:** Do not select Yes. Selecting Yes may cause installation to fail. |
| **Database alias:**                 | Enter your database alias. The default is `pindbhostname`.                                                                                 |
| **Oracle DM database number:**      | Enter the database number. The default is `0.0.0.1`.                                                                                    |
| **Oracle DM port:**                 | Enter the port number for the BRM Data Manager. The default is `12950`.                                                               |
| **Database username:**              | Enter your database user name. The default is `pin`.                                                                                   |
| **Database password:**              | Enter your database password. The default is `pin`.                                                                                     |
| **Oracle DM character set:**        | Enter the character set your database uses. BRM strongly recommends using the UTF8 character set. The default is UTF8.                    |
| **Storage Model used for Oracle tables?** | Enter the desired size of your database. The default is Small.  
  - Enter Test for test or demonstration databases smaller than 700 MB.  
  - Enter Small for demonstration databases smaller than 1.5 GB.  
  - Enter Medium for production databases smaller than 30 GB.  
  - Enter Large for production databases larger than 30 GB. |
| **Tablespace name for Tables:**     | Enter the name of your data tablespace. The default is `pin00`.                                                                      |
| **Tablespace name for Indexes:**    | Enter the name of your index tablespace. The default is `pinx00`.                                                                     |
| **Drop the BRM tables?**            | Enter whether you want to drop the database tables. The default is Yes.  
  **Caution:** If you select Yes, the installer drops all existing tables on your system. This results in irrecoverable loss of data. Do not use this unless you have backed up all of your existing data.  
  If you select No, the installer uses your existing BRM tables.  
  In test systems, select Yes to reinitialize the database. |
Installing and Configuring a BRM Demonstration System

8. Go to the directory where you installed the BRM software and source the source.me file:
   Bash shell:
   
   ```
   source source.me.sh
   ```
   
   C shell:
   
   ```
   source source.me.csh
   ```

9. To further configure BRM, such as changing the default currency and country or adding non-event partitions, edit the BRM_Home/setup/pin_setup.values file.
   This file stores the information you provided to the installer as well as a number of database and add-on component parameters.

10. Run the BRM_Home/setup/pin_setup script.

---

### Table 7–2 (Cont.) Prompt Descriptions

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Description</th>
</tr>
</thead>
</table>
| Partition tables? | Specify whether you want to enable partitioning. The default is Yes.  
**Caution:** To partition any tables, you need Oracle Partitioning. If you select Yes but don’t have Oracle Partitioning installed, the BRM setup program fails when it tries to create partitions  
**Note:** This sets the $ENABLE_PARTITION parameter to Yes in the pin_setup.values file.
| **Important:** | |
| | ■ If you select No and then change your mind after you’ve installed BRM, you will have to upgrade your BRM database from a nonpartitioned to a partitioned version before you can partition your tables.  
■ If you plan to use Rated Event (RE) Loader to load prerated events, you must partition your event tables.  
■ If you select Yes, you must configure pin_setup to set up any non-event partitions. Your event tables will be partitioned automatically. See "Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables".  
See "Partitioning Database Tables" in BRM System Administrator’s Guide. |
| Add 12 fixed (monthly) partitions to all event tables? | This prompt is displayed only if you enter Yes to Partition event tables.  
Specify whether you want the installer to add 12 monthly partitions to your event tables.  
■ Enter Yes to have the installer add 12 monthly partitions, a historic partition, and a last partition to your event tables. See "About the Default Partitioning Scheme" in BRM System Administrator’s Guide.  
■ Enter No if you want the installer to add only a historic partition and a last partition to the tables. You can use this partitioning layout for a simple test or demonstration system. For a production system, however, you must add purgeable partitions after installation is complete and before the system generates events.  
**Note:** This sets the $CREATE_PARTITIONS parameter in the pin_setup.values file to Yes. |
| CM Port: | Enter the port number for the Connection Manager (CM). The default is 11960. |
| Install Summary: | The install location and features that will be installed are displayed. |
For information on how to run the pin_setup script, see "Running the pin_setup Script".

Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables

To enable and use partitioning for any non-event tables, you must edit the pin_setup.values file and the pin_setup script.

Important: If you did not choose to enable partitioning during setup, you cannot enable partitioning for non-event tables. You have the option of changing partitioning information in the pin_setup.values file up until you run the pin_setup script. After it has been run, the enabled partitioning is finalized and cannot be changed.

1. Open the pin_setup.values file in BRM_Home/setup.
2. Add the names of the classes (not including /event) that you wish to partition to the list in the @CLASSES_TO_BE_PARTITIONED entry. For example:

   @CLASSES_TO_BE_PARTITIONED = ("/journal:local","/account:local");

Note: Only base classes should be listed.

The :local and :global suffixes designate two types of indexes that are available for non-event partitions (all event object tables are local):

- :global indexes
  - Advantage: Search operations become fast.
  - Disadvantage: BRM Services must be shut down before adding or dropping partitions; these tables require the indexes to be rebuilt.

- :local indexes
  - Advantage: Maintenance can be done without shutting down BRM.
  - Disadvantage: Performance may suffer. Search operations will be more time consuming because searches must hit every local index.

3. Save and close the file.

Running the pin_setup Script

Important: Make sure you have logged in as user pin. If you have logged in as a user other than pin, you must manually edit the BRM_Home/setup/pin_setup file by changing the PINUSER entry to your user name.

The pin_setup script reads the pin_setup.values file and the pin_tables.values file and configures BRM by:

- Initializing the database.
- Configuring the various configuration (pin.conf) files.
Setting up data files, such as Balance Element ID Objects (BEIDs), G/L IDs, ratable usage metrics (RUMs), and price lists.

Setting up database tables and indexes.

To run the `pin_setup` script:

1. Go to the `BRM_Home/setup` directory and enter the following command:

   ```
   % ./pin_setup
   ```

2. Check the `pin_setup.log` file for status and errors.

---

**Note:** After you run `pin_setup`, the `cm.pinlog` file erroneously contains several PIN_ERRROC_FLIST and PIN_ERRCLASS_SYSTEM_DETERMINATE error messages. You can safely ignore these messages.

(Optional) Changing Your Database Partitions

If you did not choose to partition your tables during installation, you can skip this section. To enable partitioning after installation, see "Changing from a Nonpartitioned to a Partitioned Database" in *BRM System Administrator’s Guide*.

If you did partition your event tables during installation, your event tables are now divided into several partitions. The number of partitions depends on the option you selected when the installer asked whether to add 12 fixed (monthly) partitions:

- If you selected Yes, your event tables were divided into 12 monthly partitions, a historic partition, and a last partition. See "About the Default Partitioning Scheme" in *BRM System Administrator’s Guide*.

  **Note:** This does not set up default partitions for other partitioned tables you may have added with `pin_setup`.

- If you selected No, your event tables were divided into a historic partition and a last partition (stores all purgeable events). This partitioning scheme is sufficient for a test or development system. For a production system, however, you must create purgeable partitions.

  **Note:** To test partitioning, you must add at least one purgeable partition.

**Important:** If you want to change your partitioning scheme (for example, add partitions or specify additional events that should never be purged), do so before any objects are stored in the partitions you want to modify. Do not modify the partition after BRM adds objects to a partition.

To change your partitioning scheme, see "Partitioning Database Tables" in *BRM System Administrator’s Guide*. 
Loading the Tailor-Made Stored Procedure

Loading of the stored procedure is required for the Tailor-Made Plan feature.

The following are the requirements to load the tailor-made stored procedure:

- BRM and Pipeline Manager should be installed.
- The BRM schema and the Pipeline Manager schema should reside on the same database.

To load the stored procedure, do the following:

1. Connect to the Oracle database with SQL*Plus:
   
   ```
   % sqlplus system/manager@databaseAlias
   ```

2. Grant access of pipeline schema to user `pin` by doing the following:
   
   a. Run the SQL grant select, update, insert, delete commands on the Pipeline Manager tables. For example, for the `ifw_rateplan` table, run the following command:

   ```
   SQL> grant select, update, insert, delete on ifw_rateplan to pin;
   ```

   Run this command on the following tables:
   - `ifw_rateplan`
   - `ifw_rateplan_cnf`
   - `ifw_rateplan_ver`
   - `ifw_model_selector`
   - `ifw_selector_detail`
   - `ifw_selector_rule`
   - `ifw_selector_rule_lnk`
   - `ifw_selector_ruleset`
   - `ifw_pricemodel`
   - `ifw_pricemdl_step`

   b. Run the SQL grant select commands on the Pipeline Manager tables mentioned below. For example, for the `ifw_service` table, run the following command:

   ```
   SQL> grant select on ifw_service to pin;
   ```

   Run this command on the following tables:
   - `ifw_service`
   - `ifw_timezone`
   - `ifw_timemodel`
   - `ifw_impact_cat`
   - `ifw_zonemodel`
   - `ifw_calendar`

   c. Run the SQL grant select commands on the Pipeline Manager sequences. For example, for the `ifw_seq_selectordetail` sequence, run the following command:
Installing and Configuring a BRM Production System

For a production system, you optimize BRM performance and availability by installing and running the BRM database on its own computer and the various processes on separate computers.

In a production environment, computers are typically dedicated to the following functions:

- Client applications
- Connection Manager (CM) and BRM Data Manager
- BRM database

For an overview of the different ways to set up a production system, see "Types of BRM Systems".

The instructions in this section assume that you have three machines in your production system as shown in Figure 7–2.

```sql
SQL> grant select ifw_seq_selectordetail to pin;

Run this command on the following tables:
- ifw_seq_selectordetail
- ifw_seq_selectorrule
- ifw_seq_modelselector
- ifw_seq_pricemodel
- ifw_seq_rateplan

3. Type exit to exit SQL*Plus.
4. Go to the BRM_Homesys/dm_oracle/data directory.
5. Enter the following command to open SQL*Plus:
   ```sql
   sqlplus pin/pin@database_Name
   ```
   where database_Name is the service name or database alias of the Oracle database.
6. Enter the following command to load the stored procedure:
   ```sql
   SQL>@create_pricing_tailormadeplan_procedures.plb
   ```
7. Type exit to exit SQL*Plus.
The BRM client machine is a Windows system that runs BRM client applications, such as Pricing Center. These applications provide a graphical user interface to the data in the BRM database. All client applications communicate with BRM through the CM.

The BRM server machine contains your CM, DM, and database client. BRM communicates with the database through the Oracle DM.

The database machine contains your BRM database.

The procedures for installing a production system include:

1. Installing the Database Client
2. Setting the BRM User’s Environment
3. Installing a BRM Production System
4. Editing the pin_setup.values File
5. Editing the pin_tables.values File
6. Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables
7. Running the pin_setup Script
8. Completing the Installation
9. (Optional) Changing Your Database Partitions
10. (Optional) Installing Sample Data Files
11. Installing Optional Components on a Separate Machine from the CM
12. Loading the Tailor-Made Stored Procedure

Installing the Database Client

If you are installing the Oracle DM and your database on separate machines, you must install a database client. For information, see "Installing the Database and Oracle Data Manager on Separate Machines".

Setting the BRM User’s Environment

Create a BRM user and set the user’s environment before installing BRM.

1. Set the following environment variable for BRM in the .cshrc file as shown in Table 7–3:
2. Update the environment for the current shell session:

   \% source .cshrc

**Referencing Environment Variables in pin.conf Files**

To prepare for migrating pin.conf files to other systems or platforms at a future time, you can reference certain environment variables from within the pin.conf files, as in this example:

```
- cm fm_module $(PIN_HOME)/lib/fm_utils/$(LIBRARYEXTENSION) fm_utils_config fm_utils_init pin
```

For more information, see "Preparing for Platform Migration by Using Variables in pin.conf Files" in *BRM System Administrator’s Guide*.

**Installing a BRM Production System**

*Note:* If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

You can install a subset of BRM components, such as the CM and DM, on a single machine to save disk space.

*Important:* If you are installing the CM and DM on separate machines, make sure all DMs are running before you install the CM.

To install individual components:

1. If the Third-Party software package isn’t installed already, install it.

   See "Installing the Third-Party Software".

2. Log in as user **pin**.


4. Go to the **temp_dir** directory where you downloaded the BRM software and enter the following command:

   `7.4_Portal_Base_platform_32_opt.bin`

*Note:* You can use the **-console** parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.
This starts the installation program.

5. Enter Custom when asked to specify the setup type.
   Select features you want to install by typing their respective numbers. Click Next.

6. Follow the instructions displayed during installation.
   Your responses are written to the `BRM_Home/setup/pin_setup.values` file. For a description of all prompts, see "Prompt Descriptions".

7. Go to the directory where you installed the BRM software and source the `source.me` file:
   Bash shell:
   ```bash
   source source.me.sh
   ```
   C shell:
   ```bash
   source source.me.csh
   ```

8. To further configure BRM, such as changing the default currency and country, edit the `BRM_Home/setup/pin_setup.values` file.
   The component files are copied to your machine.

### Editing the pin_setup.values File

To further configure BRM, such as changing the default currency and country, you edit the `BRM_Home/setup/pin_setup.values` file. This file stores the information you provided to the installer as well as a number of database and add-on component parameters.

The entries you need to edit in the `pin_setup.values` file depend on which components you install on the current machine. For example, if you are installing the Email DM on the current machine, edit the `$DM_EMAIL` entries.

The following examples show the important entries to check in three configurations:

- The CM and DM reside on separate machines.
- The system contains multiple Oracle DMs connected to one database.
- Invoices are stored in a separate database.

#### Example 7–1  The CM and DM Reside on Separate Machines

Machines that contain a CM must include the correct port number and host name of each DM in the system. This is especially critical when DMs reside on separate machines from the CM.

For example, you might install the Oracle DM and Email DM on a separate machine from the CM. In this case, you must modify the following parameters in the CM machine’s `pin_setup.values` file as shown in Table 7–4:

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>$DM_ORACLE['port']</code></td>
<td>Must contain the port number of the Oracle DM.</td>
</tr>
</tbody>
</table>
Example 7–2  The System Contains Multiple Oracle DMs Connected to One Database

When your system contains multiple Oracle DMs connected to one database, you must initialize the database and drop the tablespaces only once. In this case, you must modify each DM machine’s pin_setup.values file as shown in Table 7–5:

Example 7–3  Invoices Are Stored in a Separate Database

Storing invoices in their own databases speeds up the invoicing process; allows you to store a large number of invoices; and enables you to view, email, and print invoices without affecting the performance of the main BRM database.

If you are storing invoices in their own databases, you must update the pin_setup.values file to include the correct pointers to the invoice database. Therefore, you must modify the following parameters as shown in Table 7–6, on the machine containing the Invoice DM:

Note: The Invoice DM is supported only on Oracle databases.

Table 7–4  (Cont.) CM Machine’s pin_setup values

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$DM_ORACLE['hostname']</td>
<td>Must contain the host name of the machine running the Oracle DM.</td>
</tr>
<tr>
<td>$DM_EMAIL['port']</td>
<td>Must contain the port number of the Email DM.</td>
</tr>
<tr>
<td>$DM_EMAIL['hostname']</td>
<td>Must contain the host name of the machine running the Email DM.</td>
</tr>
</tbody>
</table>

Table 7–5  DM Machine’s pin_setup Values

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$SETUP_INIT_DB</td>
<td>Must be set to Yes on the primary Oracle DM machine; on all other machines containing a Oracle DM, set to No.</td>
</tr>
<tr>
<td>$SETUP_DROP_ALL_TABLES</td>
<td>Must be set to Yes on the primary Oracle DM machine; on all other machines containing a Oracle DM, set to No.</td>
</tr>
</tbody>
</table>

Table 7–6  Invoice DM Machine’s pin_setup values

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$INVOICE_DB['user']</td>
<td>Must contain the user name to log in to your invoice database. This user name must be different from the one used for the main BRM database.</td>
</tr>
<tr>
<td>$INVOICE_DB['password']</td>
<td>Must contain the password to log in to your invoice database.</td>
</tr>
<tr>
<td>$INVOICE_DB['alias']</td>
<td>Must contain the database alias of the invoice database.</td>
</tr>
<tr>
<td>$INVOICE_DB['Host']</td>
<td>Must contain the host name of the machine running the invoice database.</td>
</tr>
<tr>
<td>$INVOICE_DB['tables_group']</td>
<td>Must contain the name of the data tablespace.</td>
</tr>
<tr>
<td>$INVOICE_DB['indexes_group']</td>
<td>Must contain the name of the index tablespace.</td>
</tr>
<tr>
<td>$DM_INVOICE['port']</td>
<td>Must contain the port number of the Invoice DM. For guidelines, see “Guidelines for Database and Port-Number Entries” in BRM System Administrator’s Guide.</td>
</tr>
<tr>
<td>$DM_INVOICE['db_num']</td>
<td>Must contain the database number for the invoice database.</td>
</tr>
</tbody>
</table>
Editing the pin_tables.values File

If you install BRM with the default settings, BRM data is stored in a single tablespace (pin00), and BRM indexes are stored in a second tablespace (pinx00). Although you can run and test BRM with just these tablespaces, you need multiple tablespaces for optimal performance on a production system.

If your BRM database contains multiple tablespaces, you must use the `BRM_Home/setup/scripts/pin_tables.values` file to map the BRM tables to the tablespaces you created in Oracle. For information on how to map your tables, see "Mapping Tablespaces to Logical Devices".

Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables

To enable and use partitioning for any non-event tables, you must edit the `pin_setup.values` file and the `pin_setup` script.

1. Open the `pin_setup.values` file in `BRM_Home/setup`.
2. Add the names of the classes (not including /event) that you wish to partition to the list in the `@CLASSES_TO_BE_PARTITIONED` entry. For example:
   
   ```
   @CLASSES_TO_BE_PARTITIONED = ("/journal:local","/account:local");
   ```

3. Save and close the file.

The :local and :global suffixes designate two types of indexes that are available for non-event partitions (all event object tables are local):

- :global indexes
  - Advantage: Search operations become fast.
  - Disadvantage: BRM Services must be shut down before adding or dropping partitions; these tables require the indexes to be rebuilt.
- :local indexes
  - Advantage: Maintenance can be done without shutting down BRM.
  - Disadvantage: Performance may suffer. Search operations will be more time consuming because searches must hit every local index.

Running the pin_setup Script

The `pin_setup` script reads the `pin_setup.values` and `pin_tables.values` files and configures BRM by:

- Configuring your various configuration (pin.conf) files.
- Setting up database tables and indexes.
To run the pin_setup script:

1. Go to the BRM_Home/setup directory and enter the following command:
   ```bash
   ./pin_setup
   ```
2. If you receive a notification that you must append information to the CM pin.conf file:
   a. Append the lines from the BRM_Home/append_to_cm_pin_conf file to the CM machine’s BRM_Home/sys/cm/pin.conf file.
   b. Stop and restart the CM process.

You receive the notification shown below when you install a DM component on a separate machine from the CM component:

```
Warning: File not found: BRM_Home/sys/cm/pin.conf
   To complete the install, append the following
   file to the sys/cm/pin.conf file and then restart the CM process:
   'BRM_Home/append_to_cm_pin_conf'
```

3. Check the pin_setup.log file for status and errors.

---

**Note:** After you run pin_setup, the cm.pinlog file erroneously contains several PIN_ERROC_FLIST and PIN_ERRCLASS_SYSTEM_DETERMINATE error messages. You can safely ignore these messages.

---

By default, the pin_setup script configures only the last installed product by reading the pin_setup.values file. You can also do the following:

- Use the -all parameter to configure BRM and all the optional components present in the @PRODUCT_LIST section of pin_setup.values.

  For example, go to the BRM_Home/setup directory and enter the following command:

  ```bash
  pin_setup -all
  ```

- Use the productname parameter to configure only BRM or an optional component present in the @PRODUCT_LIST section of the pin_setup.values file.

  For example, go to the BRM_Home/setup directory and enter the following command:

  ```bash
  pin_setup productname
  ```

  where productname indicates the name of the optional component you want to configure.

---

**Important:** Make sure that the productname is exactly the same as the name of the optional component present in the @PRODUCT_LIST section of the pin_setup.values file.

---

**Completing the Installation**

After BRM has been installed on each computer, check the parameters in the CM configuration file (BRM_Home/sys/cm/pin.conf) and Oracle DM configuration file (BRM_Home/sys/dm_oracle/pin.conf).
1. In the BRM_Home/sys/cm/pin.conf file, verify that the dm_pointer entry contains the DM machine’s host name or IP address.

Your pin.conf file must contain a dm_pointer entry for each DM in your system. Verify that any additional dm_pointer entries include the correct host name:

- cm dm_pointer 0.0.0.1 ip dm_machine 12950

2. In the BRM_Home/sys/dm_oracle/pin.conf file, make sure the DM points to the correct database:

- dm sm_database databaseAlias

Installation is now complete. If you encountered installation problems, verify that the settings in the pin_setup.values file on each computer point to the correct CM and DM.

Changing Your Database Partitions

If you did not choose to partition your tables during installation, you can skip this section. (To enable partitioning after installation, see "Changing from a Nonpartitioned to a Partitioned Database” in BRM System Administrator’s Guide.)

If you did partition your event tables during installation, your event tables are now divided into several partitions. The number of partitions depends on the option you selected when the installer asked whether to add 12 fixed (monthly) partitions:

- If you selected Yes, your event tables were divided into 12 monthly partitions, a historic partition, and a last partition. See "About the Default Partitioning Scheme" in BRM System Administrator’s Guide.

  Note: This does not set up default partitions for other partitioned tables you may have added with pin_setup.

- If you selected No, your event tables were divided into a historic partition and a last partition (stores all purgeable events). This partitioning scheme is sufficient for a test or development system. For a production system, however, you must create purgeable partitions.

  Note: To test partitioning, you must add at least one purgeable partition.

  Caution: If you want to change your partitioning scheme (for example, add partitions or specify additional events that should never be purged), do so before any objects are stored in the partitions you want to modify. Do not modify the partition after BRM adds objects to a partition.

To change your partitioning scheme, see "Partitioning Database Tables” in BRM System Administrator’s Guide.
(Optional) Installing Sample Data Files

When you perform a custom installation, the installer does not copy sample data files, such as Balance Element ID Objects (BEIDs), G/L IDs, ratable usage metrics (RUMs), and price lists, to your system. You must create your own data files or install the BRM sample data files before you can use any client applications, such as Pricing Center.

To install the BRM sample data files:

1. Log in to the machine containing the primary CM.
2. Go to the `BRM_Home/setup` directory and open the `pin_setup.values` file in a text editor such as `vi`.
3. Change the `$SETUP_INIT_DB` entry to `Yes` and make sure all pointers to all DMs contain the correct port number.
4. Save and close the file.
5. Go to the `BRM_Home/setup/scripts` directory and enter the following command:

   `perl pin_cmp_pin_billd.pl`


Installing Optional Components on a Separate Machine from the CM

If you install any optional components on a separate machine from your CM, make sure you manually edit each component’s configuration file to include:

- The correct CM port number.
- The correct host name for the CM machine.
- Any component-specific Facilities Module (FM) entries. For information, see "Syntax for Facilities Module (FM) Entries" in the BRM System Administrator’s Guide.

Loading the Tailor-Made Stored Procedure

Loading of the stored procedure is required for the Tailor-Made Plan feature. The following are the requirements to load the tailor-made stored procedure:

- BRM and Pipeline Manager should be installed.
- The BRM schema and the Pipeline Manager schema should reside on the same database.

To load the stored procedure, do the following:

1. Connect to the Oracle database with SQL*Plus:

   `% sqlplus system/manager@databaseAlias`

2. Grant access of pipeline schema to user pin by doing the following:

   a. Run the SQL grant select, update, insert, delete commands on the Pipeline Manager tables. For example, for the `ifw_rateplan` table, run the following command:

      `SQL> grant select, update, insert, delete on ifw_rateplan to pin;`

   Run this command on the following tables:

   - `ifw_rateplan`
b. Run the SQL grant select commands on the Pipeline Manager tables mentioned below. For example, for the ifw_service table, run the following command:

```sql
grant select on ifw_service to pin;
```

Run this command on the following tables:
- ifw_service
- ifw_timezone
- ifw_timemodel
- ifw_impact_cat
- ifw_zonemodel
- ifw_calendar

c. Run the SQL grant select commands on the Pipeline Manager sequences. For example, for the ifw_seq_selectordetail sequence, run the following command:

```sql
grant select ifw_seq_selectordetail to pin;
```

Run this command on the following tables:
- ifw_seq_selectordetail
- ifw_seq_selectorrule
- ifw_seq_modelselector
- ifw_seq_pricemodel
- ifw_seq_rateplan

3. Type `exit` to exit SQL*Plus.

4. Go to the `BRM_Home/sys/dm_oracle/data` directory.

5. Enter this command to open SQL*Plus:

```sql
sqlplus pin/pin@database_Name
```

where `database_Name` is the service name or database alias of the Oracle database.

6. Enter this command to load the stored procedure:

```sql
@create_pricing_tailormadeplan_procedures.plb
```

7. Type `exit` to exit SQL*Plus.
BRM Environment Variables

Table 7–7 shows the BRM environment variables. All of these environment variables are set during installation except for NLS_LANG.

Note: Do not change the default setting for NLS_LENGTH_SEMANTICS.

<table>
<thead>
<tr>
<th>Environment variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN_HOME</td>
<td>The directory where the BRM software will be installed. The default PIN_HOME value is /opt/portal/7.4. Note: You can reference this variable in pin.conf configuration files. See &quot;Preparing for Platform Migration by Using Variables in pin.conf Files&quot; in BRM System Administrator’s Guide.</td>
</tr>
<tr>
<td>PIN_LOG_DIR</td>
<td>The directory where the BRM log file will be installed. The default PIN_LOG_DIR value is /opt/portal/7.4/var. Note: You can reference this variable in pin.conf configuration files.</td>
</tr>
<tr>
<td>LIBPATH</td>
<td>(AIX only) Set this to include $PIN_HOME/lib, $PIN_HOME/bin, and $PIN_HOME/bin/classic.</td>
</tr>
<tr>
<td>LD_LIBRARY_PATH</td>
<td>(Solaris and Linux) The path to the Solaris and Linux library files. Normally, this value should be $PIN_HOME/lib.</td>
</tr>
<tr>
<td>SHLIB_PATH</td>
<td>(HP-UX IA64 only) The path to the HP-UX IA64 library files. Normally, this value should be $PIN_HOME/lib.</td>
</tr>
<tr>
<td>LIBRARYEXTENSION</td>
<td>The extension for the libraries used by your platform. There is no default value. Extensions for each platform type:  ■ Solaris, Linux, and HP-UX IA64: .so  ■ AIX: .a Note: You can reference this variable in pin.conf configuration files.</td>
</tr>
<tr>
<td>LIBRARYPREFIX</td>
<td>The prefix for the libraries used by your platform. There is no default value.  ■ lib Note: You can reference this variable in pin.conf configuration files.</td>
</tr>
<tr>
<td>PATH</td>
<td>The path of the BRM binary files. This value should be $PIN_HOME/bin. (For AIX) Also include $PIN_HOME/jre/bin.</td>
</tr>
<tr>
<td>PERL5LIB</td>
<td>Set this to include the path to your Perl files. By default, the BRM installer copies the Perl files to /opt/portal/7.4/lib and /opt/portal/7.4/perl/5.8.0/lib.</td>
</tr>
<tr>
<td>NLS_LANG</td>
<td>Set this to American_America.UTF8. Important: You must use American_America as the language and territory, regardless of your locale, and the UTF8 character set.</td>
</tr>
</tbody>
</table>

What’s Next?

You installed the BRM system software, which you can use to test your business models. To set up pricing plans, business policies, and customer accounts, you must install the BRM client applications. See "Installing BRM Client and Server Applications on UNIX".
This chapter explains how to install a Oracle Communications Billing and Revenue Management (BRM) multischema or multidatabase system.

This chapter is for network administrators, database administrators, and engineers who install and configure BRM software. The person installing the software should be familiar with the following technologies:

- UNIX operating systems
- Database installation and configuration
- Network management systems

For an overview of multischema and multidatabase systems, see “About the BRM Database” in BRM Concepts.

Before Installing a Multischema or Multidatabase System

Before you install your multischema or multidatabase system, make sure:

- Your system meets the minimum hardware and software requirements.
  See "System Requirements".
- You have all software required to run BRM with an Oracle database.
  See "Database Requirements".
- All databases in your multidatabase system use:
  - The same version of database software, such as Oracle 9.2.0.3
  - A unique database name
  - The same user name
  - The same database character set, such as UTF8
  - The same tablespace names
  - (For Oracle only) The same default domain name in the $ORACLE_HOME/network/admin/sqlnet.ora file
Setting Up a Multischema BRM System

The installation and set up procedure for the multischema system is the same as for a multidatabase system, except you connect secondary and primary schemas with schema qualifications rather than database links.

_Note:_ The multidatabase software still creates database links between the schemas, which are used only by the "pin_multidb" utility and Account Migration Manager (AMM).

To set up a multischema system, follow the procedure for installing and configuring a multidatabase system (see "Installing a Multidatabase BRM System"). Then, configure your secondary DMs to use schema qualifications by performing the following procedure:

_Important:_ You must set up your system to use either the multischema architecture or the multidatabase architecture. After your system is set up and running, you cannot change from one architecture to the other.

1. On the primary Oracle DM machine:
   a. Open the Oracle DM configuration file (`BRM_Home/sys/dm_oracle/pin.conf`) in a text editor.
   b. For each secondary database schema in your system, add the following entry:
      - `dm schema db_no schema_name`
      where `db_no` is the database number of the schema and `schema_name` is the name of the schema.
      For example, if your system has two secondary database schemas named `pin02` and `pin03`, add the following entries:
      - `dm schema 0.0.0.2 pin02`
      - `dm schema 0.0.0.3 pin03`
   c. Save and close the file.
   d. Run the `grant_permissions_oracle.plb` script from the UNIX prompt:
      ```
      cd BRM_Home/sys/dm_oracle/data
      sqlplus login/password@ORACLE_SID < grant_permissions_oracle.plb
      call grant_permissions('secondary_schema_name');
      ```
      where:
      - `login` is the user name for the primary database schema.
      - `password` is the password for the specified user name.
      - `ORACLE_SID` is the BRM database alias of the primary database schema.
      - `secondary_schema_name` is the name of the secondary database schema to which you are granting permissions.
Setting Up a Multischema BRM System

Installing a Multischema or Multidatabase System

8-3

e. Stop and restart the primary DM.

See "Starting and Stopping the BRM System" in BRM System Administrator's Guide.

2. On each secondary Oracle DM machine:
   a. Open the Oracle DM configuration file (BRM_Home/sys/dm_oracle/pin.conf) in a text editor.
   b. For the primary database schema and each of the other secondary database schemas in your system, add the following entry:
      - dm schema db_no schema_name
      where db_no is the database number of the schema and schema_name is the name of the schema.
      For example, if your system has schemas named pin01 (primary), pin02 (secondary), and pin03 (secondary), add the following entries:
      In the schema pin02 DM configuration file:
      - dm schema 0.0.0.1 pin01
      - dm schema 0.0.0.3 pin03
      In the schema pin03 DM configuration file:
      - dm schema 0.0.0.1 pin01
      - dm schema 0.0.0.3 pin02
   c. Delete or comment out any db_link entries to the primary database schema.
      For example:
      
      # - dm db_link MD_PRIMARY

      Important: A secondary DM cannot access the primary database schema by using both a schema qualification and a database link. If both entries are set, the DM reports an invalid configuration error.

   d. Save and close the file.
   e. Run the grant_permissions_oracle.plb script from the UNIX prompt:
      
      cd BRM_Home/sys/dm_oracle/data
      sqlplus login/password@ORACLE_SID < grant_permissions_oracle.plb
      call grant_permissions('schema_name');

      where:
      login is the user name for the secondary database schema associated with the DM you are configuring.
password is the password for the specified user name.

ORACLE_SID is the BRM database alias of the secondary database schema.
schema_name is the name of the schema to which you are granting permissions.

---

**Note:** Execute `call grant_permissions('schema_name')` separately for the primary database schema and for each of the other secondary database schemas in your system.

For example, if your system has schemas named pin01 (primary), pin02 (secondary), and pin03 (secondary), do the following:

- Log in to pin01, and run the call command for pin02 and then for pin03.
- Log in to pin02, and run the call command for pin01 and then for pin03.
- Log in to pin03, and run the call command for pin01 and then for pin02.

---

**f.** Stop and restart the secondary DM.

See "Starting and Stopping the BRM System" in *BRM System Administrator's Guide*.

---

**Installing a Multidatabase BRM System**

You can distribute BRM data among multiple databases to increase scalability and availability. For more information about multidatabase systems, see "A BRM Multidatabase Production System".

---

**Multidatabase Installation Overview**

The instructions in this document assume that you have four machines in your multidatabase environment as shown in **Figure 8–1**.

---

**Figure 8–1  Four Machine Multidatabase BRM Environment**

- The primary installation machine contains the primary Connection Manager (CM), the primary Data Manager (DM), and the database client. The primary CM
communicates with both primary and secondary DMs, and the primary DM is dedicated to the primary database. This machine must contain, at a minimum, the database client, a CM, and the Oracle DM.

- The secondary installation machine contains a secondary CM, a secondary DM, and the database client. The secondary CM communicates with the secondary DM, and the secondary DM is dedicated to the secondary database. Although the secondary CM is not required, it enables you to perform dedicated operations, such as billing, on the secondary database. This machine must contain, at a minimum, the database client and an Oracle DM.

- The primary database machine contains all of the configuration objects and, optionally, account data. Modifications to any configuration objects, for example changing the price list, are always performed on the primary database.

- The secondary database machine contains accounts and the associated account data. Each secondary database also contains a copy of the configuration, pricing, audit trail, and, optionally, uniqueness objects, which are replicated from the primary database to each secondary database at specified intervals.

### Installing a Multidatabase System: Task List

This section provides an overview of the complete installation and configuration procedure for multidatabase systems.

1. On the primary database machine, install Oracle and then create your primary BRM database.
   
   See "Installing Your Database Software and Creating Your Primary Database".

2. On the secondary database machine(s), install Oracle and then create your secondary BRM database.
   
   See "Installing Your Database Software and Creating Your Secondary Database".

3. Configure each database machine to connect to all other databases in the multidatabase system and then verify that all databases are interconnected.
   
   For information, see your database documentation.

4. Install Third-Party software, which includes the PERL libraries and JRE required for installing BRM components on your primary installation machine.
   
   See "Installing the Third-Party Software".

5. Install Third-Party software, which includes the PERL libraries and JRE required for installing BRM components on your secondary installation machine.
   
   See "Installing the Third-Party Software".

6. Edit the **pin_multidb.conf** file to point to the correct JDBC library for your version of the Oracle database.
   
   See "Editing the pin_multidb.conf File to Point to the JDBC Library".

7. Install BRM on your primary installation machine.
   
   See "Installing BRM on the Primary Installation Machine".

8. Install BRM on your secondary installation machine(s).
   
   See "Installing BRM on a Secondary Installation Machine".

9. Enable the secondary database(s) for replication.
   
   See "Enabling Secondary Database Replication".
10. Verify that the installation machines can connect to both databases.
    See "Verifying That the Installation Machines Connect to Both Databases".

11. Install the multidatabase software on the primary installation machine.
    See "Installing the Multidatabase Software on the Primary Installation Machine".

12. Specify whether you want the uniqueness table replicated to your secondary databases.
    See "Setting Whether the Uniqueness Table Is Replicated".

13. Edit the `pin_multidb.conf` file on the primary installation machine.
    See "Configuring the pin_multidb.conf File on the Primary Installation Machine".

14. Run the `pin_multidb.pl` script on the primary installation machine.
    See "Running the pin_multidb.pl Script on the Primary Installation Machine".

15. Confirm replication to the secondary databases.
    See "Confirming Replication to Secondary Databases".

16. If necessary, create any custom tables that you want replicated to your secondary databases.
    See "Creating Custom Tables for Oracle Replication".

Installing Your Database Software and Creating Your Primary Database

Install Oracle on your primary database machine and then create your primary database according to the instructions in "Installing and Configuring the Oracle Database".

Installing Your Database Software and Creating Your Secondary Database

Install Oracle on your secondary database machine and then create your secondary database according to the instructions in "Installing and Configuring the Oracle Database".

Editing the `pin_mutidb.conf` File to Point to the JDBC Library

1. Open the `BRM_Home/setup/scripts/pin_multidb.conf` file in a text editor.

2. Find the `$JDBC_JAR` file entry.

3. If you are using Oracle 11g database, set it to `$PIN_MD_SQL_BASE/jdbc/lib/ojdbc5.jar`.

4. If you are using earlier versions of the database, set it to `$PIN_MD_SQL_BASE/jdbc/lib/classes12.zip`.

5. Save and close the file.

Installing BRM on the Primary Installation Machine

The primary installation machine must contain, at a minimum, a CM and an Oracle DM. If your Oracle DM and database are on separate machines, you must also install the database client.

To set up the primary installation machine:
1. Install BRM according to the instructions in “Installing and Configuring a BRM Production System”, using the values to connect to your primary database.

2. Configure the database client to connect to all primary and secondary databases. For information, see "Installing the Database and Oracle Data Manager on Separate Machines”.

3. Install the optional components you purchased that may add tables to your database.

---

**Important:**
- You must install optional components *before* you run the multidatabase scripts to ensure that configuration objects from your optional component tables are replicated to your secondary databases.
- If you are installing wireless managers, such as Account Synchronization DM or GSM Manager, you must run the `object_auditing` script *after* you run the `pin_multidb.pl` script. Otherwise, installation will fail.

**Installing BRM on a Secondary Installation Machine**

A secondary installation machine must contain, at a minimum, an Oracle DM. If your Oracle DM and database are on separate machines, you must also install the database client.

To set up a secondary installation machine:

1. Install BRM according to the instructions in “Installing and Configuring a BRM Production System”, except as noted below:

   - Make sure that the user name for the primary and secondary databases is the same. The default value is `pin`. If the user names are different, multidatabase installation will fail.

   - Specify the following parameters in the `BRM_Home/setup/pin_setup.values` file:
     - Set `$SETUP_INIT_DB` to Yes
     - Set `$DM ORACLE{'db_num'}` to 0.0.0.2. For subsequent databases, use database numbers 0.0.0.3, 0.0.0.4, and so on. Each database must have a unique database number.

   - Go to the `BRM_Home/setup` directory and run the `pin_setup` script.

2. Configure the database client to connect to all primary and secondary databases. For information, see "Installing the Database and Oracle Data Manager on Separate Machines”.

3. Install the same optional components that you installed on the primary installation machine.

**Enabling Secondary Database Replication**

You must configure each secondary database in your multidatabase system to start one or more snapshot background processes (SNPs) automatically. The database software can then restart any snapshot processes that fail.
To enable replication, you must perform the following tasks:

- Granting System Privileges on the Primary and Secondary Databases
- Modifying the init.ora File on Secondary Databases

**Granting System Privileges on the Primary and Secondary Databases**

On both primary and secondary databases, use SQL*Plus to grant system privileges to the BRM user `pin`:

```
sqlplus system/manager@databaseAlias
```

```
SQL> grant create table, create view, create snapshot, create any snapshot, create trigger to pin identified by password;
Grant succeeded.
SQL> commit;
Commit complete.
```

**Modifying the init.ora File on Secondary Databases**

Perform the following steps on each secondary database machine to enable database replication:

1. Modify the following entries in the Oracle `initSID.ora` file (`$ORACLE_HOME/dbs/initSID.ora`) as shown in Table 8–1:

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>distributed_transactions</td>
<td>Must be greater than zero. A typical value is 300.</td>
</tr>
<tr>
<td>job_queue_processes</td>
<td>Specifies the number of SNP background processes per server. Set this parameter to a value of 1 or higher. One snapshot refresh process is usually sufficient, unless you have many refresh groups that require simultaneous refresh. The valid range of values is 0 to 36.</td>
</tr>
<tr>
<td>global_names</td>
<td>Specifies whether a database link is required to have the same name as the database to which it connects. Set to False.</td>
</tr>
</tbody>
</table>

2. Stop and restart Oracle so that the database instance is initialized with your changes.
3. Make sure that all databases are running.
4. Check for the SNP processes:

    ```
    % ps -ef | grep ora_snp
    This should return a line similar to:
    oracle 29867 1 30 Aug 10 ? 42.43 ora_snp0PIN1
    ```

**Verifying That the Installation Machines Connect to Both Databases**

Verify that BRM was installed and set up properly on your installation machines by connecting to the primary and secondary databases.
Using testnap to Verify Access to Your Databases

The BRM testnap utility tests your installation machine's connection to the database by establishing a Portal Communications Module (PCM) connection with the CM and executing PCM opcodes using that connection. For more information, see "testnap" in BRM Developer's Reference.

Verifying Access between Primary Installation Machine and Primary Database

Perform the following on the primary installation machine to verify that it can connect to the primary database:

1. Log in as user pin, go to the BRM_Home/sys/test directory, and open the pin.conf file in a text editor such as vi:

```bash
% su - pin
% cd BRM_Home/sys/test
% vi pin.conf
```

2. Modify the following entries in the pin.conf file:

   - nap cm_ptr ip primary_hostname port_number
   - nap login_name login_name
   - nap login_pw password

   where:
   - **primary_hostname** is the host name of the primary installation machine.
   - **port_number** is the port number of the primary CM.
   - **login_name** is the login for the primary CM (the default is root.0.0.0.1).
   - **password** is the password for the primary CM (the default is password).

3. Run the testnap utility from the BRM_Home/sys/test directory, and check for connection errors:

   ```bash
testnap
   ===>database 0.0.0.1 from pin.conf 'userid'
   q
   ```

Verifying Access between Secondary Installation Machine and Secondary Database

Perform the following on the secondary installation machine to verify that it can connect to the secondary database:

1. Log in as user pin, go to the BRM_Home/sys/test directory, and open the pin.conf file in a text editor such as vi:

```bash
% cd BRM_Home/sys/test
% vi pin.conf
```

2. Modify the following entries in the pin.conf file:

   - nap cm_ptr ip secondary_hostname port_number
   - nap login_name login_name
   - nap login_pw password

   where:
   - **secondary_hostname** is the host name of the secondary installation machine.
   - **port_number** is the port number of the secondary CM.
installing a multidatabase BRM system

- login_name is the login for the secondary CM (the default is root.0.0.2).
- password is the password for the secondary CM (the default is password).

3. Run the testnap utility from the BRM_Home/sys/test directory, and check for connection errors:

```
testnap
  =====>database 0.0.0.2 from pin.conf "userid"
q
```

installing the multidatabase software on the primary installation machine

**Important:** The multidatabase software changes your CM and DM configuration files during installation. Therefore, you should wait to customize these files until installation is complete.

To install the multidatabase software, perform the following on the primary installation machine:

1. Download the software to a temporary directory (temp_dir).

**Important:**
- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see “Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

2. Stop all BRM processes. See “Starting and Stopping the BRM System” in BRM System Administrator’s Guide.

3. Go to the directory where you installed the Third-Party package and source the source.me file.

**Caution:** You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

```
Bash shell:
source source.me.sh

C shell:
source source.me.csh
```

4. Go to the temp_dir directory and enter this command:

```
7.4 MultiDBMgr_platform_32_opt.bin
```
5. Follow the instructions displayed during installation. The default installation directory for multidatabase software is `opt/portal/7.4`.

**Note:** The installation program does not prompt you for the installation directory if BRM or multidatabase software is already installed on the machine and automatically installs the package at the `BRM_Home` location.

6. Go to the directory where you installed the multidatabase software package and source the `source.me` file:

   Bash shell:
   
   ```bash
   source source.me.sh
   ```

   C shell:
   
   ```bash
   source source.me.csh
   ```

7. Go to the `BRM_Home/setup` directory and run the `pin_setup` script.

8. Log in as user `pin` and copy the multidatabase configuration file (`BRM_Home/apps/multi_db/pin.conf`) to the `BRM_Home/setup/scripts` directory:

   ```bash
   % su - pin
   % cp BRM_Home/apps/multi_db/pin.conf BRM_Home/setup/scripts
   ```

9. Go to the `BRM_Home/setup/scripts` directory and open the `pin.conf` file in a text editor such as `vi`:

   ```bash
   % cd BRM_Home/setup/scripts
   % vi pin.conf
   ```

10. Modify the following entries in the `pin.conf` file:

    ```bash
    - nap cm_ptr ip primary_hostname port_number
    - nap login_name login_name
    - nap login_pw password
    ```

    where:

    - `primary_hostname` is the host name of the primary installation machine.
    - `port_number` is the port number of the primary CM.
    - `login_name` is the login for the primary CM (the default is `root.0.0.0.1`).
    - `password` is the password for the primary CM (the default is `password`).


12. Run the `testnap` utility from the `BRM_Home/setup/scripts` directory and check for connection errors:

    ```bash
    testnap
    ```
Setting Whether the Uniqueness Table Is Replicated

The multidatabase software provides the option to either store the uniqueness table on the primary database only or replicate the uniqueness table to all secondary databases. The decision to replicate or not replicate the uniqueness table depends on your multidatabase configuration.

Storing the Uniqueness Table on the Primary Database Only

In this configuration, all authentication is performed on the primary database. To store the uniqueness table on the primary database only and not replicate it to the secondary databases:

1. Open the multidatabase configuration file (BRM_Home/setup/scripts/pin_multidb.conf) in a text editor such as vi:

   ```
   % vi BRM_Home/setup/scripts/pin_multidb.conf
   ```

2. Remove the "UNIQUENESS" line from the following entry:

   ```
   @PIN_MD_REFRESH_GROUPS = ("CONFIG",
   "UNIQUENESS",
   "PRICE",
   "GENERAL");
   ```

When you run `pin_multidb.pl -i` at the end of installation, the following entry is added to the primary CM `pin.conf` file. This entry tells the Facilities Module (FM) to perform authentication only on the primary database.

```
- cm uniqueness 1
```

Replicating the Uniqueness Table to All Secondary Databases

```
Important: If your system contains multiple CMs, you must copy this entry to all other CM pin.conf files in your system.
```

```
- cm uniqueness 1
```

Disabling Creation of Uniqueness Objects

BRM requires unique service login names. The /uniqueness objects maintain a list of unique login names across multiple databases, which is used during authentication.
You can set up BRM to disable creation of `/uniqueness` objects. For example, you may want to disable creation of uniqueness objects if you are using your own authentication software.

To disable creation of uniqueness objects:

1. Open the Connection Manager (CM) configuration file (`BRM_Home/sys/cm/pin.conf`).
2. Edit the following entry:
   ```
   -cm uniqueness_login 1
   ```
   where:
   - 1 creates uniqueness objects. This is the default.
   - 0 does not create uniqueness objects.
3. Save the file.
4. Stop and restart the CM. See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.

**Enabling Unique Account Numbers**

You can now configure BRM to enforce creation of unique account numbers. Similar to the `/uniqueness` object, the new `/unique_account_no` object maintains a list of unique account numbers across all BRM databases.

To enforce creation of unique account numbers:

1. Open the Connection Manager (CM) configuration file (`BRM_Home/sys/cm/pin.conf`).
2. Edit the following entry:
   ```
   -cm uniqueness_account_no 0
   ```
   where:
   - 0 does not enforce unique account numbers. This is the default.
   - 1 enforces unique account numbers.
3. Save the file.
4. Stop and restart the CM.
5. Configure BRM to use database links.

   See "Using Database Links to Manage the Uniqueness Table".

**Using Database Links to Manage the Uniqueness Table**

BRM requires unique service login names. The `/uniqueness` object maintains a list of unique login names in a BRM multidatabase system. By default, uniqueness objects are created in the primary database.

You can use database links (dblink) to manage the uniqueness table. (If you don’t, you use the `pin_confirm_logins` utility in the event of a system shut down to update confirmed or deleted login entries in the uniqueness table.) A dblink is a link between databases that allows creation of distributed objects with a single transaction. By using a dblink, a secondary database can insert and update uniqueness objects in the primary database in a single transaction.
Figure 8–2 shows the dblink data flow:

**Figure 8–2  dblink Data Flow**

The MD_PRIMARY dblink is created when you install a multidatabase BRM system. MD_PRIMARY is a dblink from secondary BRM databases to the primary BRM database. The MD_PRIMARY dblink allows a transaction on the secondary database to create or update objects on the primary database.

The total number of dblink connections to the primary database is determined by the number of secondary DMs and the number of DM back-end processes specified for each DM. For example, if your BRM system consists of 8 secondary DMs and each DM is configured with 50 back-end processes (specified in the `dm_n_be` entry), a maximum of 400 connections to the primary database can be open at the same time. For information on how to set up database links, see "Using a Database Link".

---

**Note:**

- The use of database links is supported only for `/uniqueness` and `/unique_account_no` objects, and for `/au_uniqueness` and `/au_unique_account_no` objects when auditing is enabled.
- The exact implementation of database links is different for each database vendor. Consult your database vendor about implementation.
- If you use dblinks, you can optionally kill the `pin_confirm_logins` process if it is running. For information about this process, see *BRM System Administrator’s Guide*.

---

**Important:** If you do not use dblinks to manage the uniqueness table, you should use the `pin_confirm_logins` utility in the event of a system shutdown to update confirmed or deleted login entries in the uniqueness table.
Using a Database Link

Before you can use the uniqueness table management feature, you must set up BRM to use database links (dblink).

To set up BRM to use dblink:

- Set the `use_legacy_uniqueness_population` flag in the CM configuration file.
  See "Configuring the dblink".
- Set the `db_link` entry in the secondary DM configuration file.
  See "Mapping Tablespaces to Logical Devices".

Configuring the dblink

Both the Connection Manager (CM) and BRM Data Manager (DM) must be configured to use dblink for populating the uniqueness table.

To configure the CM:

1. Open the CM configuration file (`BRM_Home/sys/cm/pin.conf`).
2. Add the following entry:
   ```
   - fm_cust use_legacy_uniqueness_population 0
   ```
   where:
   - 0 specifies using the dblink implementation for populating uniqueness objects. This is the default.
   - 1 specifies using the BRM legacy implementation for populating uniqueness objects. Use this setting if your database does not support dblinks.

   **Important:** If you have unique account numbers enabled, this entry must be set to 0.

3. Save the file.
4. Stop and restart the CM. See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.
5. If you have more than one CM, copy this entry to all CM `pin.conf` files and stop and restart the CMs.
   See "Mapping Tablespaces to Logical Devices".

Mapping the dblink

All secondary Data Manager (DM) configuration files (`pin.conf`) must contain a mapping of the dblink name. The dblink mapping uses the following format:

```
- dm db_link dblink_name
```

where `dblink_name` identifies the dblink from the secondary database to the primary database. `MD_PRIMARY` is the default dblink from secondary BRM databases to the primary database created during BRM multidatabase installation.

To configure all secondary DMs:

1. Add the following `db_link` statement to all secondary DM `pin.conf` files:
- `dm db_link MD_PRIMARY`

**Important:** Both the CM and DM must be configured to use either the dblink or BRM legacy implementation. If the `use_legacy_uniqueness_population` flag in the CM pin.conf file is set to 1, you must comment out the `db_link` flag in the DM pin.conf file as follows:

```bash
-- dm db_link MD_PRIMARY
```

**Note:** The `db_link` entry tells the DM to use the MD_PRIMARY dblink when creating or updating uniqueness objects. If the MD_PRIMARY dblink does not exist on the secondary database, you will get the following Oracle error:

```
ORA-02019: connection description for remote database not found
```

2. Stop and restart the secondary DMs.

3. Verify access to the primary database by using the MD_PRIMARY dblink.

   See "Verifying Access to Primary Database by Using the MD_PRIMARY Database Link".

**Configuring db_link for High Availability**

If the primary database is configured for high availability with Oracle RAC servers, add the following `db_link` entry to the secondary DM pin.conf to access the backup primary database:

```bash
-dm db_link MD_BACKUP
```

If the primary database fails over, the secondary DM uses the backup `db_link` entry to access the backup primary database.

**Note:** The multidb setup script prompts you to add the backup `db_link` entry to the secondary DM pin.conf file.

**Verifying Access to Primary Database by Using the MD_PRIMARY Database Link**

To verify that the MD_PRIMARY dblink was created successfully after a BRM multidatabase install or BRM upgrade:

1. Log in to the secondary database as user `pin`:
   ```
   % sqlplus pin/password@secondaryDatabaseAlias
   ```

2. Enter the following SQL command:
   ```
   SQL> select poid_id0 from uniqueness_t@MD_PRIMARY where poid_id0=1;
   ```

   If successful, the primary database returns the following lines:
   ```
   poid_id0
   -----------------------------------------------
   1
   ```
If the primary database returns an error instead, recreate the MD_PRIMARY dblink and run the SQL query again. If this query fails again, consult your Oracle systems administrator.

To create the MD_PRIMARY dblink:
1. Log in to the secondary database as user pin:
   % sqlplus pin/password@secondaryDatabaseAlias

2. Enter the following SQL command to create the dblink:
   SQL> CREATE DATABASE LINK MD_PRIMARY CONNECT TO $PIN_MD_PRIMARY_OWNER
   IDENTIFIED by $PIN_MD_PRIMARY_PASSWD USING '$PIN_MD_PRIMARY_DBNAME';

3. Enter the following SQL command to verify that the link was created:
   SQL> select * from all_db_links;

If successful, this command should return the MD_PRIMARY dblink and any other dblinks created in the database.

Configuring the pin_multidb.conf File on the Primary Installation Machine

You must enter any configuration parameters for your multidatabase setup in the pin_multidb.conf file.

To configure a BRM multidatabase system:
1. Open the BRM_Home/setup/scripts/pin_multidb.conf file in a text editor such as vi:
   % vi BRM_Home/setup/scripts/pin_multidb.conf

2. Modify the following configuration entries shown in Table 8–2, making sure they contain a set of $PIN_MD_SECONDARY*[x] entries for each secondary database instance in your system. For example, if your system contains three secondary databases, the file should contain a set of $PIN_MD_SECONDARY* entries ending in [0], a set ending in [1], and a set ending in [2].

Table 8–2 pin_multidb.conf File Entries

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$PIN_MD_SQL_PLATFORM</td>
<td>Enter which database software your multidatabase system uses. Enter 'Oracle'.</td>
</tr>
<tr>
<td>$PIN_MD_SQL_BASE</td>
<td>Set this to $ORACLE_HOME.</td>
</tr>
</tbody>
</table>
| $PIN_MD_INFRANET_BASE| Enter the directory in which you installed BRM on your primary installation machine.  
You must change this value if you installed BRM in a directory other than /opt/portal/7.4. |
| $PIN_MD_CM_HOST      | Enter the machine name where the primary CM is running.                     |
| $PIN_MD_CM_PORT      | Enter the primary CM’s port number. The default is 11960. You can check the port number by looking in the BRM_Home/sys/cm/pin.conf file. |
| $PIN_MD_PRIMARY_DBNO | Enter the primary database number. The default is “0.0.0.1”.                |
Installing a Multidatabase BRM System

Table 8–2  (Cont.) pin_multidb.conf File Entries

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$PIN_MD_PRIMARY_OWNER</td>
<td>Enter your user name for the primary database. The default is &quot;PIN&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_PRIMARY_PASSWD</td>
<td>Enter your password for the primary database. The default is &quot;pin&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_PRIMARY_DBNAME</td>
<td>Enter the database alias for the primary database.</td>
</tr>
<tr>
<td>$PIN_MD_PRIMARY_HOSTNAME</td>
<td>Enter the machine name where the primary DM is running.</td>
</tr>
<tr>
<td>$PIN_MD_PRIMARY_PORT</td>
<td>Enter the port number for the primary DM. The default is 12950.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_START_INST</td>
<td>Enter which database instance is the first secondary database to be added to your system. For example, if you are creating three secondary databases, enter 0.</td>
</tr>
<tr>
<td></td>
<td>If you are adding secondary databases to an existing multidatabase system, enter the instance number for the first database being added to the system. For example, if your system contains three secondary databases (instances 0, 1, and 2) and you are adding two more databases, enter 3. This tells the multidatabase script to configure only database instances 3 and above, and to ignore database instances 0, 1, and 2. The default is &quot;0&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_END_INST</td>
<td>Enter which database instance is the last secondary database to be added to your system. For example, if you are creating three secondary databases, enter 2.</td>
</tr>
<tr>
<td></td>
<td>If you are adding secondary databases to an existing multidatabase system, enter the instance number for the last database being added to the system. For example, if your system contains three secondary databases and you are adding two more databases, enter 4. The default is &quot;0&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_DBNO [0]</td>
<td>Enter the secondary database number. The default is &quot;0.0.0.2&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_OWNER [0]</td>
<td>Enter your user name for the secondary database. The default is &quot;PIN&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_PASSWD [0]</td>
<td>Enter your password for the secondary database. The default is &quot;pin&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_DBNAME [0]</td>
<td>Enter the database alias for the secondary database.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_HOSTNAME [0]</td>
<td>Enter the machine name where the secondary DM is running.</td>
</tr>
<tr>
<td>$PIN_MD_SECONDARY_PORT [0]</td>
<td>Enter the DM port number for the secondary database.</td>
</tr>
<tr>
<td>$PIN_MD_CONFIG_REF_UNIT</td>
<td>Enter the unit of measure for replicating configuration objects. The default is &quot;Days&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_CONFIG_REF_INTERVAL</td>
<td>Enter how frequently to replicate configuration objects. The default is &quot;10&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_UNIQUENESS_REF_UNIT</td>
<td>Enter the unit of measure for replicating uniqueness objects. The default is &quot;Hours&quot;.</td>
</tr>
<tr>
<td>$PIN_MD_UNIQUENESS_REF_INTERVAL</td>
<td>Enter how frequently BRM should replicate uniqueness objects to the secondary databases. The default is &quot;6&quot;.</td>
</tr>
</tbody>
</table>
Editing the start_mdb and stop_mdb Scripts

The start_mdb script does not start pin_confirm_logins if the database platform is Oracle. If your database platform is not Oracle, you must do the following:

1. Open the BRM_Home/bin/start_mdb script with a text editor such as vi.
2. Edit the following parameter to indicate your database platform:
   
   SQL_PLATFORM=oracle

3. Save and close the file.
4. Repeat steps 2 and 3, using the stop_mdb script.

Running the pin_multidb.pl Script on the Primary Installation Machine

The pin_multidb.pl script initializes and configures your primary and secondary databases.

Running pin_multidb.pl -i

The pin_multidb.pl script with the -i parameter initializes the primary and secondary databases. For information, see "pin_multidb" in BRM System Administrator’s Guide.

To run pin_multidb -i, perform the following on the primary installation machine:

1. Log in as user pin, go to the BRM_Home/apps/multi_db directory, and open the config_dist.conf file in a text editor such as vi:
   
   % su - pin
   % cd BRM_Home/apps/multi_db
   % vi config_dist.conf

2. Change the status of all secondary databases to "OPEN".
Installing a Multidatabase BRM System

### Note:
If your system contains multiple secondary databases, create a new set of entries for each additional secondary database.

```
DB_NO = "0.0.0.1" ; # 1st database config block.
PRIORITY = 1 ;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;
```

```
DB_NO = "0.0.0.2" ; # 2nd database config block.
PRIORITY = 1 ;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;
```

3. Go to the `BRM_Home/setup/scripts` directory and run `pin_multidb.pl -i`:

   % cd BRM_Home/setup/scripts
   % perl pin_multidb.pl -i

   This starts a series of interactive prompts. Follow the instructions on the screen.

### Important: (Multischema systems only) When a prompt instructs you to set up schema qualifications, see "Setting Up a Multischema BRM System" for more information.

4. Check the `pin_multidb.log` file for errors.

5. Check the primary CM’s configuration file (`BRM_Home/sys/cm/pin.conf`).
   a. In the following line, verify that `DM_machine` represents the host name of the primary installation machine:

      - cm dm_pointer 0.0.0.1 ip DM_machine 12950

   b. In the following line at the end of the file, verify that `DM_machine` represents the host name of the secondary installation machine:

      - cm primary_db 0.0.0.1 / 0
      - cm dm_attributes 0.0.0.2 scoped,assign_account_obj,searchable
      - cm dm_pointer 0.0.0.2 ip DM_machine 12950

### Note: Your `pin.conf` file must contain a `dm_pointer` entry for each secondary DM in your system. Verify that any additional `dm_pointer` entries include the correct host name.

### Running `pin_multidb.pl -f`

### Important: Make sure you complete all of the on-screen instructions for `pin_multidb.pl -i` before you run `pin_multidb.pl -f`.

The `pin_multidb.pl` script with the `-f` parameter completes the installation process. It starts the `pin_config_distribution` and `pin_confirm_logins` processes, which run at the frequency you configured.
To complete multidatabase installation:

1. On the secondary installation machine, open the Oracle DM configuration file (BRM_Home/sys/dm_oracle/pin.conf) in a text editor such as `vi`.

2. Make the data dictionary objects writable by changing the following entries to 1:
   - `dm dd_write_enable_fields 1`
   - `dm dd_write_enable_objects 1`
   - `dm dd_write_enable_portal_objects 1`

3. On the primary installation machine, go to the BRM_Home/setup/scripts directory and run `pin_multidb.pl -f`:
   ```
   % cd BRM_Home/setup/scripts
   % perl pin_multidb.pl -f
   ```
   This starts a series of interactive prompts. Follow the instructions on the screen.

4. Verify that the `pin_confirm_logins` and `pin_config_distribution` processes are running. For information, see "pin_confirm_logins" and "pin_config_distribution" in BRM System Administrator's Guide.

5. Check the `pin_multidb.log` file for errors.

6. Add the following entries to the secondary CM's configuration file (BRM_Home/sys/cm/pin.conf):
   - `cm primary_db 0.0.0.1 / 0`
   - `cm dm_attributes 0.0.0.1 scoped,assign_account_obj,searchable`
   - `cm dm_pointer 0.0.0.1 ip DM_machin e 12950`

All BRM applications now have multidatabase capability.

### Confirming Replication to Secondary Databases

Confirm that your multidatabase system replicates properly.

To confirm replication on Oracle databases:

1. Log into your secondary database as `pin` and enter the following command:
   ```
   % sqlplus pin/password@databaseAlias
   SQL> desc user_snapshots;
   ```

2. Check the NAME, LAST_REFRESH, ERROR, NEXT, START_WITH, REFRESH_GROUP, and UPDATE_LOG tables.
   ```
   SQL> select name from user_snapshots;
   ```
   This command returns the following:

   ```
   NAME
   -----------------------------
   CONFIG_T
   CONFIG_ADJUSTMENT_EVENTS_T
   CONFIG_BEID_BALANCES_T
   CONFIG_BUSINESS_PARAMS_T
   CONFIG_BUSINESS_TYPE_T
   CONFIG_CTRY_CUR_MAP_T
   CONFIG_CTRY_CUR_ARR_T
   CONFIG_CREDIT_TERMCAUSES_T
   CONFIG_CUR_RATES_TIMEFRAMES_T
   CONFIG_CUR_CONV_RATES_T
   ```
<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG_CURRENCY_EMU_MEMBERS_T</td>
</tr>
<tr>
<td>NAME</td>
</tr>
<tr>
<td>CONFIG_CUR_SUPPORTEDCOMB_T</td>
</tr>
<tr>
<td>CONFIG_CUR_SUPPORTED_SECCUR_T</td>
</tr>
<tr>
<td>CONFIG_DEVICE_PERMIT_MAP_T</td>
</tr>
<tr>
<td>CONFIG_DEVICE_PERMITTEDS_T</td>
</tr>
<tr>
<td>CONFIG_DEVICE_TYPE_INFO_T</td>
</tr>
<tr>
<td>CONFIG_DEVICE_STATES_T</td>
</tr>
<tr>
<td>CONFIG_DEVICE_NEXT_STATES_T</td>
</tr>
<tr>
<td>CONFIG_DISTRIBUTION_T</td>
</tr>
<tr>
<td>CONFIG_EVENT_MAP_T</td>
</tr>
<tr>
<td>CONFIG_PERMITTED_EVENTS_T</td>
</tr>
<tr>
<td>CONFIG_EVENT_RECORD_MAP_T</td>
</tr>
<tr>
<td>CONFIG_FLD_VALIDATE_DOMAINS_T</td>
</tr>
<tr>
<td>CONFIG_FLD_VALIDATE_FORMATS_T</td>
</tr>
<tr>
<td>CONFIG_FLD_VALIDATE_VAL_T</td>
</tr>
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<td>CONFIG_GEL_TEMPLATE_T</td>
</tr>
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<td>CONFIG_GL_CHARTACCTS_T</td>
</tr>
<tr>
<td>CONFIG_GL_COA_ACCTS_T</td>
</tr>
<tr>
<td>CONFIG_GL_SEGMENT_T</td>
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<td>CONFIG_GLID_T</td>
</tr>
<tr>
<td>CONFIG_GLID_ACCTS_T</td>
</tr>
<tr>
<td>CONFIG_IMPACT_CATEGORIES_T</td>
</tr>
<tr>
<td>CONFIG_INVOICE_EVENTS_T</td>
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<td>CONFIG_INVOICE_EVENT_TYPES_T</td>
</tr>
<tr>
<td>CONFIG_INV_TEMP_FORMATS_T</td>
</tr>
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<td>CONFIG_ITEMS_T</td>
</tr>
<tr>
<td>CONFIG_EVENTS_T</td>
</tr>
<tr>
<td>CONFIG_LOCALS_CODESET_T</td>
</tr>
<tr>
<td>CONFIG_LOCALS_VALID_SPEC_T</td>
</tr>
<tr>
<td>CONFIG_NETWORK_ELEMENT_T</td>
</tr>
<tr>
<td>CONFIG_PAYMENT_BILL_TYPES_T</td>
</tr>
<tr>
<td>CONFIG_PYMTTOOL_BILL_TYPES_T</td>
</tr>
<tr>
<td>CONFIG_ARCHIVE_T</td>
</tr>
<tr>
<td>CONFIG_WEBD_PERMITTEDS_T</td>
</tr>
<tr>
<td>CONFIG_REMITTANCE_SPEC_T</td>
</tr>
<tr>
<td>CONFIG_REMITTANCE_CRITERIA_T</td>
</tr>
<tr>
<td>CONFIG_CANDIDATES_RMS_T</td>
</tr>
<tr>
<td>CONFIG_TAXS_T</td>
</tr>
<tr>
<td>CONFIG_VERIFY_CHECKS_T</td>
</tr>
<tr>
<td>CONFIG_GEL_TEMPLATE_BUF_T</td>
</tr>
<tr>
<td>CONFIG_INV_TEMP_T</td>
</tr>
<tr>
<td>CONFIG_INV_TEMP_INHERITED_T</td>
</tr>
<tr>
<td>CONFIG_LOCALS_MAP_T</td>
</tr>
<tr>
<td>CONFIG_LOCALS_VALIDATE_T</td>
</tr>
<tr>
<td>CONFIG_MAP_GLID_T</td>
</tr>
</tbody>
</table>
CONFIG_NOTIFY_EVENTS_T
CONFIG_PAYMENT_OPCODES_T
CONFIG_PYMT_TOOL_BT_FIELDS_T
CONFIG_ARCHIVE_TABLEMAP_T
CONFIG_REMITTANCE_FLD_T
CONFIG_RUM_MAP_T
CONFIG_SPEC_RATES_T
CONFIG_USAGE_MAP_T
CONFIG_INV_TEMP_BUFF_T
DEAL_PRODUCTS_T
PLAN_LIMIT_T

NAME
------------------------
PRODUCT_T
RATE_T
RATE_BAL_IMPACTS_T
RATE_TIERS_T
DAY_RANGES_T
TOD_RANGES_T
ZONEMAP_T
AU_DEAL_PRODUCTS_T
AU_PLAN_LIMIT_T
AU_PRODUCT_T
AU_RATE_T

NAME
------------------------
AU_RATE_BAL_IMPACTS_T
AU_RATE_TIERS_T
AU_DAY_RANGES_T
AU_RATE_PLAN_SELECTOR_T
SELECTOR_T
ZONEMAP_DATA_RAW_T
DEAL_T
PLAN_T
PLAN_SERVICES_T
PRODUCT_USAGE_MAP_T
RATE_QUANTITY_TIERS_T

NAME
------------------------
RATE_PLAN_T
DATE_RANGES_T
RATE_PLAN_SELECTOR_T
AU_DEAL_T
AU_PLAN_T
AU_PLAN_SERVICES_T
AU_PRODUCT_USAGE_MAP_T
AU_RATE_QUANTITY_TIERS_T
AU_RATE_PLAN_T
AU_DATE_RANGES_T
AU_TOD_RANGES_T

NAME
------------------------
AU_SELECTOR_T
ZONEMAP_DATA_DERIVED_T
UNIQUENESS_T
UNIQUENESS_ALIAS_LIST_T
Creating Custom Tables for Oracle Replication

You can create custom tables or modify existing tables after your multidatabase system is installed and configured. To replicate these tables to your secondary databases:

1. Create your custom table on the primary database by connecting to the multidatabase CM.
2. Name your table using the following naming convention:

   | CONFIG* | PLAN* | PRODUCT* | RATE* | UNIQUEN* | STRINGS* | CHANNEL* | SEARCH* | ZONE*_T | TOD* | FOLD* |

3. Add an index on the primary key of each custom table that you want replicated.
4. Perform step 2 of the pin_multidb.pl -i script:
   a. Go to the BRM_Home/setup/scripts directory and run pin_multidb.pl -i:
      ```bash
      cd BRM_Home/setup/scripts
      perl pin_multidb.pl -i
      ```
   b. At the following prompt, enter y to begin configuration:
      ```bash
      Do you want to start the configuration now? (y/n):  y
      ```
   c. At the following prompt, enter 2 to initialize the primary database:
      ```bash
      Please enter the starting step (0-8). If you don’t know, enter 0:  2
      ```
d. When step 2 is complete, exit the `pin_multidb.pl` script.

5. Run `pin_multidb.pl -R` to recreate the refresh groups in the secondary databases:

```bash
% cd BRM_Home/setup/scripts
% perl pin_multidb.pl -R group
```

where `group` is the name of the group your custom table belongs to. For information, see "pin_multidb" in BRM System Administrator's Guide.

**What's Next?**

Your BRM system now has multidatabase capability. You can install the BRM client applications and start creating your accounts. See "Installing BRM Client and Server Applications on Windows".

For information on how to manage your multidatabase system, such as setting database priority and database status, see "Managing a Multidatabase System" in BRM System Administrator's Guide.
Installing and Configuring BRM with IMDB Cache Manager

This chapter describes how to install and configure an Oracle Communications Billing and Revenue Management (BRM) system with In-Memory Database (IMDB) Cache Manager.

**Important:** If you have existing BRM data created on a BRM system before IMDB Cache Manager was installed, you must run the `load_pin_uniqueness` utility to prepare data for migration to an IMDB Cache Manager-enabled system before you load BRM objects into the Oracle IMDB Cache.

Before you read this document, you should be familiar with:

- Oracle In-Memory Database Cache concepts and architecture. See Oracle In-Memory Database Cache User's Guide.

**Important:** IMDB Cache Manager is an optional feature that requires a separate license.

**About the BRM System with IMDB Cache DM**

A BRM system with IMDB Cache DM supports real-time event rating for both prepaid and postpaid subscribers.

**Important:** Do not run batch rating if your BRM system is configured with IMDB Cache DM. Running batch rating in a BRM system with IMDB Cache DM may cause unexpected results.

A basic BRM system to rate prepaid and postpaid real-time events using IMDB Cache DM includes the following components:

- Client applications (for example, AAA Gateway Manager and Customer Center)
- Service-specific applications (for example, GSM AAA Manager and GPRS AAA Manager)
- Connection Manager, along with the Facilities Modules (FMs)
About the BRM System with IMDB Cache DM

- Resource Reservation Framework (RRF)
- Real-time discounting pipeline, if your rating includes discounting
- IMDB Cache DM
- Oracle IMDB Cache
- Oracle Database

Figure 9–1 shows a basic BRM system for rating prepaid real-time events with IMDB Cache DM.

**Figure 9–1  A Basic BRM System with IMDB Cache DM**

In a BRM system with multiple database schemas, each database schema must be mapped to an instance of IMDB Cache DM. Each IMDB Cache DM handles all the operations associated with the accounts in that specific database schema. You can configure one CM for each IMDB Cache DM, or one CM for multiple IMDB Cache DMs, or multiple CMs for multiple IMDB Cache DMs.

Figure 9–2 shows a basic IMDB Cache DM-enabled system for a multi-schema database.

**Figure 9–2  A Basic IMDB Cache DM-Enabled System for Multi-Schema Database**
Hardware and Software Requirements

Table 9–1 describes the hardware and software requirements for installing IMDB Cache Manager.

<table>
<thead>
<tr>
<th>System Requirement</th>
<th>Hardware and Software Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRM System</td>
<td>BRM 7.4 Patch Set 8</td>
</tr>
<tr>
<td>Operating System</td>
<td>Solaris, Linux, HP-UX, AIX</td>
</tr>
<tr>
<td>Processor</td>
<td>64-bit architecture</td>
</tr>
<tr>
<td>Database Version</td>
<td></td>
</tr>
</tbody>
</table>
| Oracle 11.1.0.7.0 and required Oracle patches 6890831, 9352179, 6963600.  
 Oracle 11.2.0.1.0            |
| Oracle IMDB Cache           | Oracle IMDB Cache 11.2.1.8.2                                       |
| Oracle Clusterware 11.1.0.7.0 |
| Run Oracle IMDB Cache in its own cluster, not in the Oracle Real Application Clusters (RAC) cluster. |
| Java Runtime                | J2SE Software Development Kit (JDK) version 1.5                    |
| Perl                        | Perl 5.8.0                                                          |
| Perl Modules:               |                                                                    |
|  DBI version 1.605           |
|  DBD-Oracle version 1.16     |
|  Bit-Vector version 7.1      |

About Installing and Configuring a BRM System with IMDB Cache Manager

Before you set up a BRM system with IMDB Cache Manager, you should plan your system configuration. For example, you should decide whether the system will be configured with logical partitioning, high availability, a single-schema database, or a multischema database.

For information about:

- A basic BRM system with IMDB Cache DM, see "About the BRM System with IMDB Cache DM".
- A BRM system with logical partitioning, see "Using the IMDB Cache Grid to Partition Data" in BRM System Administrator’s Guide.
- A high-availability BRM system, see "Understanding a high-availability system" and "Configuring a high-availability system" in BRM System Administrator’s Guide.
- A multischema BRM system, see "Configuring IMDB Cache DM for a Multi-Schema Environment".

Installing and Configuring a Basic BRM System with IMDB Cache Manager

This section provides instructions for configuring a basic BRM system with IMDB Cache Manager. The examples demonstrate how to create the data store tt_0.0.0.1 in Oracle TimesTen In-Memory Database for a single-schema BRM database.
To install and configure a basic BRM system with IMDB Cache Manager:

1. Install and configure the BRM database.
2. Install Oracle IMDB Cache. See *Oracle TimesTen In-Memory Database Installation Guide*.
3. Install BRM 7.5. See "Installing BRM".
4. Install IMDB Cache Manager. See "Installing IMDB Cache Manager".
5. Install any optional components that you want to add to your system.
6. Create your data stores. See "Creating the Data Store in Oracle IMDB Cache".
7. If you have existing BRM data that was created before IMDB Cache Manager was installed, run the `load_pin_uniqueness` utility to prepare data for migration to an IMDB Cache-enabled system.

   **Note:** Stop and restart CM and DM.

8. Create the schema and load BRM objects into the data store. See "Initializing the Data Store in Oracle IMDB Cache".
9. Make the data store accessible to IMDB Cache DM. See "Making the Data Store Accessible to IMDB Cache DM".
10. Configure IMDB Cache DM to connect to the data store. See "Connecting IMDB Cache DM to the IMDB Cache Data Store".
11. Configure your CM to connect to the IMDB Cache DM. See "Connecting the CM to IMDB Cache DM".
12. Perform post-installation tasks. See "IMDB Cache Manager Post Installation Tasks".

### Creating the Data Store in Oracle IMDB Cache

You need to create a data store in Oracle IMDB Cache, in which you cache the BRM database tables.

To create data store `tt_0.0.0.1` in Oracle IMDB Cache:

1. On the system where IMDB Cache is installed, create a directory for storing database files:

   ```
   mkdir `IMDB_home/Database_Files_Location`
   ```

   where:
   - `IMDB_home` is the directory in which you installed Oracle IMDB Cache.
   - `Database_Files_Location` is the directory in which you want to store the BRM database files.

   For example:

   ```
   mkdir `IMDB_home/BRMFiles`
   ```

   **Note:** Oracle recommends using a local disk for the database files instead of a network-mounted disk.
2. Go to the user home directory:
   
   ```
   cd IMDB_home/info
   ```

3. Create a data store configuration file named `sys.odbc.ini` with the following entries:

   ```ini
   [DSN]
   DataStore=Database_Files_Location/Datastore_Name
   OracleNetServiceName=Oracle_Database_Service_Name
   DatabaseCharacterSet=UTF8
   ConnectionCharacterSet=UTF8
   PLSQL=1
   OracleNetServiceName=BRM_Database_Service_Name
   oraclepwd=$TIMESTEN_HOME/lib/libtten.so
   #Shared-memory size in megabytes allocated for the datastore.
   PermSize= Shared_Memory_Size
   #Shared-memory size in megabytes allocated for temporary data partition,
   #generally half the size of Permsize.
   TempSize=Half_of_PermSize
   PassThrough=0
   #Use large log buffer, log file sizes
   LogFileSize=512
   #Async repl flushes to disk before sending batches so this makes it faster
   #on Linux
   LogFlushMethod=2
   CkptFrequency=200
   CkptLogVolume=0
   #Limit Ckpt rate to 10 mb/s
   CkptRate=10
   Connections=200
   #Oracle recommends setting LockWait to 30 seconds.
   LockWait=30
   DurableCommits=0
   CacheGridEnable=1
   ```

   **Note:** For information on configuring the data store attributes in the `sys.odbc.ini` file, see *Oracle TimesTen In-Memory Database Operations Guide*.

**sys.odbc.ini configuration file**

- **DSN** is the data source name, which is the same as the data store name. DSN must also be the same as the database alias name in the `tnsnames.ora` file. See "Making the Data Store Accessible to IMDB Cache DM".
- **DatabaseFilesLocation** is the directory where you want to store the database files.
- **DataStoreName** is the name of the data store in the Oracle TimesTen In-Memory Database.
- **Oracle_Database_Service_Name** identifies the service name for the BRM database instance.
- **Oracle_DB_User** is the BRM database user.
- **Oracle_DB_Password** is the password for the BRM database user.
- **Shared_Memory_Size** is the size of shared memory segment allocated for the data store being created.

4. Save and close the file.

5. Go to `IMDB_home/bin` and source the `ttenv.csh` file:
   
   ```
   cd IMDB_home/bin
   source ttenv.csh
   ```

6. Set up the Oracle IMDB Cache grid privileges in the BRM database:
   
   a. Connect to the BRM database as a system administrator:
   
   ```
   cd IMDB_home/oraclescripts
   sqlplus sys as sysdba
   ```

   b. Run the following SQL*Plus scripts:
   
   ```
   @IMDB_home/oraclescripts/initCacheGlobalSchema.sql
   @IMDB_home/oraclescripts/grantCacheAdminPrivileges.sql
   ```

   c. Run the following commands to grant privileges:
   
   ```
   grant all onTIMESTEN.TT_GRIDID to "Oracle_DB_User";
   ```

   where `Oracle_DB_User` is the BRM database user.

   For more information, see Oracle In-Memory Database Cache User’s Guide.

7. Create the data store by using the TimesTen `ttIsql` utility:

   ```
   cd IMDB_home/bin
   ttIsql DataStoreName
   ```

   where `DataStoreName` is the name of the data store you defined in the `sys.odbc.ini` file.

8. Create the data store user:

   ```
   create user DataStoreName identified by DataStorePassword;
   ```

   where:

   - `DataStoreUser` is the IMDB Cache data store user.
   - `DataStorePassword` is the password for the IMDB Cache data store user.

   **Important:** The IMDB Cache data store user must be the same as the BRM database user. However, the data store password can be different from the BRM database user password.

To initialize data stores for multischema setup, you must create the primary user along with the secondary user in all the secondary logical partitions.

```
create user Primary_Data_Store_User identified by Primary_Data_Store_Password;
```

where:

- `Primary_Data_Store_User` is the primary data store user.
- `Primary_Data_Store_Password` is the password for the primary data store user.

9. Grant all permissions to the data store user:
grant all to Data_Store_User;

10. Set the data store user and password:

    ttIsql "uid=Data_Store_User; pwd=Data_Store_Password; dsn=tt_0.0.0.1"
    call ttcacheuidpwdset('Cacheadminuser', 'Cacheadminuserpwd');

    where:
    ■ Cacheadminuser is the cache user name.
    ■ Cacheadminuserpwd is the cache password.

11. Make the data store grid-enabled.

    For example:
    call ttGridCreate('ttGrid');
    call ttGridNameSet('ttGrid');
    call ttGridAttach(1,'0.0.0.1',Host, Port);

    where:
    ■ Host is the host on which the data store resides.
    ■ Port is a free port on the system.

    See Oracle TimesTen In-Memory Database Reference for more information on the
    procedures for creating a data store.

Initializing the Data Store in Oracle IMDB Cache

To load BRM objects into the data store, you must first generate the BRM cache groups
schema using the BRM database and extract the data from the BRM database for
 caching. You then create and initialize the schema in the IMDB Cache data store.

To load BRM objects into the Oracle IMDB Cache data store:

1. Generate the BRM cache groups schema and extract the BRM data. See
   "Generating the Schema and Load SQL files".

2. Create and initialize the BRM cache groups in the data store. See "Initializing the
   Data Store".

Generating the Schema and Load SQL files

Using the pin_tt_schema_gen utility, generate the schema SQL file with the BRM
 cache groups schema and load SQL file with the BRM data. See "Creating and
 Initializing the BRM Cache Group Schema" in BRM System Administrator’s Guide for
 more information about using pin_tt_schema_gen utility.

To generate the schema and load SQL files:

1. Open the BRM_Home/bin/pin_tt_schema_gen.values file and configure the values
   in the file, where BRM_Home is the directory in which you installed BRM.

2. Save and close the file.

3. Run the following command:
source BRM_Home/source.me.csh

4. Run the pin_tt_schema_gen utility with the -a parameter:
   ./pin_tt_schema_gen -a

---

**Note:** If you do not specify the values for MAIN_DB['user'] and MAIN_DB['password'] in the pin_tt_schema_gen.values file, the pin_tt_schema_gen utility prompts you to enter these values.

---

This updates the BRM database with unique indexes and non-null constraints and generates the following files:

- tt_schema.sql
- tt_load.sql
- tt_drop.sql

**Initializing the Data Store**

Use the schema and load SQL files to create the BRM cache groups schema and to load BRM data in the IMDB Cache data store.

To initialize data store tt_0.0.0.1:

1. Start the cache agent:
   call ttcachestart;

2. Create the schema:
   run BRM_Home/bin/tt_schema.sql;

3. Create stored procedures:
   run $PIN_HOME/sys/dm_tt/data/tt_create_pkg_pin_sequence.plb;
   run $PIN_HOME/sys/dm_tt/data/tt_create_procedures.plb;
   run $PIN_HOME/sys/dm_tt/data/create_tt_wrappers.plb;

---

**Note:** The stored procedures in tt_create_pkg_pin_sequence.plb should be loaded before the procedures in tt_create_procedures.plb.

---

4. Load the BRM data into the data store:
   run $PIN_HOME/bin/tt_load.sql;

5. Get status and exit:
   call ttrepstart;
   statsupdate;
   exit;

---

**Note:** To initialize data stores for multi-schema setup, you must generate the schema and load SQL files for each database schema using the pin_tt_schema_gen utility. Then follow the steps above to create and initialize the data stores for each schema.
Connecting IMDB Cache to the BRM Database

To configure Oracle TimesTen In-Memory Database to establish connections with the BRM database:

1. Open the tnsnames.ora file located in the directory specified by $TNS_ADMIN.
2. Add the following entry:

```
Database_Alias_Name = (DESCRIPTION = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
(CONNECT_DATA = (SERVICE_NAME = Datastore_Name) (SERVER = timesten_direct )))
```

where:

- **Database_Alias_Name** is the data store name specified in the sys.odbc.ini file.
- **Datastore_Name** is the name of the data store specified in the sys.odbc.ini file.
- **timesten_direct** indicates that Oracle TimesTen In-Memory Database can connect directly to the BRM database.

For example:

```
tt_0.0.0.1= (DESCRIPTION = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
(CONNECT_DATA = (SERVICE_NAME = tt_0.0.0.1) (SERVER = timesten_direct )))
```

3. Save and close the file.

Making the Data Store Accessible to IMDB Cache DM

To configure the data store so that IMDB Cache DM can directly connect to it:

1. Open the tnsnames.ora file located in the directory specified by $TNS_ADMIN.
2. Add the following entry:

```
DatabaseAliasName=(Description = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
(CONNECT_DATA =
(SERVICE_NAME = DataStoreName)
(SERVER = timesten_direct )))
```

where:

- **DatabaseAliasName** is the data store name specified in the sys.odbc.ini file.
- **DataStoreName** is the name of the data store specified in the sys.odbc.ini file.
- **timesten_direct** indicates that IMDB Cache DM can connect directly to the data store.

For example:

```
tt_0.0.0.1=(Description = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
(CONNECT_DATA =
(SERVICE_NAME = tt_0.0.0.1)
(SERVER = timesten_direct )))
```

3. Save and close the file.

Connecting IMDB Cache DM to the IMDB Cache Data Store

To configure IMDB Cache DM to connect to Oracle TimesTen In-Memory Database:

1. Open the IMDB Cache DM configuration file (BRM_Home/sys/dm_tt/pin.conf).
2. Set the `sm_database_tt` entry to the TimesTen data store; for example:
   - `dm sm_database_tt tt_0.0.0.1`

3. Set the `sm_pw_tt` entry to the data store password.
   - `dm sm_pw_tt Datastore_Password`

4. Save and close the file.

5. Start IMDB Cache DM.

**Connecting the CM to IMDB Cache DM**

To configure the Connection Manager (CM) to connect to IMDB Cache DM:

1. Open the CM `pin.conf` file (`BRM_Home/sys/cm/pin.conf`).

2. Set the `enable_publish` entry to 0:
   - `fm_publish enable_publish 0`

3. Set the `dm_pointer` entry to the IMDB Cache DM host name and port number:
   - `cm dm_pointer 0.0.0.1 ip DMTT_Host Port`

4. Set the `timesten` entry to 1, which indicates that this environment uses Oracle TimesTen In-Memory Database:
   - `cm timesten 1`

5. Save and close the file.

6. Verify that IMDB Cache DM is running.

7. Go to the `BRM_Home/bin` directory, and stop and restart the CM by running the following command:
   - `pin_ctl restart cm`

**Installing and Configuring a BRM System with Logical Partitioning**

This section provides instructions for installing and configuring a BRM system with logical partitions for a single-schema database. Throughout the rest of this section, the examples show how to create a cache grid `ttGrid` with two data stores (grid members) `tt_0.0.0.1` and `tt_0.1.0.1` corresponding to the logical partitions 0.0.0.1 and 0.1.0.1. Both data stores are on the same TimesTen database.

To install and configure a BRM system with two logical partitions:

1. Install BRM 7.4. See the BRM 7.4 documentation for information about installing BRM 7.4.


3. Install Oracle TimesTen In-Memory Database. See **Oracle TimesTen In-Memory Database Installation Guide** for information about installing Oracle TimesTen In-Memory Database.

4. Create the data stores in the Oracle TimesTen In-Memory Database to cache BRM objects. See "Creating Data Stores in the TimesTen Database for Logical Partitioning" for information.
5. Configure Oracle TimesTen In-Memory Database to connect to the BRM database. See "Configuring TimesTen Data Stores to Connect to the BRM Database" for more information.

6. Install IMDB Cache Manager. See "Installing IMDB Cache Manager" for more information.

7. If you have existing BRM data created on a BRM system before IMDB Cache Manager was installed, run the load_pin_uniqueness utility to prepare data for migration to an IMDB Cache Manager-enabled system.

   **Note:** Stop and restart CM and DM.

8. Create the schema and load BRM objects into the TimesTen data stores. See "Initializing the Data Stores in the TimesTen Database for Logical Partitioning" for more information.

9. Configure IMDB Cache DM instances to connect to the data stores. See "Configuring IMDB Cache DM Instances to Connect to the TimesTen Data Stores" for more information.

10. Configure CM to connect to the IMDB Cache DM instances. See "Configuring the CM to Connect to IMDB Cache DM Instances" for more information.


**Creating Data Stores in the TimesTen Database for Logical Partitioning**

To create the cache grid ttGrid with data stores tt_0.0.0.1 and tt_0.1.0.1:

1. On the system where TimesTen database is installed, create a directory for storing database files:

   ```
   mkdir BRM_Home/Database_Files_Location
   ```

   For example:

   ```
   mkdir $PIN_HOME/brm_database_files
   ```

   **Note:** Oracle recommends to use a local disk for database files instead of a network mounted disk.

2. Go to the user home directory:

   ```
   cd $TIMESTEN_HOME/info
   ```

   where $TIMESTEN_HOME is the directory in which Oracle TimesTen In-Memory Database is installed.

3. Create (or edit) a data store configuration file named `sys.odbc.ini` with the data store attributes.

   **Note:** You can edit the `sys.odbc.ini` file in the $TIMESTEN_HOME/info directory by commenting the default configurations.

   For example:
[tt_0.0.0.1]
DataStore=/opt/portal/7.4/brm_database_files/tt_0.0.0.1
DatabaseCharacterSet=UTF8
ConnectionCharacterSet=UTF8
PLSQL=1
OracleNetServiceName=pin_db
oraclepwd=pin01
Driver=$TIMESTEN_HOME/lib/libtten.so
# Shared-memory size in megabytes allocated for the datastore.
PermSize=32
#Shared-memory size in megabytes allocated for temporary data partition,
generally half the size of PermSize.
TempSize=16
PassThrough=0
# Use large log buffer, log file sizes
LogFileSize=512
#Async repl flushes to disk before sending batches so this makes it faster
# on Linux
LogFlushMethod=2
# Limit Ckpt rate to 10 mb/s
CkptFrequency=200
CkptLogVolume=0
CkptRate=10
Connections=200
# Oracle recommends setting LockWait to 30 seconds.
LockWait=30
DurableCommits=0
CacheGridEnable=1

[tt_0.1.0.1]
DataStore=/opt/portal/7.4/brm_database_files/tt_0.1.0.1
DatabaseCharacterSet=UTF8
ConnectionCharacterSet=UTF8
PLSQL=1
OracleNetServiceName=pin_db
oraclepwd=pin01
Driver=$TIMESTEN_HOME/lib/libtten.so
# The shared-memory size in megabytes allocated for the datastore.
PermSize=32
# Shared-memory size in megabytes allocated for temporary data partition,
generally half the size of PermSize.
TempSize=16
PassThrough=0
# Use large log buffer, log file sizes
LogFileSize=512
# Async repl flushes to disk before sending batches so this makes it faster
# on Linux
LogFlushMethod=2
# Limit Ckpt rate to 10 mb/s
CkptFrequency=200
CkptLogVolume=0
CkptRate=10
Connections=200
# Oracle recommends setting LockWait to 30 seconds.
LockWait=30
DurableCommits=0
CacheGridEnable=1
4. Save and close the file.

5. Go to the directory where you have installed Oracle TimesTen In-Memory Database and source the `ttenv.csh` file:

```
cd $TIMESTEN_HOME/bin
source ttenv.csh
```

where `$TIMESTEN_HOME` is the directory in which Oracle TimesTen In-Memory Database is installed.

6. Set up the Oracle TimesTen In-Memory Database grid privileges in the BRM database:

   a. Connect to the BRM database as a system administrator:

```
% cd $TIMESTEN_HOME/oraclescripts
% sqlplus sys as sysdba
```

   b. Run the following SQL*Plus scripts:

```
$TIMESTEN_HOME/oraclescripts/initCacheGlobalSchema.sql
$TIMESTEN_HOME/oraclescripts/grantCacheAdminPrivileges.sql
```

   c. Run the following commands:

```
grant all on TIMESTEN.TT_GRIDID to "Oracle_DB_User";
grant all on TIMESTEN.TT_GRIDINFO to "Oracle_DB_User";
```

where `Oracle_DB_User` is the BRM database user.

For more information, see Oracle TimesTen In-Memory Database Cache User’s Guide.

7. Perform the following tasks on the Oracle TimesTen In-Memory Database system.

   a. Create the data stores for each logical partition; for example:

```
cd $TIMESTEN_HOME/bin
ttIsq1 tt_0.0.0.1
ttIsq1 tt_0.1.0.1
```

   b. Create the data store user for each data store and grant all permissions:

```
ttIsq1 tt_0.0.0.1
create user TimesTen_DB_User identified by TimesTen_DB_Password;
grant all to TimesTen_DB_User;

   ttIsq1 tt_0.1.0.1
create user TimesTen_DB_User identified by TimesTen_DB_Password;
grant all to TimesTen_DB_User;
```

where:

`TimesTen_DB_User` is the TimesTen data store user and must be the same as the BRM database user.
TimesTen_DB_Password is the TimesTen data store user password for the TimesTen database user.

**Important:** TimesTen_DB_User must be the same as the BRM database user.

TimesTen_DB_Password can be different from the BRM database user password.

c. Set the data store user and password and make each data store grid-enabled:

```sql
ttIsql "uid=TimesTen_DB_User;pwd=TimesTen_DB_Password;dsn=tt_0.0.0.1"
call ttcacheuidpwdset('Cache_Admin_User', 'Cache_Admin_User_Pwd');
call ttGridCreate('ttGrid');
call ttGridNameSet('ttGrid');

ttIsql "uid=TimesTen_DB_User;pwd=TimesTen_DB_Password;dsn=tt_0.1.0.1"
call ttcacheuidpwdset('Cache_Admin_User', 'Cache_Admin_User_Pwd');
call ttGridNameSet('ttGrid');
```

where:

- **Cache_Admin_User** is the cache user.
- **Cache_Admin_User_Pwd** is the cache user password.

For more information on the procedures for creating a cache grid, see Oracle TimesTen In-Memory Database Cache User’s Guide.

**Configuring TimesTen Data Stores to Connect to the BRM Database**

To configure the data stores to establish connections with the BRM database:

1. Open the tnsnames.ora file located in the directory specified by $TNS_ADMIN.

2. Add the following entry:

```sql
Database_Alias_Name = (DESCRIPTION = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
  (CONNECT_DATA = (SERVICE_NAME = DataStore_Name) (SERVER =
timesten_direct ))))
```

where:

- **Database_Alias_Name** is the DSN specified in the sys.odbc.ini file
- **DataStore_Name** is the name of the data store specified in the sys.odbc.ini file
- **timesten_direct** indicates that Oracle TimesTen In-Memory Database can connect directly to the BRM database

**Note:** You need to add a separate entry for each logical partition.

For example:

```sql
tt_0.0.0.1 = (DESCRIPTION = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
  (CONNECT_DATA = (SERVICE_NAME = tt_0.0.0.1) (SERVER = timesten_direct ))))

tt_0.1.0.1 = (DESCRIPTION = (ADDRESS = (PROTOCOL = ) (HOST = ) (PORT = ))
  (CONNECT_DATA = (SERVICE_NAME = tt_0.1.0.1) (SERVER = timesten_direct ))))
```
3. Save and close the file.

**Initializing the Data Stores in the TimesTen Database for Logical Partitioning**

To load BRM objects into the data stores, you must first generate the BRM cache groups schema using the BRM database and extract the data from the BRM database for caching, then create and initialize the schema in the TimesTen data stores.

**Note:** If you have existing BRM data created on a BRM system before IMDB Cache Manager was installed, you must run the `load_pin_uniqueness` utility.

To load BRM objects into the TimesTen data stores:

1. Generate the BRM cache groups schema and extract the BRM data. See "Generating the Schema and Load SQL Files for Logical Partitions".
2. Create and initialize the BRM cache groups in the TimesTen data stores. See "Initializing the Data Stores for Logical Partitioning".

**Generating the Schema and Load SQL Files for Logical Partitions**

Using the `pin_tt_schema_gen` utility, generate the schema SQL file with the BRM cache groups schema and generate the load SQL file with the BRM data.

To generate the schema and load SQL files:

1. Open the `BRM_Home/bin/pin_tt_schema_gen.values` file and configure the values in the file.

   **Note:** You must generate the load SQL for each data store. For example, generate `tt_load_0.0.0.1.sql` with `$db_no_for_load_sql` set to `0.0.0.1` and generate `tt_load_0.1.0.1.sql` with `$db_no_for_load_sql` set to `0.1.0.1` in the `pin_tt_schema_gen.values` file.

2. Save and close the file.
3. Run the following commands:

   ```bash
   source $PIN_HOME/source.me.csh
   
   See "Installing IMDB Cache Manager" for more information.
   
   4. Run the `pin_tt_schema_gen` utility with the `-a` parameter:

      ```bash
      ./pin_tt_schema_gen -a
      ```

   **Note:** If you do not specify the values for `MAIN_DB{'user'}` and `MAIN_DB{'password'}` in the `pin_tt_schema_gen.values` file, `pin_tt_schema_gen` utility prompts you to enter these values.

This updates the BRM database with unique indexes and non-null constraints, and generates the following files:

- `tt_schema.sql`
Initializing the Data Stores for Logical Partitioning

Use the schema and load SQL files to create the BRM cache groups schema and to load BRM data in the TimesTen data stores.

To initialize data store tt_0.0.0.1:

1. Set the data store user and password:

   ```sql
   ttSql "uid=TimesTen_DB_User; pwd=TimesTen_DB_Password; dsn=tt_0.0.0.1"
   call ttcacheuidpwdset('Cache_Admin_User','Cache_Admin_User_Pwd');
   ```

2. Start the cache agent:

   ```sql
   call ttcacheagent;
   ```

3. Create the schema:

   ```sql
   run $PIN_HOME/bin/tt_schema.sql;
   ```

4. Create stored procedures:

   ```sql
   run $PIN_HOME/sys/dm_tt/data/tt_create_pkg_pin_sequence.plb;
   run $PIN_HOME/sys/dm_tt/data/tt_create_procedures.plb;
   run $PIN_HOME/sys/dm_tt/data/create_tt_wrappers.plb;
   ```

   **Note:** The stored procedures in `tt_create_pkg_pin_sequence.plb` should be loaded before the procedures in `tt_create_procedures.plb`.

5. Attach the data store to the cache grid:

   ```sql
   call ttGridAttach(1, '0.0.0.1', 'Host', Port);
   ```

   where

   - **Host** is the host on which the data store resides
   - **Port** is a free port on the system

6. Load the BRM data into the data store:

   ```sql
   run $PIN_HOME/bin/tt_load_0.0.0.1.sql;
   ```

   **Note:** If you get errors while loading the first partition (0.0.0.1) using the `tt_load_0.0.0.1.sql` script, load the schema for the second partition (0.1.0.1) and then try to load the first partition.

7. Get status and exit:

   ```sql
   call ttrepstart;
   statsupdate;
   exit;
   ```

Initialize data store tt_0.1.0.1 by running the same commands as you did for data store tt_0.0.0.1 as follows:
Installing and Configuring a BRM System with Logical Partitioning

```
ttIsql 'uid=TimesTen_DB_User; pwd=TimesTen_DB_Password; dsn=tt_0.1.0.1'
call ttcacheidpwdset('Cacheadminuser','Cacheadminuserpwd');
call ttcachestart;
run $PIN_HOME/bin/tt_schema.sql;
run $PIN_HOME/sys/dm_tt/data/tt_create_pkg_pin_sequence.plb;
run $PIN_HOME/sys/dm_tt/data/tt_create_procedures.plb;
run $PIN_HOME/sys/dm_tt/data/create_tt_wrappers.plb;
call ttGridAttach(1,'0.1.0.1','Host',Port);
run $PIN_HOME/bin/tt_load_0.1.0.1.sql;
call ttrepstart;
statsupdate;
exit;
```

**Note:** To initialize the data stores for multi-schema setup, you must generate the schema and load SQL files for each database schema using the `pin_tt_schema_gen` utility. Then follow the steps above to create and initialize the data stores for each schema.

---

**Configuring IMDB Cache DM Instances to Connect to the TimesTen Data Stores**

For logical partitioning, you need to have one instance of IMDB Cache DM for each data store. This section describes how to configure IMDB Cache DM instances to connect to data stores `tt_0.0.0.1` and `tt_0.1.0.1`.

To configure the IMDB Cache DM instances:

1. Configure the existing IMDB Cache DM for data store `tt_0.0.0.1`. See "Configuring the Existing IMDB Cache DM for Data Store tt_0.0.0.1".

2. Add a new IMDB Cache DM instance for data store `tt_0.1.0.1`. See "Adding a New Instance of IMDB Cache DM for Data Store tt_0.1.0.1".

---

**Configuring the Existing IMDB Cache DM for Data Store tt_0.0.0.1**

Use the existing IMDB Cache DM directory to configure the settings for data store `tt_0.0.0.1`.

To configure the IMDB Cache DM for data store `tt_0.0.0.1`:

1. Open the `BRM_Home/sys/dm_tt/pin.conf` file.
2. Set the `tt_ha_enabled` entry to 0.
   - `dm tt_ha_enabled 0`
3. Set the `sm_database_tt` entry to the TimesTen data store:
   - `dm sm_database_tt tt_0.0.0.1`
4. Set `sm_pw_tt` entry to the TimesTen data store password:
   - `dm sm_pw_tt Datastore_Password`
5. Set the `logical_partition` entry to 1 to enable logical partitioning:
   - `dm logical_partition 1`
6. Save and close the file.
Adding a New Instance of IMDB Cache DM for Data Store tt_0.1.0.1

Add a new instance of IMDB Cache DM by making a copy of the existing IMDB Cache DM directory and configure the settings for data store tt_0.1.0.1.

---

**Note:** You do not have to install IMDB Cache Manager to add a new instance of IMDB Cache DM.

---

To add a new instance of IMDB Cache DM for data store tt_0.1.0.1:

1. Create a directory named `dm_tt_0.1.0.1` in `BRM_Home/sys`.
2. Copy the contents of `BRM_Home/sys/dm_tt` into `BRM_Home/sys/dm_tt_0.1.0.1`.
3. Open the `BRM_Home/sys/dm_tt_0.1.0.1/pin.conf` file.
4. Update the following entries:
   - `dm tt_ha_enabled 0`
   - `dm sm_database_tt tt_0.1.0.1`
   - `dm sm_pw_tt Datastore_Password`
   - `dm logical_partition 1`
5. Configure `dm_tt_0.1.0.1` to have its own log file location and its own port:
   - `dm dm_logfile BRM_Home/sys/dm_tt_0.1.0.1/dm_tt_0.1.0.1.pinlog`
   - `dm dm_port Port`
6. Save and close the file.
7. Configure `pin_ctl` utility for starting and stopping IMDB Cache DM instances:
   a. Open the `pin_ctl.conf` file in `BRM_Home/bin`.
   b. Add the following line to the components list:
      
      ```
      start_sequence DMTT_Instance2_Service_Name=DMTT_Instance1_Service_Name
      ```
      
      where:
      
      `start_sequence` is the start and stop sequence number. This determines the order in which components are started or stopped.
      
      `DMTT_Instance2_service_name` is the name of the IMDB Cache DM instance.
      
      `DMTT_Instance1_service_name` indicates that `DMTT_Instance2_service_name` is different from the standard service name.
      
      For example:
      
      ```
      1 dm_tt #This line is preconfigured with IMDB Cache DM installation.
      1 dm_tt2=dm_tt #This line is added for multiple IMDB Cache DM instances.
      ```
      c. Add the following line to the startup configuration section of the file:
         
         ```
         start_DMTTInstance_Service_Name cpidproc:DMTTInstance_Service_Name:
         cport:DMTT_Port host:DMTT_Host dbno:DSN
         ```
         
         where:
         
         `start_DMTTInstance_Service_Name` is the name of the start command for the IMDB Cache DM instance.
         
         `cpidproc:DMTTInstance_Service_Name` is a simple process name matching filter.
cport:\DMTT\_Port is the IMDB Cache DM port number.
host:\DMTT\_Host is the IMDB Cache DM host name.
dbno:\DSN is the data store database number.
For example:

```
start_dm_tt cpidproc:dm_tt: cport:1234 host:vm31230 dbno:0.0.0.1
start_dm_tt2 cpidproc:dm_tt2: cport:2233 host:vm31230 dbno:0.1.0.1
```

d. Save and close the file.

See "Using the pin\_ctl utility to monitor BRM" in BRM System Administrator's Guide for more information about configuring pin\_ctl for high-availability.

8. Go to the \BRM\_Home\bin directory and start the IMDB Cache DM instance by running the following command:

```
pin\_ctl start dm_tt
```

### Configuring the CM to Connect to IMDB Cache DM Instances

To configure the CM to connect to the IMDB Cache DM instances:

1. Open the \BRM\_Home\sys\cm\pin\_conf file.
2. Set the dm\_pointer entries to point to the IMDB Cache DM instances:
   
   ```
   - cm dm\_pointer 0.0.0.1 ip DMTT\_0.0.0.1\_Host DMTT\_0.0.0.1\_Port
   - cm dm\_pointer 0.1.0.1 ip DMTT\_0.1.0.1\_Host DMTT\_0.1.0.1\_Port
   ```
   
   where:
   - \DMTT\_0.0.0.1\_Host is the host of the IMDB Cache DM instance connected to data store tt\_0.0.0.1.
   - \DMTT\_0.0.0.1\_Port is the port number of the IMDB Cache DM instance connected to data store tt\_0.0.0.1.
   - \DMTT\_0.1.0.1\_Host is the host of the IMDB Cache DM instance connected to data store tt\_0.1.0.1.
   - \DMTT\_0.1.0.1\_Port is the port number of the IMDB Cache DM instance connected to data store tt\_0.1.0.1.
3. Set the DM attributes. For example:
   ```
   - cm dm\_attributes 0.0.0.1 assign\_account\_obj, scoped, searchable
   - cm dm\_attributes 0.1.0.1 assign\_account\_obj, scoped, searchable
   ```
4. Set the timesten entry to 1, which indicates that this environment uses Oracle TimesTen In-Memory Database:
   ```
   - cm timesten 1
   ```
5. Set the logical\_partition to 1 to enable logical partitioning:
   ```
   - cm logical\_partition 1
   ```
6. Set the single\_node\_search\_object\_list entry. For example:
   ```
   - cm single\_node\_search\_object\_list /event,/tmp\_unprocessed\_events,/config,/device,/product,/deal,/discount,/plan,/rate\_plat\_selector,/rate\_plan,/rate,/rate\_change,/zonemap,/group,/search,/batch,/string,/uniqueness,/profile
7. Save and close the file.

8. Go to the `BRM_Home/bin` directory and start the CM by running the following command:

   `start_cm`

### Installing IMDB Cache Manager

**Note:** The base BRM schema is updated when you install IMDB Cache Manager. The schema updates cannot be undone.

To install IMDB Cache Manager:

- Obtaining Information Needed for Installing IMDB Cache Manager
- Installing IMDB Cache Manager
- Running the `pin_setup` Script

### Obtaining Information Needed for Installing IMDB Cache Manager

You will be prompted for the following information about your existing BRM system during the IMDB Cache Manager installation:

**Tip:** You can obtain some of the information from the existing `BRM_Home/setup/pin_setup.values` file on your BRM server.

- The temporary directory for installation (`temp_dir`)
- The following information about the BRM database to which IMDB Cache DM will connect:
  - Database alias
  - Database user name
  - Database user password
- The following information about the machine running the Oracle TimesTen In-Memory Database to which IMDB Cache DM will connect:
  - Data store name
  - Database number
  - Port number

### Installing IMDB Cache Manager

**Important:** IMDB Cache Manager must be installed on the same system where Oracle TimesTen In-Memory Database is installed.

To install IMDB Cache Manager:

2. Download the software to a temporary directory (temp_dir).

   Important:
   - If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
   - You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. See "Increasing Heap Size to Avoid “Out of Memory” Error Messages".

3. Go to the directory where you installed the Third-Party package and source the source.me file.

   Caution: You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

   Bash shell:  
   ```bash
   source source.me.sh
   ```

   C shell:  
   ```csh
   source source.me.csh
   ```

4. Go to temp_dir and enter this command:  
   ```bash
   7.4Patch_TimesTen_Manager_platform.bin
   ```

   Note: You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

5. Follow the instructions on the screen and, when prompted, provide the information you collected. The default installation directory for IMDB Cache Manager is opt/portal/7.4.

   Note: If you plan to install IMDB Cache Manager with high availability, ensure that you enter the following details during installation:

   - Restrict access to the TimesTen installation to the group ‘pin’? [ yes ] no
   - Do you want to restrict access to the TimesTen installation to a different group? [ yes ] no
   - Are you sure you want to make this instance world-accessible? [ yes ] yes

6. Go to the directory where you installed the IMDB Cache Manager package and source the source.me file:
Bash shell:

source source.me.sh

C shell:

source source.me.csh

Your IMDB Cache Manager installation is now complete.

Running the pin_setup Script

The `pin_setup` script reads the `pin_setup.values` file, configures IMDB Cache DM, and starts IMDB Cache DM. If necessary, open the `BRM_Home/setup/pin_setup.values` file and change the configuration entries.

To run the `pin_setup` script:

1. Log in as user `pin`:
   ```sh
   su - pin
   ```

2. Go to the `BRM_Home/setup` directory and run the `pin_setup` script:
   ```sh
   ./pin_setup
   ```

3. Check the `BRM_Home/setup/pin_setup.log` file for status and errors.

Configuring IMDB Cache DM for a Multi-Schema Environment

In a BRM system with multiple schema, each Oracle TimesTen In-Memory Database instance is associated with one schema. There is no overlap in the data stored in the different instances of Oracle TimesTen In-Memory Database.

The installation and configuration steps for setting up a IMDB Cache DM-enabled system for multi-schema database is the same as for a single-schema database setup. For each schema, follow the steps in "Installing and Configuring a Basic BRM System with IMDB Cache Manager" to install and configure IMDB Cache Manager and Oracle TimesTen In-Memory Database, except for the following:

- Before you run `pin_tt_schema_gen -a` to generate the schema and load SQL files, the following entries needs to be changed in `BRM_Home/bin/pin_tt_schema_gen.values` file for the specific schema:
  - Update the schema SQL filename to refer to the schema database number. For example:
    ```sh
    $fileName="tt_schema_0.0.0.2.sql"
    ```
  - Update the database user name for the schema. For example:
    ```sh
    $MAIN_DB{'user'}="Secondary_Schema_User"
    ```
  - Update the password for the schema database user. For example:
    ```sh
    $MAIN_DB{'password'}="Secondary_Schema_User_Password"
    ```
  - Specify the user name of the primary schema database. For example:
    ```sh
    $primary_db_user_name="Primary_Schema_User"
    ```
  - Update the database number for the logical partition. For example:
Installing and Configuring BRM with IMDB Cache Manager

During IMDB Cache Manager installation, provide the database number for the specific schema. For instance, database number for the second schema should be 0.0.0.2.

For more information, see "Creating and Initializing the BRM Cache Group Schema" in BRM System Administrator’s Guide.

Installing Optional Components

Consider a scenario where you are using BRM with IMDB Cache Manager, and you install an additional optional component, which creates additional tables in the BRM database. You may want these additional tables to be cached in Oracle TimesTen In-Memory Database to improve the performance of your BRM system.

To cache additional tables in Oracle TimesTen In-Memory Database:

1. Run the pin_tt_schema_gen utility, which generates scripts for creating custom cache groups.
2. Run the generated scripts against the Oracle TimesTen In-Memory Database.

For more information, see "Initializing the Data Store in Oracle IMDB Cache".

IMDB Cache Manager Post Installation Tasks

Perform the following post-installation tasks.

Storing Reservations

In a IMDB Cache DM-enabled system, you need to set the balance_coordinator CM configuration entry to 1. This is the default setting. This entry specifies how reserved amounts are tracked in the BRM system.

When balance_coordinator is set to 1, reservations are tracked in /balance_group storable object (which is created in the subscriber cache group).

When balance_coordinator is set to 0, reserved amounts are tracked in the /reservation_list storable object (which is created in the TimesTen database local tables).

Because TimesTen database does not support migration of local tables across grid members, /reservation_list cannot be used to track reservations for resource sharing groups. For this reason, it is recommended to set balance_coordinator value to 1 in a IMDB Cache DM-enabled system so that reservations are tracked in /balance_group object.

To set the balance_coordinator entry:
1. Open the CM\textit{pin.conf} file.
2. Set the following entry:
   
   \texttt{\textit{cm balance_coordinator} 1}

3. Save and close the file.

### Setting the Stacksize Limit

On the system where IMDB Cache DM is installed, set the \textit{stacksize} limit to \textit{unlimited}.

To set the stacksize limit:

1. Log on to the system where IMDB Cache DM is installed.
2. Enter the following command:

   \texttt{%limit stacksize unlimited}

3. Verify the stacksize limit by entering the following command:

   \texttt{%limit stacksize}

### Disabling Deferred Taxation

The deferred taxation (billing time taxation) feature is not supported in a IMDB Cache DM environment. You must disable deferred taxation for event rating and account-level adjustments.

Disable deferred taxation for event rating by setting the \textit{taxation_switch} entry in the CM\textit{pin.conf} file to 0 or 1:

\texttt{- fm_bill taxation_switch 1}

This entry is set to 3 by default. When \textit{taxation_switch} is set to 0, both real and deferred taxation is disabled. When \textit{taxation_switch} is set to 1, only deferred taxation is disabled.

Disable deferred taxation for account-level adjustments by setting the \textit{tax_now} entry in the CM\textit{pin.conf} file to 1:

\texttt{- fm_ar tax_now 1}

By default, BRM defers calculating tax for account-level adjustments until billing time. When \textit{tax_now} is set to 1, the tax for account-level adjustments is calculated at the time the adjustment is created. If this \textit{tax_now} is set to 0 or is missing from the CM\textit{pin.conf} file, BRM does not apply the tax reversal for the account-adjustment.

See the discussion on configuring taxes for adjustments in the BRM 7.4 documentation for more information about the tax methods for account-level adjustments.

### Setting Database Status

To set or change the database status:

1. Go to the \textit{BRM_Home/apps/multi_db} directory and open the \textit{config_dist.conf} file.
2. Change the values in the \textit{STATUS} entries:

\begin{verbatim}
DB_NO = "0.0.0.1" ;  # 1st database schema configuration block
PRIORITY = 1 ;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;
\end{verbatim}
DB_NO = "0.1.0.1" ;  # 1st database schema configuration block with logical partition
PRIORITY = 1 ;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;

DB_NO = "0.0.0.2" ;  # 2nd database schema configuration block
PRIORITY = 2;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "OPEN";

DB_NO = "0.1.0.2" ;  # 2nd database schema configuration block with logical partition
PRIORITY = 1;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "OPEN";

Note: If your system contains multiple database schemas and logical partitions, create a new set of entries for each additional database schema and each logical partition.

3. Save and close the file.
4. Verify that the **pin_config_distribution** utility is not running.
5. Go to the **BRM_Home/apps/multi_db** directory and run the **load_config_dist** utility.

Caution: The **load_config_dist** utility overwrites existing distributions. If you are updating distributions, you cannot load new distributions only. You must load complete sets of distributions each time you run the **load_config_dist** utility.

6. Stop and restart all CMs. See the BRM 7.4 documentation for information on starting and stopping the BRM system.

Tip: To check how full your databases are, see the BRM 7.4 documentation for information on monitoring database space.

### Setting Database Priority

To set or change database priority:

1. Go to the **BRM_Home/apps/multi_db** directory and open the **config_dist.conf** file.
2. Edit the **PRIORITY** entries.

Note: Oracle recommends to assigning different priorities to the BRM database schemas and assigning the same priority to all the logical partitions within a given BRM database schema to distribute the accounts across all the logical partitions.

In the following example, BRM creates accounts on database 0.1.0.2 because it has the highest priority setting of all open database schemas.

DB_NO = "0.0.0.1" ;  # 1st database configuration block
PRIORITY = 1 ;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;
DB_NO = "0.1.0.1" ;  # 1st database configuration block with logical partition
PRIORITY = 1;
MAX_ACCOUNT_SIZE = 100000 ;
STATUS = "OPEN" ;
DB_NO = "0.0.0.2" ;  # 2nd database configuration block
PRIORITY = 2;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "OPEN" ;
DB_NO = "0.1.0.2" ;  # 2nd database configuration block with logical partition
PRIORITY = 1;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "OPEN" ;
DB_NO = "0.0.0.3" ;  # 3rd database configuration block
PRIORITY = 3;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "CLOSED" ;
DB_NO = "0.1.0.3" ;  # 3rd database configuration block with logical partition
PRIORITY = 1;
MAX_ACCOUNT_SIZE = 50000 ;
STATUS = "OPEN"

**Note:** If your system contains multiple database schemas and multiple logical partitions, create a new set of entries for each additional database schema and logical partition.

3. Save and close the file.

4. Verify that the **pin_config_distribution** utility is not running.

**Caution:** The **load_config_dist** utility overwrites all distributions that are already in the database. If you are updating distributions or adding new ones, beware that you cannot load only the new and changed distributions.

5. Go to the `BRM_Home/apps/multi_db` directory and run the **load_config_dist** utility.

**Note:** The **load_config_dist** utility requires a configuration file. See BRM 7.4 documentation for information on creating configuration files for BRM utilities.

6. Stop and restart all CMs. See the BRM 7.4 documentation for information on starting and stopping the BRM system.

**Tip:** To check how full your databases are, see the BRM 7.4 documentation for information on monitoring database space.

---

**Uninstalling IMDB Cache Manager**

To uninstall IMDB Cache Manager, run the `BRM_Home/uninstaller/TimesTen_Manager/uninstaller.bin`. 

---
The Oracle Communications Billing and Revenue Management (BRM) system includes applications that provide graphical user interfaces to the data in the BRM database. The following applications are available:

- **Self-Care Manager server application**: Use to provide customer self-care services using Web browsers and wireless devices. Customers use Self-Care Manager to view their account details. See "About Self-Care Manager" in *BRM Managing Customers*.

  To install Self-Care Manager, see "Installing Self-Care Manager".

- **Developer Center client application**: Use for programming tasks, including creating and modifying storable classes, testing customizations, and importing events from log files into BRM. See "About Developer Center" in *BRM Developer's Guide*.

  To install Developer Center, see "Installing BRM Client Applications".

---

**Important**: Before installing server or client applications, you must first install BRM.

### Downloading Applications

You download the software by using a Web browser. If your server is not running a Web browser, you can download and extract the software to a PC and then use `ftp` to transfer the file to the server.

1. Download the software to a temporary directory (`temp_dir`).
2. Save the `.tar.Z` file to a temporary directory (`temp_dir`).
3. Log in as user `pin`:

   ```
   % su - pin
   ```

4. Go to the temporary directory where you downloaded the software (`temp_dir`) and uncompress and extract the `.tar.Z` file:

   ```
   % cd temp_dir
   % uncompress file_name.tar.Z
   % tar -xvf file_name.tar
   ```

   This extracts the files to a subdirectory of the current directory.
Installing BRM Client Applications

This section describes how to install BRM client applications. Developer Center applications are the only applications supported on UNIX.

Installing the Software

1. Download the software. See "Downloading Applications".
2. In the directory where you downloaded and extracted the software .tar.Z file, open the setup.cnf file with any text editor. The default version of the file contains this configuration information:

   INSTALL_PATH=/opt/portal/7.4/application_Name
   MAIN_CM_HOSTNAME=__ENTER_INFORMATION__
   MAIN_CM_PORT=11960
   JRE_Path=$INSTALL_PATH

   For Developer Center, application_Name is DevCenter.

3. (Optional) To change the default installation directory of /opt/portal/7.4/application_Name, specify a new path in the INSTALL_PATH entry.
4. For MAIN_CM_HOSTNAME, enter the name of your BRM system host.
5. (Optional) For MAIN_CM_PORT, enter your BRM system port number if it’s different from the default of 11960.
6. Enter the JRE path if it’s different from the default.
7. Save and close the file.
8. Enter this command to install the application:
   
   % ./install.ksh

   The application is installed in the directory specified in the setup.cnf file.

Starting BRM Client Applications

To start a client application:

1. Go to the install_dir directory, where install_dir is the directory in which you installed the client application.
2. Enter the following command:

   ./application_Name.sh

Installing Event Extraction Manager

For more information about Event Extraction Manager, see "Using Event Extraction Manager" in BRM Setting Up Pricing and Rating.

The default installation automatically installs all three applications on your system. To install only the Event Extraction Manager software, you must use the custom install.

To install the event loaders and Event Extraction Manager together, follow the instructions in "Installing Rated Event Loader" in BRM Configuring Pipeline Rating and Discounting.
To install only the Event Extraction Manager:

1. Download the software to a temporary directory (temp_dir).

   **Important:**
   - If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
   - You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

2. Go to the directory where you installed the Third-Party package and source the source.me file.

   **Caution:** You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

   Bash shell:
   ```
   source source.me.sh
   ```

   C shell:
   ```
   source source.me.csh
   ```

3. Go to the temp_dir directory and enter this command:

   ```
   7.4_RatedEventLoader_platform_32_opt.bin
   ```

   **Note:** You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

4. To install Event Extraction Manager either on this computer or on another computer, select custom install when asked to specify the setup type. Select the EventExtractionTool component by typing its number and click Next.

5. Follow the instructions displayed during installation. The default installation directory for Event Extraction Manager is opt/portal/7.4.
6. Go to the directory where you installed the Event Extraction Manager package and source the `source.me` file:

Bash shell:
```
source source.me.sh
```

C shell:
```
source source.me.csh
```

7. Go to the `BRM_Home/setup` directory and run the `pin_setup` script.

**Note:** The `pin_setup` script starts all required BRM processes.

Your Event Extraction Manager installation is now complete.

---

**Installing BRM SDK**

For more information about BRM SDK, see "Using BRM Developer Tools" in *BRM Developer’s Guide*.

You can install BRM SDK independently of the BRM server, making it possible to isolate development activities from production servers. For example, you can install BRM SDK on each of the computers used by BRM developers at your site. These developers can share access to test and production BRM servers.

While it is not necessary to install BRM SDK on BRM servers, there are some advantages to doing so. For example, installing the SDK on your BRM server gives you access to sample applications that are not included in the server installation.

**Important:**
- To use BRM SDK, you must have access to a test installation of BRM. Use the test installation to verify the functionality of new or customized components before deploying them to your production BRM installation. See "Testing New or Customized Components" in *BRM Developer’s Guide*.
- If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

You can install BRM SDK on Solaris, AIX, Linux, and HP-UX IA64. See "BRM Software Compatibility" for specific version numbers.

To install BRM SDK:

1. Download the software to a temporary directory (`temp_dir`).
2. Go to the directory where you installed the Third-Party package and source the `source.me` file.

   Important:
   - If you download to a Windows workstation, use FTP to copy the `.bin` file to a temporary directory on your UNIX server.
   - You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see “Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

   Bash shell:
   ```bash
   source source.me.sh
   ```

   C shell:
   ```bash
   source source.me.csh
   ```

3. Go to the `temp_dir` directory and enter this command:

   ```bash
   7.4_Portal_SDK_platform_32_opt.bin
   ```

   Note: You can use the `-console` parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the `DISPLAY` environment variable before you install the software.

4. When prompted, enter the directory where you want to install BRM SDK. The default directory for installing BRM SDK is `opt/portal/7.4/PortalDevKit`. The installation program installs BRM SDK files in the specified directory.

   Note:
   - The installation directory is called `BRM_SDK_home` in the documentation.
   - Do not install BRM SDK in the same installation directory in which you installed BRM or any other optional component.

5. Go to the directory where you installed the BRM SDK package and source the `source.me` file:

   Bash shell:
   ```bash
   source source.me.sh
   ```
Installing PCM SDK

C shell:

```
source source.me.csh
```

Your BRM SDK installation is now complete.

**Uninstalling BRM SDK**

To uninstall BRM SDK, run the `BRM_SDK_home/uninstaller/Portal_SDK/uninstaller.bin`.

---

**Note:** The uninstallation will not uninstall any compiled BRM SDK policy files. These files should be manually removed.

---

**Installing PCM SDK**

For more information about PCM SDK, see "Using BRM Developer Tools" in *BRM Developer’s Guide*.

You can install PCM SDK independent of the BRM server, making it possible to isolate development activities from production servers. For example, you can install PCM SDK on each of the computers used by BRM developers at your site. These developers can share access to test and production BRM servers.

While it is not necessary to install PCM SDK on BRM servers, there are some advantages to doing so. For example, installing the SDK on your BRM server gives you access to sample applications that are not included in the server installation.

---

**Important:**

- To use PCM SDK, you must have access to a test installation of BRM. Use the test installation to verify the functionality of new or customized components before deploying them to your production BRM installation. See "Testing New or Customized Components" in *BRM Developer’s Guide*.

- If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

- Third-Party software and BRM SDK must be installed before you install PCM SDK, otherwise the installation of PCM SDK will fail.

---

You can install PCM SDK on Solaris, AIX, Linux, and HP-UX IA64. See "BRM Software Compatibility" for specific version numbers.

To install PCM SDK:

1. Download the software to a temporary directory (`temp_dir`).
Installing PCM SDK

Important:
- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

2. Go to the directory where you installed the Third-Party package and source the source.me file.

    Caution: You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

    Bash shell:
    
    source source.me.sh

    C shell:

    source source.me.csh

3. Go to the temp_dir directory and enter this command:

    7.4_PCM_SDK_platform_64_opt.bin

Note:
- You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.
- PCM SDK is automatically installed in the same directory as BRM SDK. The default directory for installing BRM SDK is opt/portal/7.4/PortalDevKit.

4. Go to the directory where you installed the PCM SDK package and source the source.me file:

    Bash shell:

    source source.me.sh

    C shell:

    source source.me.csh

Your PCM SDK installation is now complete.
Uninstalling PCM SDK

To uninstall PCM SDK, run the $BRM_SDK_home/uninstaller/PCM_SDK/uninstaller.bin$ program.

**Note:** The uninstallation will not uninstall any compiled PCM SDK policy files. These files should be manually removed.

Installing Self-Care Manager

To use Self-Care Manager, you need to install a third-party application server and Self-Care Manager itself. Follow these procedures to install everything you need to run Self-Care Manager:

- Installing an Application Server
- Installing the Self-Care Manager Files

**Important:** You must install the application server and Self-Care Manager on the same system. The Connection Manager (CM) can be on the same system as Self-Care Manager or on a different system.

Installing an Application Server

Supported application servers include Tomcat, WebLogic, and WebSphere. For more information, see the vendor installation instructions for the application server you are using.

Installing the Self-Care Manager Files

Before installing Self-Care Manager, make sure an application server is already installed.

To install the Self-Care Manager files:

1. Download the software. See "Downloading Applications".
2. In the temporary directory where you downloaded the Self-Care Manager .tar file, open the setup.cnf file with any text editor. The default version of the file contains this configuration information:

   INSTALL_PATH=/opt/portal/7.4/WebKit
   MAIN_CM_HOSTNAME=__ENTER_INFORMATION__
   MAIN_CM_PORT=11960

3. (Optional) To change the default installation directory of /opt/portal/7.4/WebKit, specify a new path in the INSTALL_PATH entry.

   **Note:** You can install Self-Care Manager in any location.

4. For MAIN_CM_HOSTNAME, enter the name of your BRM system host.
5. (Optional) For MAIN_CM_PORT, enter your BRM system port number if it’s different from the default of 11960.
6. Save and close the file.
7. Enter this command to install Self-Care Manager:

```bash
%/install.ksh
```

Self-Care Manager is installed in the directory specified in the `setup.cnf` file.

After installing the Self-Care Manager files, configure the application server to work with Self-Care Manager. See "Configuring the Application Server" in *BRM Managing Customers*.

What’s Next?

After installing the BRM server and client applications, you need to test BRM with your business models:

- For an overview of setting up price lists, see "Setting Up Price List Data" in *BRM Setting Up Pricing and Rating*.
- For an overview of setting up billing, see "Setting Business Policies for Billing" in *BRM Configuring and Running Billing*.
- For an overview of setting up customer registration and managing customer accounts, see "Customizing Registration" in *BRM Managing Customers* and "About Registering Customers" in *BRM Concepts*. 
11

Installing BRM Client and Server Applications on Windows

This chapter describes how to install Oracle Communications Billing and Revenue Management (BRM) applications on Windows.

**Note:** The BRM server components (Connection Manager, Data Manager, and so on), do not run on Windows systems.

### About BRM Client and Server Applications for Windows

The Oracle Communications Billing and Revenue Management (BRM) system includes several client applications that provide graphical user interfaces to the data in the BRM database. You use BRM client applications to manage customers and payments and to configure your BRM system. See "About the BRM Client Applications" in *BRM Concepts*.

The BRM system also includes one server application, Self-Care Manager, that provides customer self-care services using Web browsers and wireless devices. Customers use Self-Care Manager to display and modify their account data. See "About Self-Care Manager" in *BRM Managing Customers*.

You can install BRM applications in any combination and in any order; however, you **must first install** BRM. See "BRM Installation Overview".

### Required Disk Space for BRM Windows Applications

*Table 11–1* lists the approximate disk space required to download, extract, and install each client application.

**Note:** BRM client applications require the Java Runtime Environment (JRE). The JRE is included in each application package and is approximately 50 MB. Once the JRE is installed with a BRM application, it will not be reinstalled.

<table>
<thead>
<tr>
<th>Application</th>
<th>Type</th>
<th>Required Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Manager</td>
<td>Client application</td>
<td>100 MB</td>
</tr>
<tr>
<td>Business Configuration Center</td>
<td>Client application</td>
<td>100 MB</td>
</tr>
</tbody>
</table>
Installing BRM Client Applications on Windows

This section describes how to install and start all BRM client applications except Customer Center and Pricing Center.

To install Customer Center, see "Installing Customer Center on Windows".

To install Pricing Center, see "Installing Pricing Center on Windows".

Before Installing BRM Client Applications

To install the BRM client applications, you need the following:

- An application such as WinZip for extracting compressed files.
- The following information about the machine running the Connection Manager (CM) to which Customer Center, Payment Tool, Payment Center, and Pricing Center will connect:
  - Computer or server name
  - Port number
  - Database number
- Windows users must have administrator privileges to install Customer Center, Payment Tool, or Pricing Center.

For information on localized versions of the client applications, see “Creating a Localized Version of BRM” in BRM Developer’s Guide.

Downloading the Compressed Files

1. Download the software to a temporary directory (temp_dir).

   **Important:** To install Payment Center, download and install the PaymentTool.zip file.

2. Extract the files in the .zip file to a temporary directory.

* Payment Center is installed with Payment Tool. It is accessible only if you purchase the Payment Suspense Manager feature.
Installing the Software

For information on installing Customer Center, see "Installing Customer Center on Windows".

For information on installing Pricing Center, see "Installing Pricing Center on Windows".

To install all other client applications:

1. Download the software. See "Downloading the Compressed Files".

2. Go to the temporary directory where you extracted the client application download file.

3. Double-click Setup.exe.

4. On the Choose Destination Location screen, select the destination folder for the program and click Next.

5. On the Connection Manager screen, enter the server, port, and database information and click Next.

   For a demonstration system, enter the server name (computer where you installed the CM) and accept the default values of 11960 and 0.0.0.1.

6. On the Select Program Folder screen, accept the default program folder Portal or select a new one; click Next.

7. On the Start Copying Files screen, click Next to start installing the application.

8. On the Setup Complete screen, you can choose to restart the computer or wait until you have installed all the applications.

9. Click Finish to complete the process.

Starting and Using a BRM Client Application

When running client applications on Windows 7 operating system, make sure you have Full Control permission to the C:\Program Files (x86)\Common Files\PortalSoftware directory. By default, the client applications create a temporary resource file or a property file with the values entered in the client applications in the C:\Program Files(x86)\Common Files\Portal Software directory. If you do not have Full Control permission to the C:\Program Files (x86)\Common Files\Portal Software directory, the properties file will not be created. In subsequent logins, the default values will not be displayed in the client applications.

For example, if you have Full Control permission to the C:\Program Files(x86)\Common Files\Portal Software directory, the Voucher Administrator client creates the VoucherAdminDefaults.properties file with the values you entered during the first voucher creation. These values are displayed during subsequent logins for voucher administration.

The following procedure applies to any BRM client application, but there are additional ways to start Customer Center and Pricing Center. See "Starting Customer Center" and "Starting Pricing Center".

To start a client application:

1. Choose the application from the Start - Programs - Portal menu or open the shortcut on your desktop if available.

   The Login dialog box appears.

2. Enter your login name and password.
For information on login names and passwords for client applications, see "Implementing System Security" in BRM System Administrator’s Guide.

3. To connect to a database other than the one specified during installation, click Connection Info and enter the host name and port number.

4. Click OK.

For information on how to use a client application, see the Help for that application.

Installing Customer Center on Windows

To install Customer Center, see the following:

- About Installing and Running Customer Center
- Before Installing Customer Center
- Installing the Customer Center Files
- Installing Java Web Start and Downloading Customer Center
- Starting Customer Center
- Uninstalling Customer Center from a Client System

About Installing and Running Customer Center

You must install Customer Center on a system with a Web server. You then use the Web server and Java Web Start technology to distribute Customer Center to your CSRs.

To use Customer Center, CSRs download it from the Web server to their Windows client systems. When CSRs run Customer Center, they run their local versions that communicate directly with the BRM database.

Each time a CSR runs Customer Center, the application uses Java Web Start to check the Web server for updates and automatically download new versions.

**Note:** You can install Customer Center on either a UNIX or Windows system, but Customer Center can be run only on a Windows system.

Before Installing Customer Center

- Obtain the following information about the machine running the CM to which Customer Center will connect:
  - Computer or server name
  - Port number
  - Database number
- Make sure you have Windows administrator privileges.
- Install a third-party Web server.
- Make sure each Customer Center client system has a Web browser.
  
  For a list of supported browsers, see "BRM Software Compatibility".
- Optionally, you can install the Java Runtime Environment (JRE) 1.5.0_06 on each client system. If you do not do it in advance, JRE 1.5.0_06 will be installed as part of downloading Customer Center.
Installing Customer Center on Windows

See "Installing Java Web Start and Downloading Customer Center".

To display decimals to the desired precision, ensure that your regional settings are properly defined.

Installing the Customer Center Files
Install Customer Center on the same system as your Web server.

1. Download the software. See "Downloading the Compressed Files".

2. Go to the temporary directory where you unzipped the client application download file.

3. Double-click Setup.exe.

4. Enter a destination folder. You can enter your Web server’s document root directory, such as C:\Program Files\Apache Group\Apache\htdocs on an Apache Web server.

You can also enter a subdirectory of your Web server’s document root directory or another directory that you map to your Web server.

5. Enter the name and port number of the BRM server where the Connection Manager (CM) is running.

6. Enter the database number for the Data Manager (DM); for example, 0.0.0.1.

7. Enter the full URL to the location of Customer Center on your Web server. The default URL is http://machine_name where machine_name is the name of the system where you are installing Customer Center.

Important: Your Web server must be mapped to the URL you specify.

Specify the URL as follows:

- If you are installing Customer Center in your Web server’s document root directory, or a directory mapped to your Web server’s document root directory, use the default URL.

- If you are installing Customer Center in a subdirectory of your Web server’s document root, add the subdirectory names to the default URL. But do not change the top-level URL.

For example, if your default URL is http://server1, and you install Customer Center in the applications subdirectory of your document root, your URL should be http://server1/applications.

- If you are installing Customer Center in a directory outside your Web server directory, map that installation directory to a subdirectory of your document root. Then add the name of the subdirectory of the document root to the default URL.

For example, you can install Customer Center in C:\Program Files\Portal Software\CustomerCenter, and then map that directory to the applications subdirectory of the Web server document root. If your default URL is http://server1, your URL should be http://server1/applications.

- If your Web server uses a port number other than 80, add the port number to the URL as follows: URL:port_number.
For example, if your Customer Center URL is http://server1 and your port number is 81, your URL should be http://server1:81.

See your Web server documentation for information on the document root directory and mapping other directories to your URL.

---

**Note:** To access Customer Center, add the file name `CustomerCenter_en.html` to the URL you specify here. Do not add the file name on this screen.

---

8. For Apache and iPlanet Web servers, open your Web server’s MIME types file to add an entry for JNLP, a special file type associated with Java Web Start. For IIS Web servers, you don’t need to do this.

Add a MIME type as follows:

- For an Apache Web server, add the following entry to the `mime.types` file:

  ```
  application/x-java-jnlp-file  JNLP
  ```

- For an iPlanet Web server, add the following entry to the `mime.types` file:

  ```
  type=application/x-java-jnlp-file  exts=JNLP
  ```

  You can also use the iPlanet Server Manager to add a MIME type.

  For more information, see your Web server documentation.

9. For iPlanet Web servers only, edit the `mime.types` file for your Web server to enable downloading of `.exe` files. This is necessary so that client systems can download the Java Web Start installation file from the Web server.

Change the `.exe` file extension’s MIME type association as follows:

- Remove `exe`, and the comma before it, from this line:

  ```
  type=magnus-internal/cgi  exts=cgi,bat,exe
  ```

- Add `exe`, preceded by a comma, to the end of this line:

  ```
  type=application/octet-stream  exts=bin,exe
  ```

  You can also make this change with the iPlanet Server Manager. See the iPlanet documentation.

10. Stop and restart your Web server.

**Setting the Heap Size for Java Web Start**

To set the heap size for Java Web Start implementations:

1. Open your `CustomerCenter_locale.jnlp` file.

2. Change the `<j2se>` element to set the initial and maximum heap size.

   The default entry looks like this:

   ```
   <j2se version="1.4**"/>
   ```

   For example, this entry changes the initial heap size to 128 megabytes and the maximum heap size to 256 megabytes:

   ```
   <j2se version="1.4**" initial-heap-size="128m" max-heap-size="256m"/>
   ```
3. Stop and restart Customer Center to make the change take effect.

Installing Java Web Start and Downloading Customer Center

The first time you start Customer Center on a client system, you download and install Java Web Start.

**Note:** With Internet Explorer, you have the option of installing directly from the server without downloading the file.

1. Go to this URL in your Web browser:

   http://machine_name/CustomerCenter_en.html

   Replace *machine_name* with the name of the system running the Web browser and Customer Center. If Customer Center is located in a subdirectory of your Web browser’s document root directory, include the full path to CustomerCenter_en.html.

   If your Web server uses a port number other than the default of 80, include the port number in the URL:

   http://machine_name:port_number/CustomerCenter_en.html

   For example, if Customer Center is on a system called server1 using port 81, go to this URL: http://server1:81/CustomerCenter_en.html.

   The browser begins downloading the Java Web Start installation file, javawebstart-install.exe.

   **Note:**

   - If your Web server uses default port 80, specifying the port number is optional. Otherwise, you must include the port number.
   - If your Web server does not display the page correctly or does not start downloading the Java Web Start installation file, make sure you set the JNLP MIME type in your Web server. See "Installing the Customer Center Files".
   - If the MIME type is set in your Web server, try clearing the cache in your Web browser. For Internet Explorer, delete temporary Internet files. For Netscape, clear the memory cache and the disk cache.

2. Choose the directory to save the installation file, then save the file.

3. Go to the temporary directory where you saved the Java Web Start installation file.

4. Double-click javawebstart-install.exe and follow the prompts in the installer.
Installing Customer Center on Windows

5. (For Netscape 6 only) In Netscape, choose Edit - Preferences - Navigator - Helper Applications and create a new MIME type as shown in Table 11–2:

<table>
<thead>
<tr>
<th>File Extension</th>
<th>MIME Type</th>
<th>Application to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>jnlp</td>
<td>application/x-java-jnlp-file</td>
<td>javaws.exe, located in your Java Web Start installation directory, such as C:\Program Files\Java Web Start</td>
</tr>
</tbody>
</table>

7. In your Web browser, return to the Customer Center URL (http://machine_name:port_number/CustomerCenter_en.html) and click the link for running Customer Center.

Java Web Start launches and copies the Customer Center files from the Web server.

8. In the Security dialog box that asks if you want to install and run Customer Center, click Start.

For more information on using Java Web Start, see the Java Web Start documentation.

Starting Customer Center

After installing Java Web Start and running Customer Center for the first time, you can start Customer Center in any of these ways:

- Java Web Start.
  
  See "Starting Customer Center from Java Web Start".

- Shortcut.
  
  See "Starting Customer Center from a Shortcut".

  Note: Creating and using a shortcut to Customer Center is the simplest way to start it.

- Browser.
  
  See "Starting Customer Center from Your Browser".

Using any of these methods, if there’s a newer version of the Customer Center files on the Web server, Java Web Start installs them on your system.

Starting Customer Center from Java Web Start

To start Customer Center from the Java Web Start Application Manager:
Installing GSM Manager Customer Center Extension on Windows

1. Start Java Web Start from the desktop icon or the Start menu.
2. If you do not see Customer Center listed in the Application Manager, choose View - Downloaded Applications.
3. Select Customer Center and click Start.

Starting Customer Center from a Shortcut
To create a shortcut and use it to start Customer Center:

1. Open the Desktop Integration window in one of these ways:
   - The second time you start Customer Center, Java Web Start asks if you want to create shortcuts to Customer Center on your desktop and your Start menu.
   - Start Java Web Start; in the Application Manager, select Customer Center and choose Application - Create Shortcuts.
2. Select one or both of these options:
   - Shortcut on Desktop
   - Shortcut in Start Menu
3. Click Yes.
4. Start Customer Center from the desktop icon or the Start menu.

Starting Customer Center from Your Browser
To start Customer Center from your browser, go to the URL http://machine_name:port_number/CustomerCenter_en.html.
This URL automatically starts Java Web Start, which in turn starts Customer Center.

Uninstalling Customer Center from a Client System
To remove a version of Customer Center that has been downloaded to a client system:
1. Start Java Web Start from the desktop icon or the Start menu.
2. If you do not see Customer Center listed in the Application Manager, choose View - Downloaded Applications.
3. Select Customer Center.

Installing GSM Manager Customer Center Extension on Windows
For more information about the GSM Manager components, see "About the GSM Manager Components" in BRM Telco Integration.

GSM Manager Customer Center Extension enables support for assigning SIM cards and telephone numbers in Customer Center. See the discussion about setting up GSM services in Customer Center Help.

---

**Important:** You must install the GSM Manager Customer Center Extension on a system that already has Customer Center installed. See "Installing Customer Center on Windows".

---

To install GSM Manager Customer Center Extension:
1. Download the software to a temporary directory (temp_dir).
2. Extract the downloaded .zip file to a temporary directory (temp_dir).
3. Go to temp_dir and run the setup.exe program. The installation wizard for GSM Manager Customer Center Extension starts.
4. Answer the prompts in the installation wizard screens.

Your GSM Manager Customer Center Extension installation is now complete.

Installing Pricing Center on Windows

To install Pricing Center, see the following:

- About Installing and Running Pricing Center
- Before Installing Pricing Center
- Installing the Pricing Center Files
- Installing Java Web Start and Downloading Pricing Center
- Granting Administrative Privileges to Pricing Center Users
- Starting Pricing Center
- Uninstalling Pricing Center from a Client System
- Uninstalling Pricing Center from Windows

About Installing and Running Pricing Center

Pricing Center can be installed as a standalone application or on a system with a Web server.

- If you will use Pricing Center as a standalone application on a single system, install the standalone version.
- If you are installing with a Web server, you use the Web server and Java Web Start technology to distribute Pricing Center to your CSRs.

To use Pricing Center, CSRs download it from the Web server to their Windows client systems. When CSRs run Pricing Center, they run their local versions that communicate directly with the BRM database.

Each time CSRs run Pricing Center, the application uses Java Web Start to check the Web server for updates and to automatically download any new versions it finds.

---

**Note:** When you install Pricing Center, you also automatically install the Resource Editor and the Zone Mapper.

---

Before Installing Pricing Center

- Obtain the following information about the machine running the CM to which Pricing Center will connect:
  - Computer or server name
  - Port number
  - Database number
- Make sure you have Windows administrator privileges.
Install a third-party Web server.

Make sure each Pricing Center client system has a Web browser.
For a list of supported browsers, see "BRM Software Compatibility".

Optionally, you can install JRE 1.5.0_06 on each client system. If you don’t do it in advance, JRE 1.5.0_06 will be installed as part of downloading Pricing Center.
See "Installing Java Web Start and Downloading Pricing Center".

Installing the Pricing Center Files

---

**Important:** Install Pricing Center on the same system as your Web server.

---

1. Download the software. See "Downloading the Compressed Files".
2. Go to the temporary directory where you unzipped the client application download file.
3. Double-click **Setup.exe**.
4. When the Welcome screen appears, click **Next**.
   The Choose Destination Location window opens.
5. Enter the directory path where you want the Pricing Center files to be installed.
   By default, Pricing Center is installed into the directory `C:\Program Files\Portal Software\PricingCenter`.
6. Click **Next** to choose the default directory, or use the **Browse** button to choose a different directory and then click **Next**.
   The Install Type window opens.
7. On the Install Type window, choose one of the following:
   - **Standalone install**
     If you will use Pricing Center as a standalone application on a single system, select **Standalone install** and click **Next**.
     The Install Sample Price Plans window opens.
     Sample price plans are selected by default. To install them, click **Next**. To skip installing sample price plans, clear the check box, then click **Next**.
     The Enable Pipeline Rating Feature window opens. Skip to Step 8.
   - **Web server install**
     If you are installing Pricing Center on a central server, select **Web server install** and click **Next**.
     The Enter the Web Server Name window opens.
     Specify the URL as follows:
     **If you are installing in your Web server’s document root directory or in a directory mapped to your Web server’s document root directory:** Use the default URL.
If you are installing in a subdirectory of your Web server’s document root:
Add the subdirectory names to the default URL. But do not change the top-level URL.

If you are installing in a directory outside your Web server directory:
Map that installation directory to a subdirectory of your document root. Then add the name of the subdirectory of the document root to the default URL.

8. Enter the URL where you want Pricing Center installed and click Next.
The Enable Pipeline Rating Feature window opens.

9. The Enable pipeline rating feature check box is selected by default.
   - If you rate events using Pipeline Manager, accept the default selection and click Next.
   - If you do not rate events using Pipeline Manager, clear this option and click Next.
The Enable Data Migration Functionality window opens.

10. You use the Pipeline Manager data migration feature to move pipeline pricing data from a development system to a production system. For more information on data migration, see Pricing Center Help.
    Choose how you want data migration to be handled using the values in Table 11–3:

<table>
<thead>
<tr>
<th>Table 11–3 Data Migration Configuration Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values</td>
</tr>
<tr>
<td>Turn OFF Data Migration</td>
</tr>
<tr>
<td>Import Only</td>
</tr>
<tr>
<td>Turn ON Data Migration</td>
</tr>
</tbody>
</table>

11. Click Next.
The Select Program Folder window opens.

12. Specify the folder where you want Pricing Center to add program icons and click Next.
The Start Copying Files window opens.
    By default, Pricing Center is installed in C:\Program Files\Portal Software\PricingCenter.

13. Click Next.
The Pricing Center files are copied to the directory you specified.
    When the files have been copied, the Setup Complete window appears.

14. Click Finish to complete the setup process.
Installing Java Web Start and Downloading Pricing Center

**Important:** If you installed Pricing Center as a standalone product, skip this section and go to "Granting Administrative Privileges to Pricing Center Users".

If you installed the Web Server version of Pricing Center, follow the instructions in this section.

The first time you start Pricing Center on a client system, you download and install Java Web Start.

1. Go to this URL in your Web browser:
   ```
   http://machine_name/PricingCenter_en.html
   ```

2. Replace `machine_name` with the name of the system running the Web browser and Pricing Center. If Pricing Center is located in a subdirectory of your Web browser’s document root directory, include the full path to `PricingCenter_en.html`.
   
   If your Web server uses a port number other than the default of 80, include the port number in the URL:
   ```
   http://machine_name:port_number/PricingCenter_en.html
   ```
   
   For example, if Pricing Center is on a system called server1 using port 81, go to this URL: `http://server1:81/PricingCenter_en.html`.

   The browser begins downloading the Java Web Start installation file, `javawebstart-install.exe`. On Internet Explorer, you have the option of installing directly from the server without downloading the file.

**Note:**

- If your Web server uses default port 80, specifying the port number is optional. Otherwise, you must include the port number.
- If your Web server does not display the page correctly or does not start downloading the Java Web Start installation file, make sure you set the JNLP MIME type in your Web server.
- If the MIME type is set in your Web server, try clearing the cache in your Web browser. For Internet Explorer, delete temporary Internet files. For Netscape, clear the memory cache and the disk cache.

3. Specify the directory where you want the installation file saved, then save the file.
4. Go to the temporary directory where you saved the Java Web Start installation file.
5. Double-click `javawebstart-install.exe` and follow the prompts in the installer.
Installing Pricing Center on Windows

6. **(For Netscape 6 only) In Netscape, choose Edit - Preferences - Navigator - Helper Applications** and create a new MIME type as shown in Table 11–4:

<table>
<thead>
<tr>
<th>File Extension</th>
<th>MIME Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>jnlp</td>
<td>application/x-java-jnlp-file</td>
</tr>
</tbody>
</table>

Application to Use: `javaws.exe`, located in your Java Web Start installation directory, such as C:\Program Files\Java Web Start

7. Stop and restart Netscape.

8. In your Web browser, return to the Pricing Center URL (http://machine_name:port_number/PricingCenter_en.html) and click the link for running Pricing Center.

Java Web Start launches and copies the Pricing Center files from the Web server.

9. In the Security dialog box that asks if you want to install and run Pricing Center, click **Start**.

For more information on using Java Web Start, see the Java Web Start documentation.

**Granting Administrative Privileges to Pricing Center Users**

You use the `pricing_admin.pl` script to grant administrative privileges to Pricing Center users. Users with administrative privileges are called **pricing admins**.

To grant administrative privileges to Pricing Center users, perform the procedures in these sections:

1. **Modifying the Database Configuration File**
2. **Modifying the pricing_admin.pl Script Configuration File**
3. **Setting up the Pipeline Manager Database Server for the Pipeline Manager Administrator**
4. **Configuring the Pricing Center for Branding**
5. **Initializing the Pricing Admin Configuration Object**
6. **Specifying Administrative Privileges for Pipeline Manager Users**
7. **Removing Pricing Admins**

**Modifying the Database Configuration File**

1. Go to the DM directory: `cd BRM_Home/sys/dm_oracle`

Where **BRM_Home** is the directory in which you installed BRM.
2. Back up the database configuration file (pin.conf).

| Important: You will be restoring the pin.conf file later in the procedure. |

3. Open the pin.conf file with a text editor.
4. If the dd_write_enable_objects entry is set to 0, set the entry to 1.
5. If the crypt entry is commented out, uncomment it and configure it according to the notes that precede this entry:
   - crypt md5 | BRM_Home/lib/libpin_crypt4dm.so "secret_key"

   For more information, see "About Encrypting Information" in BRM Developer’s Guide.
6. Save and close the file.
7. Stop and restart the Data Manager (DM) and Connection Manager (CM). See “Starting and Stopping the BRM System” in BRM System Administrator’s Guide.

Modifying the pricing_admin.pl Script Configuration File
1. Go to the BRM_Home/setup/scripts directory.
2. Open the setup configuration file (pin.conf) file with a text editor.
3. Check that the following entries are specified in the pin.conf file:
   - nap login_type 1
   - userid 0.0.0.1 /service/admin_client 1
4. Specify appropriate values for the login_name and login_pw parameters:
   - nap login_name login_name
   - nap login_pw password

   For example:
   - nap login_name integrate
   - nap login_pw integrate
5. Enter the host name and port number of your server in the cm_ptr entry:
   - nap cm_ptr ip host_name port_number
6. Specify values for the entries described in Table 11-5. These entries specify Pipeline Manager configuration data used by the pricing_admin.pl script to set up and maintain pricing admins and the Pipeline Manager database for Pricing Center.
### Table 11–5  Entries in the `pricing_admin.pl` Script

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
</table>
| `default_table_space_name`   | The tablespace that newly created Oracle users are assigned to. The default is `INTEGRATE_TS_1_DAT`.  
If the default tablespace is not available in the Pipeline Manager database, use an available existing tablespace or create a new one.  
**Important:** You must specify a value for `default_table_space_name` before you run the `pricing_admin.pl` script with the `-set` parameter. |
| `database_role_name`         | The role that provides select, insert, delete, and update privileges on IFW_* and JSA_* tables. The default is `INTEGRATE_ROLE_ALL`.  
If the default role is not available in the Pipeline Manager database, use an existing role that provides these privileges or create a new role.  
If you use the `-init` parameter, the entry is optional. |
| `host`                       | The host name for the server where the Pipeline Manager database is located and running. |
| `port`                       | The port number used by the Pipeline Manager database listener. |
| `db`                         | The name of the Pipeline Manager database instance.  
**Note:** You must set the `db` value to the ORACLE_SID value. If you set the `db` value to the SERVICE_NAME value, BRM does not generate an error when creating the `/config/pricing_admin` object; however, you cannot connect to the Pipeline Manager database from Pricing Center. |
| `db_type`                    | The name of the database vendor. The value should be one of the system database driver groups of entries in the `jsaconf.properties` file, for example, `oracle`. |
| `login_name`                 | The default Pipeline Manager database user name.  
**Important:** You must specify a value for `login_name` before you run the `pricing_admin.pl` script with the `-init` parameter. |
| `login_pw`                   | The password of the default Pipeline Manager database user.  
**Important:** You must specify a value for `login_pw` before you run the `pricing_admin.pl` script with the `-init` parameter. |
| `admin`                      | The DBA on the Pipeline Manager database that has user creation privileges. |
| `admin_pw`                   | The password of the DBA account. |
| `db_alias`                   | The alias used to log in to the Pipeline Manager database.  
**Important:** Ensure that the `tnsnames.ora` file also contains an entry with this alias. |

### Example 11–1  Sample `pin.conf` Entry Value

```
- pipeline default_table_space_name INTEGRATE_TS_1_DAT  
- pipeline database_role_name INTEGRATE_ROLE_ALL  
- pipeline host ttal-013  
- pipeline port 1521  
- pipeline db pindb  
- pipeline db_type oracle  
- pipeline login_name integrate  
- pipeline login_pw integrate  
- pipeline admin system  
- pipeline admin_pw manager  
- pipeline db_alias ttal  
```
Installing Pricing Center on Windows

7. Save and close the file.

Setting up the Pipeline Manager Database Server for the Pipeline Manager Administrator

To set up an Oracle database server for the Pipeline Manager administrator:

1. Edit the `tnsnames.ora` file to specify HOST, PORT, and SERVICE_NAME values. Use the same values that you used for the `host`, `port`, and `db` entries in the setup configuration file (`BRM_Home\setup\scripts\pin.conf`).

   The following is the required name entry in the `tnsnames.ora` file that corresponds to the sample `pin.conf` file shown in step 6 in "Modifying the pricing_admin.pl Script Configuration File".

   ```
   TTAL-013 =
   (DESCRIPTION =
   (ADDRESS_LIST =
   (ADDRESS = (PROTOCOL = TCP) (HOST = ttal_013) (PORT = 1521) )
   )
   (CONNECT_DATA =
   (SERVICE_NAME = pindb)
   )
   )
   
   2. To ensure that the `pin.conf` entries for `admin`, `admin_pw`, `db_alias`, and `host` are correct, try connecting to the Pipeline Manager database using the following command:

   ```
   sqlplus admin/admin_pw@db_alias
   ```

Configuring the Pricing Center for Branding

If your system uses branding and you use pipeline pricing components:

1. Open the `pricing_admin.sce` scenario file located in `BRM_Home\setup\scripts`.
2. Change the PIN_FLD_READ_ACCESS value from Self to Global:

   ```
   PIN_FLD_READ_ACCESS              STR [0] 'Global'
   ```

3. Save and close the file.

Initializing the Pricing Admin Configuration Object

Initialize the pricing admin configuration object by running the `pricing_admin.pl` script:

1. Go to the `BRM_Home\setup\scripts` directory.
2. Run the `pricing_admin.pl` script with the `-init` parameter:
   ```sh
   perl pricing_admin.pl -init
   ```
   If initialization is successful, the system returns this line:
   ```
   Initialized config object for pricing admin.
   ```

3. Restore the original database configuration file (pin.conf) that you backed up in "Modifying the Database Configuration File".

4. Stop and restart the DM to apply the new settings. See "Starting and Stopping the BRM System" in *BRM System Administrator’s Guide*.

**Specifying Administrative Privileges for Pipeline Manager Users**

To specify administrative privileges for Pipeline Manager users:

1. Make sure that every Pipeline Manager user who will be a pricing admin has a CSR account in BRM (an account using the `admin_client` service). You create CSR accounts in Customer Center by using the CSR Plan. See information about the Account Creation wizard’s Contact page in Customer Center Help.

2. Create a text file that has the user name and password (in that order) of each pricing admin on a separate line. User names and passwords must be separated by a space. For example:
   ```
   john_jones valhalla
   mary_allen dorado
   ```

3. Go to the `BRM_Home\setup\scripts` directory.

4. Run the `pricing_admin.pl` script with the `-set` parameter:
   ```sh
   perl pricing_admin.pl -set < text_file
   ```
   where `text_file` is the name of the file you created in Step 2.

5. Delete the text file if security is a concern.

**Removing Pricing Admins**

This section describes how to remove single and multiple users from the Pipeline Manager database.

**Removing One Pricing Admin**

To remove one pricing admin from the database:

1. Go to the `BRM_Home\setup\scripts` directory.

2. Run the `pricing_admin.pl` script with the `-remove` parameter:
   ```sh
   perl pricing_admin.pl -remove
   ```

---

**Important:** BRM user names (login names) are case sensitive, but Pipeline Manager user names are not. Therefore, be sure to type the names exactly as specified in Customer Center, but avoid using names that are too similar. For example, do not create two accounts with the user names “Smith” and “smith” because they will both be logged in to the Pipeline Manager as “SMITH.”
3. When prompted, enter the user name to be deleted.

   For each pricing admin removed, the system responds with this line:

   Removed pricing admin user_name

4. Repeat step 3 until all appropriate user names are removed.

**Removing Multiple Pricing Admins**

To remove multiple pricing admins from the database:

1. Go to the *BRM_Home/setup/scripts* directory.
2. Create a text file (*text_file*) containing only the user names that you want to remove. Put each user name on a separate line, as in this example:

   - john_jones
   - mary_allen

3. Run the *pricing_admin.pl* script with the `-remove` and *text_file* parameters:

   perl pricing_admin.pl -remove < text_file

---

**Starting Pricing Center**

After installing the standalone version of Pricing Center, you can start it from the Windows *Start* menu.

See "Starting Standalone Pricing Center from the Start Menu".

After installing Java Web Start and running Pricing Center for the first time, you can start Pricing Center in these ways:

- **Java Web Start.**
  
  See "Starting Pricing Center from Java Web Start".

- **Shortcut.**
  
  See "Starting Pricing Center from a Shortcut".

---

**Note:** Creating and using a shortcut to Pricing Center is the simplest way to start it.

---

- **Browser.**

  See "Starting Pricing Center from Your Browser".

Using any of these methods of starting the Web version, if there’s a newer version of the Pricing Center files on the Web server, Java Web Start installs them on your system.

To start standalone Pricing Center, see "Starting Standalone Pricing Center from the Start Menu".

---

**Starting Standalone Pricing Center from the Start Menu**

To start the standalone version of Pricing Center:

1. From the *Start* menu, choose *Start - Programs - Portal - Pricing Center*.
2. Enter the root account password in the Login Application Center window.
Starting Pricing Center from Java Web Start
To start Pricing Center from the Java Web Start Application Manager:
1. Start Java Web Start from the desktop icon or the Start menu.
2. If you do not see Pricing Center listed in the Application Manager, choose View - Downloaded Applications.
3. Select Pricing Center and click Start.

Starting Pricing Center from a Shortcut
To create a shortcut and use it to start Pricing Center:
1. Open the Desktop Integration window in one of these ways:
   - The second time you start Pricing Center, Java Web Start asks if you want to create shortcuts to Pricing Center on your desktop and your Start menu.
   - Start Java Web Start; in the Application Manager, select Pricing Center and choose Application - Create Shortcuts.
2. Select one or both of these options:
   - Shortcut on Desktop
   - Shortcut in Start Menu
3. Click Yes.
4. Start Pricing Center from the desktop icon or the Start menu.

Starting Pricing Center from Your Browser
To start Pricing Center from your browser, go to the URL http://machine_name:port_number/PricingCenter_en.html.
This URL automatically starts Java Web Start, which in turn starts Pricing Center.

Uninstalling Pricing Center from a Client System
To remove a version of Pricing Center that has been downloaded to a client system:
1. Start Java Web Start from the desktop icon or the Start menu.
2. If you don’t see Pricing Center listed in the Application Manager, choose View - Downloaded Applications.
3. Select Pricing Center.

Uninstalling Pricing Center from Windows
To remove a standalone version of Pricing Center from Windows:
1. From the Windows Start menu, choose Settings - Control Panel - Add or Remove Programs.
2. Select Pricing Center 7.4.
3. Click Change/Remove.
4. Click OK.
Installing Customer Center SDK on Windows

This section describes the requirements and the procedure for installing Customer Center SDK on Windows.

Customer Center SDK package includes components that are used to customize both Customer Center and Self-Care Manager. Follow these instructions for installing the common SDK package.

To customize Customer Center, see "Customizing the Customer Center Interface" in BRM Developer's Guide.

To customize Self-Care Manager, see "Customizing the Self-Care Manager Interface" in BRM Developer’s Guide.

---

**Important:** Before installing Customer Center SDK, verify that JDK 1.5.0_06 is installed in your development environment. You must also have access to a BRM server.

---

For information about Customer Center SDK, see "Using Customer Center SDK" in BRM Developer’s Guide.

Software Requirements

Customer Center SDK is available for the Windows operating system.

You must have the following software installed on or available to your system before you install Customer Center SDK:

- **BRM.**
  
  See "BRM Installation Overview".

- A Web server such as Apache HTTP Server, IPlanet Web Server, or Microsoft Internet Information Server (IIS) with the Customer Center client software installed.

  To install Customer Center, see "Installing Customer Center on Windows".

- An application such as WinZip for extracting compressed files.

- The JDK supported for this release.
  
  See "BRM Software Compatibility".

- (Customer Center only) A Java Code Signing Certificate. Customer Center SDK includes a makecertificate utility for creating a self-signed certificate that you use to create jar files to deploy your customizations.

- (Optional) Borland JBuilder 5 or later, Professional or Enterprise Edition. You can use JBuilder for various tasks such as creating WAR files for Self-Care Manager and custom pages for Customer Center.

Information Requirements

Before installing Customer Center SDK, have this information available:

- The destination folder for your Customer Center SDK installation. The default folder is `C:\Program Files\Portal Software\CustomerCareSDK`

- The name of the server where the Connection Manager (CM) is running.
Installing Customer Center SDK on Windows

- The port number where the CM is running.
- The database number for the BRM Data Manager (DM).
- The URL for the Web server from which Customer Center is deployed. This is the directory where Customer Center is installed. For example, http://server1.

Installing Customer Center SDK

To install Customer Center SDK, verify that you have Administrator privileges, then follow these steps:

1. Download the Customer Center SDK software.
2. Unzip the compressed Customer Center SDK files you downloaded.
3. Click Setup.exe to start the installation.
   The installation program extracts files to a temporary directory on your computer.
4. Follow the instructions on the screen, providing the following information when prompted, or click Next to accept the default entries:
   - Destination folder for the installed software.
   - Connection Manager's server name, port, and database number.
   - Customer Center Web Start deployment URL, if available. Use the URL where you will deploy your customizations.
   - Program folder for the Start menu.
5. When the Setup Complete dialog box appears, click Finish to complete the installation.

---

**Note:** You can delete the temporary extraction directory created by the installation program if it isn’t automatically deleted when you exit your unzip application.

---

6. If you installed GSM Customer Center Extension on a Customer Center installation, copy the following files from the Customer Center library directory (CC_Path\lib) to the library directory of the version of Customer Center included in Customer Center SDK (CCSDK_Path\lib):
   - GSMManager.jar
   - GSMManager_en.jar
   - Modular.properties

where:
CC_Path is the path to your Customer Center installation (by default C:\Program Files\Portal Software\CustomerCenter) and CCSDK_Path is the CC SDK installation path (by default C:\Program Files\Portal Software\CustomerCareSDK).

GSM Customer Center Extension enables additional features, such as support for associating SIM and number devices with GSM services. See the information about working with GSM accounts in Customer Center Help.
Installing the Localization SDK on Windows

To extract the SDK files, you need a zip file utility, such as WinZip.

1. If you have installed an earlier version of the SDK, uninstall it.
2. Extract the files in the zip file to a temporary directory.
3. Install the files.
4. In a command window, use the `subst` command to substitute the drive letter for the build tree directory of the SDK. If you installed the SDK in the default location, enter the command as follows:

   ```
   subst W: "C:\Program Files\Portal Software\Localization SDK"
   ```

5. To prepare the MFC files, verify that the Visual C++ files are in the path:

   ```
   C:\Program Files\Microsoft Visual Studio .NET 2003\Vc7\bin\vcvars32.bat
   ```

   The MFC files are ready to be translated. After translation, see "Building Payment Tool" in BRM Developer’s Guide.

Installing Self-Care Manager on Windows

To use Self-Care Manager, you need to install a third-party Web server, an application server, and Self-Care Manager itself. Follow these procedures:

- Installing an Application Server
- Installing the Self-Care Manager Files

---

**Important:** You must install your application server and Self-Care Manager on the same system. The Connection Manager (CM) can be on the same system as Self-Care Manager or on a different system.

---

Installing an Application Server

Supported application servers include WebLogic and WebSphere. For more information, see the vendor installation instructions for the application server you are using.

Installing the Self-Care Manager Files

Before installing Self-Care Manager, make sure your application server servlet engine is already installed. See "Installing an Application Server".

To install the Self-Care Manager files:

1. Download the software. See "Downloading the Compressed Files".
2. See "Installing the Software" for information about the dialog boxes that appear when you install Self-Care Manager.
Problems installing BRM Client Applications

This section describes problems you might encounter when installing BRM client applications and their solutions.

Problem: Cannot Start a Client Application after Installation

You cannot start one of the client applications, even though the installation appeared to be successful.

Possible Cause

BRM couldn’t add the client application to your Windows path because the path is too long. Therefore, Windows cannot find it.

Solution

Review your path statement and delete references to obsolete programs. For more information, see your Windows documentation. Reboot the system before you try restarting the client application.
This chapter explains how to install the following Oracle Communications Billing and Revenue Management (BRM) tax calculation managers:

- Taxware Manager
- Vertex Quantum Manager
- Vertex Manager

**Note:** Vertex Quantum Manager does not support Vertex Communications Tax Q Series.

**Note:** Vertex Manager supports Vertex Communications Tax Q Series and Vertex Sales Tax Q Series.

Before you read this chapter, you should be familiar with BRM concepts and architecture. See the following documents:

- "Introducing BRM" in *BRM Concepts*
- "BRM System Architecture" in *BRM Concepts*
- "About Calculating Taxes" in *BRM Calculating Taxes*

**Important:**

- These tax calculation managers are optional features that require a separate license.
- The third-party tax packages are not included with the BRM software; you must purchase and install the ones you want.

**System Requirements**

BRM tax calculation managers are available for the Linux, AIX, and Solaris operating systems. Vertex is also available for the HP-UX IA64 operating system.

**Important:** Vertex Manager and Vertex Quantum Manager are not supported on 64-bit operating systems. Taxware Manager is not supported on HP-UX IA64 operating systems.
For information on disk space requirements for the HP-UX IA64, AIX, Linux, and Solaris operating systems, see "Disk Space Requirements".

**Software Requirements**

Before installing a tax calculation manager, you must install:

- Third-Party software, which includes the PERL libraries and JRE required for installing BRM components.
  
  See "Installing the Third-Party Software".

- BRM
  
  See "BRM Installation Overview".

- Oracle 9i or 10g or 11g

**Installing Tax Calculation Managers**

**Note:** If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

To install a tax calculation manager:

1. Download the software to a temporary directory (`temp_dir`).

   **Important:**
   
   - If you download to a Windows workstation, use FTP to copy the `.bin` file to a temporary directory on your UNIX server.
   
   - You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information see, "Increasing Heap Size to Avoid “Out of Memory” Error Messages".

2. Go to the directory where you installed the Third-Party package and source the `source.me` file.

   **Caution:** You must source the `source.me` file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

   Bash shell:
   
   `source source.me.sh`

   C shell:
   
   `source source.me.csh`

3. Go to the `temp_dir` directory, and run the `.bin` file.
Installing Tax Calculation Managers in a Multidatabase Environment

4. Follow the instructions displayed during installation. The default installation directory for the tax calculation manager is `opt/portal/7.4`.

**Note:** The installation program does not prompt you for the installation directory if BRM or a tax calculation manager is already installed on the machine and automatically installs the package at the `BRM_Home` location.

5. Go to the directory where you installed the tax calculation manager package and source the `source.me` file:
   Bash shell:
   ```bash
   source source.me.sh
   ```
   C shell:
   ```bash
   source source.me.csh
   ```

6. Go to the `BRM_Home/setup` directory and run the `pin_setup` script.

   **Note:** The `pin_setup` script starts all required BRM processes.

7. (Oracle only) If you use Oracle for your BRM database and your event tables are partitioned, run the `partition_utils` utility with the `-o update` parameter from the `BRM_Home/apps/partition_utils` directory:
   ```bash
   perl partition_utils.pl -o update
   ```
   For more information, see "Updating Partitions" and "partition_utils" in BRM System Administrator’s Guide.

Your BRM tax calculation manager installation is now complete.

**Installing Tax Calculation Managers in a Multidatabase Environment**

To install the tax calculation managers in a multidatabase environment:

1. Install the tax calculation manager on the primary installation machine.
   See "Installing Tax Calculation Managers".

2. Configure the tax calculation manager on the primary installation machine.

3. Configure the secondary installation machine to link to the tax calculation software on the primary installation machine by adding the following lines to the secondary CM `pin.conf` file (`BRM_Home/sys/cm/pin.conf`):
   ```bash
   - fm_rate taxware_db taxware_db_number /_tax_db 0 - cm dm_pointer taxware_db
   ```
Configure the secondary installation machine to link to the `taxcodes_map` file on the primary installation machine by adding the following lines to the secondary CM `pin.conf` file (`BRM_Home/sys/cm/pin.conf`):

- `fm_rate taxcodes_map path_to_taxcodes_map`

On the primary installation machine, use the replication scripts in the `BRM_Home/setup/scripts/repl_tax_supplier` directory to copy the tax supplier data in the profile tables to the secondary databases.

For information, see the `repl_tbl_man` file in the `BRM_Home/setup/scripts/repl_tax_supplier` directory.

On the primary installation machine, go to the `BRM_Home/setup/scripts` directory and run `pin_multidb.pl -r` from the command line to force a refresh of the configuration tables:

```
% cd BRM_Home/setup/scripts
% perl pin_multidb.pl -r CONFIG
```

For information, see "pin_multidb" in *BRM System Administrator’s Guide*.

### What’s Next?

- If you installed BRM Taxware Manager, see “Setting Up Tax Calculation for Taxware” in *BRM Calculating Taxes*.
- If you installed Vertex Quantum Manager or Vertex Manager, see "Setting Up Tax Calculation for Vertex" in *BRM Calculating Taxes*. 
This document explains how to install the Oracle Communications Billing and Revenue Management (BRM) Paymentech Manager software.

Before you read this document, you should be familiar with BRM concepts and architecture. See the following documents:

- "Introducing BRM" in *BRM Concepts*
- "BRM System Architecture" in *BRM Concepts*
- "About BRM-Initiated Payments" in *BRM Configuring and Collecting Payments*

**Important:** Paymentech Manager is an optional feature that requires a separate license.

### System Requirements

Paymentech Manager is available for the HP-UX IA64, Linux, AIX, and Solaris operating systems. For information on disk space requirements for the HP-UX IA64, Solaris, AIX, and Linux operating systems, see "Disk Space Requirements".

### Software Requirements

Before installing Paymentech Manager, you must install:

- Third-Party software, which includes the PERL libraries and JRE required for installing BRM components.
  
  See "Installing the Third-Party Software".

- BRM.
  
  See "BRM Installation Overview".

### Installing Paymentech Manager

**Note:** If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

To install Paymentech Manager:

1. Download the software to a temporary directory (`temp_dir`).
2. Go to the directory where you installed the Third-Party package and source the source.me file.

---

**Caution:** You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

Bash shell:

```
source source.me.sh
```

C shell:

```
source source.me.csh
```

3. Go to the temp_dir directory and enter this command:

```
7.4_PaymentechMgr_platform_32_opt.bin
```

---

**Note:** You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

4. Follow the instructions displayed during installation. The default installation directory for Paymentech Manager is `opt/portal/7.4`.

---

**Note:** The installation program does not prompt you for the installation directory if BRM or Paymentech Manager is already installed on the machine and automatically installs the package at the `BRM_Home` location.

5. Go to the directory where you installed the Paymentech Manager package and source the source.me file:

Bash shell:

```
source source.me.sh
```

C shell:

```
source source.me.csh
```

6. Go to the `BRM_Home/setup` directory and run the `pin_setup` script.
Note: The pin_setup script starts all required BRM processes.

7. (Oracle only) If you use Oracle for your BRM database and your event tables are partitioned, run the partition_utils utility with the -o update parameter from the BRM_Home/apps/partition_utils directory:

perl partition_utils.pl -o update

For more information, see "Updating Partitions" and "partition_utils" in BRM System Administrator’s Guide.

Your Paymentech Manager installation is now complete.

What’s Next?

Read the instructions in "Configuring BRM-Initiated Payment Processing" in BRM Configuring and Collecting Payments.

Uninstalling Paymentech Manager

To uninstall Paymentech Manager, run the BRM_Home/uninstaller/PaymentechMgr/uninstaller.bin file.
Although the Oracle Communications Billing and Revenue Management (BRM) system is designed for trouble-free installation, you might encounter a problem. This document lists some problems other customers have encountered and describes their solutions.

For more information, see "Reference Guide to BRM Error Codes" and "Resolving Problems in Your BRM System" in BRM System Administrator’s Guide.

Problems Installing the Database

For more information on errors that can occur when installing your database, see your database documentation.

Problem: Cannot Start the Oracle Listener

When you try to start the Oracle Listener, you get a “permission denied” error.

Possible Cause
The path points to a directory for which you don’t have access.

Solution
Change the permissions to the directory where the listener.ora and listener.log files are stored.

Problem: Cannot Connect to the Oracle Database as the System User

You cannot connect to the database as the system user with SQL.

Possible Causes
- The Oracle Listener is not running.
- Oracle cannot find a tnsnames.ora file.
- The tnsnames.ora file doesn’t point to a valid database.

Solution
1. Start the Oracle Listener.
2. Make sure the tnsnames.ora file points to your database on the specific host machine.
3. Make sure the Oracle user’s path contains the correct path to your `tnsnames.ora` file.

**Problems Installing BRM**

If you have a problem installing the BRM software and its optional components, first check the `pin_setup.log` file, and then the DM and CM log files for possible reasons for the failure.

**Problem: The Setup Script Cannot Start the CM or DM on HP-UX IA64**

The `pin_setup` script fails when it tries to start the Connection Manager (CM) or Data Manager (DM).

**Possible Cause**

The manager cannot find the `dld.so` (HP-UX IA64) file, because the CM or DM host computer is missing the necessary C++ libraries.

**Solution**

Install C++ runtime libraries on the computer that will run the System Manager, and reinstall BRM. See "Overview of Hardware and Software Requirements".

**Problem: HP-UX IA64 Semaphore Errors**

BRM installation fails, and you receive the following error:

```
ORA-07279: spcre: semget error, unable to get first semaphore set.
HP-UX Error: 28: No space left on device
Additional information: 1
```

**Possible Cause**

The database host server doesn’t have sufficient shared memory to perform the installation.

**Solution**

Set the kernel `SEMMNI`, `SEMMNS`, and `SEMMAP` parameters to the following values:

```
SEMMNI = 1000
SEMMNS = 1000
SEMMAP = 1002
```

**Note:** If multiple applications are running on the host computer, increase the values in these parameters to handle the most demanding application’s semaphore requirements.

**Problem: An Error Occurred during the Move Data Process**

You receive the error “An error occurred during the move data process -132.”

**Possible Cause**

A BRM process is running, so the `pin_setup` script cannot finish executing.
Solution
Make sure you stop all existing BRM processes, and then run the pin_setup script again.

Problem: Errors are Recorded in the Log File When the dm_oracle Starts
After you install BRM and while running the pin_setup script of BRM, when the Oracle Data Manager starts, errors are recorded in the dm_oracle.pinlog file.

Possible Cause
Cannot find the ACCOUNT_T table, as this gets created later on.

Solution
There is no solution; the error does not impact any functionality and can be ignored.

Problem: An Error Occurs in the dm_fusa.pinlog file during pin_setup of Paymentech Manager
Errors occur while running the pin_setup script of Paymentech Manager in the dm_fusa.pinlog file.

Possible Cause
The simulator is not started.

Solution
After the pin_setup of Paymentech Manager is complete, make sure to start the answer simulator, to remove the errors. The simulators are in BRM_Home/bin, where BRM_Home is the directory in which you installed BRM. You start the simulator through the command line:

start_answer

Problems Connecting to the Database
Conflicting settings in the pin_setup.values configuration file often cause database connection failures.

Problem: Pointer to the Wrong Database Name
The pin_setup script cannot connect to the database, and the error message in the DM log file shows that the DM is trying to connect to the incorrect database.

Possible Cause
The $MAIN_DB{'alias'} entry in the pin_setup.values file doesn’t match the database alias.

Solution
Enter the correct name for your database; for example, pindbhostname, in the $MAIN_DB{'alias'} entry of the pin_setup.values file. Re-run the pin_setup script.
Problems Connecting to the Database

Problem: Cannot Log into Database

The pin_setup script cannot log in to the BRM database. The error message indicates an invalid user name or password.

Possible Cause

The $MAIN_DB{'user'} and $MAIN_DB{'password'} entries in the pin_setup.values file don't specify the correct user name and password for the BRM database. The default BRM user name and password is pin.

Solution

First, verify that you can connect to the BRM database by using the user name and password you want. If you cannot connect:

1. Use SQL statements to set up the user and password for the BRM database.
2. Enter the correct user name and password for the BRM database in the $MAIN_DB{'user'} and $MAIN_DB{'password'} entries in the pin_setup.values file.
3. Re-run the pin_setup script.

Problem: Out of Memory on UNIX

The pin_setup script cannot start the DM, and the DM’s error log file refers to “bad shmget”, “bad shmat”, or another error related to memory.

Possible Cause

There is not enough shared memory on the database server.

Note: AIX systems automatically use all shared memory that is available.

HP-UX IA64 Solution

Use the HP-UX SAM utility to increase the SEMMNI, SEMMNS, or SEMMAP values. For example:

SEMMNI = 1000
SEMMNS = 1000
SEMMAP = 1002

Note: If multiple applications are running on the host computer, increase these values based on each application’s shared memory requirements.

Solaris Solution

Increase the shared memory value in the /etc/system file. For example, type the following in a text editor, such as vi:

set shmsys:shminfo_shmmax=4294967295

Linux Solution

Increase the shared memory value in the /etc/sysctl.conf file. Type the following in a text editor:
1. Log on as root.

2. Open the `/etc/sysctl.conf` file.

3. Add the following lines to the end of the file, or modify the values if these lines are already present:

   ```
   kernel.shmmax = 536870912
   kernel.shmall = 536870912
   ```

4. Run `sysctl -p` from the unix prompt.
This chapter provides information to help developers test their Oracle Communications Billing and Revenue Management (BRM) system configuration.

## Installing and Configuring Multiple Instances of BRM on One Machine

You can install multiple instances of BRM on one machine to reduce the amount of hardware needed to test the BRM software. To set up multiple instances of BRM on one machine, you must perform the following steps:

1. **Creating Multiple Users**
2. **Installing and Configuring Oracle**
3. **Installing Multiple Instances of BRM**
4. **Configuring Each BRM Instance**

### Creating Multiple Users

Create a user for each instance of BRM you want to install. For example, to install four instances of BRM, create users `pin1`, `pin2`, `pin3`, and `pin4`.

To create multiple users:

1. Log in as `root`:
   ```
   % su - root
   ```
2. Create each user. For example, type the following to create four users:
   ```
   # For HP-UX IA64, Linux, and Solaris:
   # useradd -g pin -s /bin/csh -d BRM_Home/pin1 pin1
   # useradd -g pin -s /bin/csh -d BRM_Home/pin2 pin2
   # useradd -g pin -s /bin/csh -d BRM_Home/pin3 pin3
   # useradd -g pin -s /bin/csh -d BRM_Home/pin4 pin4
   
   # For AIX:
   # mkuser pgrp=pin home=BRM_Home/pin1 shell=/bin/csh pin1
   # mkuser pgrp=pin home=BRM_Home/pin2 shell=/bin/csh pin2
   # mkuser pgrp=pin home=BRM_Home/pin3 shell=/bin/csh pin3
   # mkuser pgrp=pin home=BRM_Home/pin4 shell=/bin/csh pin4
   ```

Where `BRM_Home` is the directory in which you installed BRM.
Installing and Configuring Multiple Instances of BRM on One Machine

3. Create a password for each user.
   For example, type the following to create the pin1 password:
   
   # passwd pin1

Installing and Configuring Oracle

Before you install BRM, you must install Oracle and configure it for multiple instances of BRM. Install and configure Oracle according to the instructions in "Installing and Configuring the Oracle Database", except create your BRM tablespaces and BRM users as described in this section.

Creating Tablespaces for Each User

You must create unique data, index, and temporary tablespaces for each instance of BRM you install. The examples in this document use the following tablespaces:

- **pinN00** (for data)
- **pinxN00** (for indexes)
- **PINTEMPN** (for a temporary tablespace)

1. Create a directory for the tablespaces, such as /u02/oradata/pindb. This directory is referred to as table_location.

2. Connect to the Oracle database by using SQL*Plus:
   
   % sqlplus system/manager@databaseAlias

3. Create a data, index, and temporary tablespace for each BRM user.
   Repeat the following commands for each BRM instance:

   SQL> create tablespace pin00 datafile 'table_location/pin00.dbf'
   size 600M reuse autoextend on extent management
   local uniform size 64K segment space management
   auto;
   
   Tablespace created.

   SQL> create tablespace pinx00 datafile 'table_location/pinx00.dbf'
   size 400M reuse autoextend on extent management
   local uniform size 64K segment space management
   auto;
   
   Tablespace created.

   SQL> create temporary tablespace pintemp tempfile
   'table_location/PINTEMP.dbf' size 100M reuse autoextend on;
   
   Tablespace created.

Creating Multiple BRM Users for Oracle

Create the BRM users who can access the Oracle database. The examples in this document use pinN, but you can use another naming scheme.

1. Connect to the Oracle database by using SQL*Plus:
   
   % sqlplus system/manager@databaseAlias

2. Perform the following for each instance of BRM you will install:
Installing and Configuring Multiple Instances of BRM on One Machine

Installing Multiple Instances of BRM

To install multiple instances of BRM on one machine:

1. If the Third-Party software package isn’t installed already, install it.
   
   See "Installing the Third-Party Software".

2. Log in as user pinN.
   
   `% su - pinN`

3. Download the software to a temporary directory (temp_dir).

4. Go to the directory where you installed the Third-Party package and source the source.me file.

   **Caution:** You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

   Bash shell:

   `source source.me.sh`

   C shell:

   `source source.me.csh`

5. Stop all BRM processes. See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.
6. Go to the temp_dir directory and enter this command:

```
7.4_Portal_Base_platform_32_opt.bin
```

**Note:** You can use the **-console** option to run the installation in a command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the patch.

7. Log in separately for each instance of BRM that you need to install. For example, log in as **pin1** and install the first instance of BRM. Then, log in as **pin2** and install the second instance of BRM, and so on.

Follow the instructions displayed during installation. Your responses are written to the **BRM_Home/setup/pin_setup.values** file. Table 15–1 lists the setup prompt descriptions.

**Table 15–1 Prompt Descriptions**

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup type:</td>
<td>Enter the type of installation you prefer. The default is <strong>Typical</strong>.</td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Typical</strong> for development and production systems.</td>
<td></td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Demo</strong> for test or demonstration systems. This is the quickest option and asks you the least number of questions.</td>
<td></td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Custom</strong> for production systems. The installer lets you install a subset of the BRM components.</td>
<td></td>
</tr>
<tr>
<td>Directory name:</td>
<td>Enter the directory in which to install BRM. The default is <code>/opt/portal/7.4</code>.</td>
</tr>
<tr>
<td>Create BRM Database Tablespaces? (Oracle only)</td>
<td>Enter whether you want the installer to create default tablespaces for you. Enter <strong>No</strong> to create custom tablespaces manually. You must create your tablespaces before you run the <code>pin_setup</code> script. Do not select <strong>Yes</strong>. Selecting <strong>Yes</strong> may cause installation to fail.</td>
</tr>
<tr>
<td>Database alias:</td>
<td>Enter your database alias. The default is <code>pindbhostname</code>.</td>
</tr>
<tr>
<td>Oracle DM database number:</td>
<td>Enter the database number. The default is <code>0.0.0.1</code>.</td>
</tr>
<tr>
<td>Oracle DM port:</td>
<td>Enter the port number for the BRM Data Manager. The default is <code>12950</code>.</td>
</tr>
<tr>
<td>Database username:</td>
<td>Enter your database user name. The default is <strong>pin</strong>.</td>
</tr>
<tr>
<td><strong>Important:</strong> Make sure you enter the user name for <strong>pin1</strong>, then <strong>pin2</strong>, and so on.</td>
<td></td>
</tr>
<tr>
<td>Database password:</td>
<td>Enter your database password. The default is <strong>pin</strong>.</td>
</tr>
<tr>
<td><strong>Important:</strong> Make sure you enter the password for <strong>pin1</strong>, then <strong>pin2</strong>, and so on.</td>
<td></td>
</tr>
<tr>
<td>Oracle DM character set:</td>
<td>Enter the character set your database uses. BRM strongly recommends using the UTF8 character set. The default is <strong>UTF8</strong>.</td>
</tr>
<tr>
<td>Storage Model used for Oracle tablespaces:</td>
<td>Enter the desired size of your database. The default is <strong>Small</strong>.</td>
</tr>
<tr>
<td>(Oracle only)</td>
<td><strong>-</strong> Enter <strong>Test</strong> for test or demonstration databases smaller than 700 MB.</td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Small</strong> for demonstration databases smaller than 1.5 GB.</td>
<td></td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Medium</strong> for production databases smaller than 30 GB.</td>
<td></td>
</tr>
<tr>
<td><strong>-</strong> Enter <strong>Large</strong> for production databases larger than 30 GB.</td>
<td></td>
</tr>
<tr>
<td>Tablespace name for Tables:</td>
<td>Enter the name of your data tablespace. The default is <strong>pin00</strong>.</td>
</tr>
<tr>
<td>Tablespace name for Indexes:</td>
<td>Enter the name of your index tablespace. The default is <strong>pinx00</strong>.</td>
</tr>
</tbody>
</table>
Installing and Configuring Multiple Instances of BRM on One Machine

8. Go to the directory where you installed the BRM software and source the `source.me` file:
   Bash shell:
   
   ```bash
   source source.me.sh
   ```
   
   C shell:
   
   ```csh
   source source.me.csh
   ```

9. To further configure BRM, such as changing the default currency and country, edit the `BRM_Home/setup/pin_setup.values` file.

   This file stores the information you provided to the installer as well as a number of database and add-on component parameters.

### Table 15–1 (Cont.) Prompt Descriptions

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop the BRM tables?</td>
<td>Enter whether you want to drop the database tables. The default is No. If you select Yes, the installer drops all existing tables on your system. This results in irrecoverable loss of data. Do not use this unless you have backed up all of your existing data. If you select No, the installer uses your existing BRM tables. In test systems, select Yes to reinitialize the database.</td>
</tr>
</tbody>
</table>
| Partition tables? (Oracle only)             | Specify whether you want to enable partitioning. The default is No. Caution: To partition any tables, you need Oracle Partitioning. If you select Yes but don’t have Oracle Partitioning installed, the BRM setup program fails when it tries to create partitions. Important:  
   - If you select No and then change your mind after you’ve installed BRM, you will have to upgrade your BRM database from a nonpartitioned to a partitioned version before you can partition your tables.  
   - If you plan to use Rated Event (RE) Loader to load prerated events, you must partition your event tables.  
   - If you select Yes, you must configure `pin_setup` to set up any non-event partitions. Your event tables will be partitioned automatically. See "Editing the pin_setup.values File to Enable Partitioning for Non-Event Tables".  
   See "Partitioning Database Tables" in BRM System Administrator’s Guide. |
| Add 12 fixed (monthly) partitions to all event tables? (Oracle only) | This prompt is displayed only if you enter Yes to Partition event tables. Specify whether you want the installer to add 12 monthly partitions to your event tables.  
   - Enter Yes to have the installer add 12 monthly partitions, a historic partition, and a last partition to your event tables. See "About the Default Partitioning Scheme" in BRM System Administrator’s Guide.  
   - Enter No if you want the installer to add only a historic partition and a last partition to the tables. You can use this partitioning layout for a simple test or demonstration system. For a production system, however, you must add purgeable partitions after installation is complete and before the system generates events. |
| CM Port                                     | Enter the port number for the Connection Manager (CM). The default is 11960.                                                                                                                                |
Each instance of BRM is installed in the BRM_Home/pinN directory, where N represents the instance number. For example, the installation program copies BRM to the following directories when you install four instances of BRM in the default BRM directory, /opt/portal/7.4:

- /opt/portal/7.4/pin1
- /opt/portal/7.4/pin2
- /opt/portal/7.4/pin3
- /opt/portal/7.4/pin4

### Configuring Each BRM Instance

Follow these steps for each instance of BRM you want to install on your machine:

1. Log in as root and change the permissions for the BRM_Home/pinN directory and its contents from pin to pinN:

```bash
% su - root
# cd BRM_Home
# chown -R pin pinN
```

2. Edit the pin_setup file.
   a. Go to the BRM_Home/pinN/setup directory, change permissions for the pin_setup file, and then open the file in a text editor such as vi:

```bash
% cd BRM_Home/setup
% chmod 755 pin_setup
% vi pin_setup
```

   b. Edit the VERSION and PINUSER entries to include the pinN directory:

   ```
   VERSION = 7.4/pinN
   PINUSER = pinN
   ```

   c. Save and close the file.

3. Edit the pin_setup.values file.
   a. Go to the BRM_Home/pinN/setup directory and open the pin_setup.values file in a text editor such as vi:

```bash
% cd BRM_Home/setup
% vi pin_setup.values
```

   b. Modify all path references to include the pinN directory:

   ```
   $PIN_HOME = "/opt/portal/7.4/pinN"
   $PIN_LOG_DIR = "/var/portal/7.4/pinN"
   $PIN_TEMP_DIR = "/opt/portal/7.4/pinN/setup"
   ```

   c. Save and close the file.

4. Go to the BRM_Home/setup directory and run the pin_setup script:

```bash
% cd BRM_Home/setup
% ./pin_setup
```

5. Check the pin_setup.log file for status and errors.

6. Verify that BRM was installed and set up correctly by creating an account with Customer Center.

7. Repeat steps 1 through 6 for each instance of BRM you installed on your machine.
Reinitializing the Database

You can reinitialize the BRM database, including tables, indexes, and triggers, and return it to its original condition. You might do this, for example, to clean out a test database.

---

Caution: When you reinitialize a database, you completely remove existing data from the database. When the data is removed, you cannot restore it. Perform this task only if you are certain you won’t need to access any data in the database or you have backed up the data and have confirmed that you can restore it.

---

Reinitializing BRM Server and Optional Component Data

To reinitialize all BRM data, including data in your core BRM tables and optional component tables:

2. Edit the pin_setup.values file.
   a. Log in as pin, go to the BRM_Home/setup directory, and open the pin_setup.values file in a text editor such as vi:
      ```
      % su - pin
      % cd BRM_Home/setup
      % vi pin_setup.values
      ```
   b. Change the $SETUP_DROP_ALL_TABLES and $SETUP_INIT_DB entries to YES:
      ```
      $SETUP_DROP_ALL_TABLES = "YES";
      $SETUP_INIT_DB = "YES";
      ```
   c. Save and close the file.
3. Run the pin_setup script:
   ```
   % cd BRM_Home/setup
   % ./pin_setup
   ```
4. Drop the optional component tables from your database.
5. Using SQL*Plus, log in to your database as the SYSTEM user and execute the following command using the information in Table 15–2:
   ```
   SQL> @path/file_name
   ```

<table>
<thead>
<tr>
<th>Optional Component</th>
<th>Path</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_content_oracle.source</td>
</tr>
<tr>
<td>GPRS Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_gprs_oracle.source</td>
</tr>
<tr>
<td>GSM Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_service_order_oracle.source</td>
</tr>
<tr>
<td></td>
<td></td>
<td>drop_tables_settlement_oracle.source</td>
</tr>
<tr>
<td>Invoice Data Manager</td>
<td>BRM_Home/sys/dm_invoice/data</td>
<td>drop_tables.source</td>
</tr>
<tr>
<td>Number Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_num_oracle.source</td>
</tr>
</tbody>
</table>
6. Start all BRM processes.

   See “Starting and Stopping the BRM System” in *BRM System Administrator’s Guide*.

   All core BRM tables and optional component tables have been dropped from your system. You can start adding test accounts to your database and continue testing.

**Reinitializing Optional Component Data Only**

To reinitialize data from your optional component tables, but keep the data in your core BRM tables:

1. Stop the Connection Manager and Data Manager processes.

2. Enable writing of the data dictionary objects in your Oracle DM configuration file:

   a. Open your Oracle DM configuration file (*BRM_Home*/sys/dm_oracle/pin.conf).

   b. Make sure the following entries are set to 1:

      - `dm dd_write_enable_objects` 1
      - `dm dd_write_enable_fields` 1
      - `dm dd_write_enable_portal_objects` 1

   c. Save and close the file.

3. Stop and restart the CM and Oracle DM processes.
4. Delete the BRM data dictionary objects for each optional component.
   
   You can find the data dictionary objects for each component in the files listed in Table 15–3:

<table>
<thead>
<tr>
<th>Optional Component</th>
<th>Path and File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_content.source</td>
</tr>
<tr>
<td>GPRS Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_gprs.source</td>
</tr>
<tr>
<td>GSM Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_service_order.source</td>
</tr>
<tr>
<td></td>
<td>BRM_Home/sys/dd/data/dd_objects_telco_gsm.source</td>
</tr>
<tr>
<td></td>
<td>BRM_Home/sys/dd/data/dd_objects_settlement.source</td>
</tr>
<tr>
<td></td>
<td>BRM_Home/sys/dd/data/dd_objects_telco.source</td>
</tr>
<tr>
<td></td>
<td>BRM_Home/sys/dd/data/dd_objects_config_accountera.source</td>
</tr>
<tr>
<td>Invoice Data Manager</td>
<td>BRM_Home/sys/dm_invoice/data/dd_objects.source</td>
</tr>
<tr>
<td>Number Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_num.source</td>
</tr>
<tr>
<td>Rated Event Loader</td>
<td>BRM_Home/sys/dd/data/dd_objects_rel.source</td>
</tr>
<tr>
<td>Resource Reservation Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_reservation.source</td>
</tr>
<tr>
<td>SIM Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_sim.source</td>
</tr>
<tr>
<td>Taxware Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects.source</td>
</tr>
<tr>
<td>TelcoTax Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_telephony.source</td>
</tr>
<tr>
<td>Vertex Quantum Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_telephony.source</td>
</tr>
<tr>
<td>Vertex Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_telephony.source</td>
</tr>
<tr>
<td>SMS Settlement Reports</td>
<td>BRM_Home/sys/dd/data/dd_objects_sms_settle_report.source</td>
</tr>
<tr>
<td>Suspense Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_suspense.source</td>
</tr>
<tr>
<td>GSM AAA Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_gsm_aaa.source</td>
</tr>
<tr>
<td>Services Framework AAA Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_telco_aaa.source</td>
</tr>
<tr>
<td>IP Address Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_ip.source</td>
</tr>
<tr>
<td></td>
<td>BRM_Home/sys/dd/data/dd_objects_apn.source</td>
</tr>
<tr>
<td>Collections Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_collections.source</td>
</tr>
<tr>
<td>Conversion Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_cmt.source</td>
</tr>
<tr>
<td>Revenue Assurance Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_process_audit.source</td>
</tr>
<tr>
<td>GPRS AAA Manager</td>
<td>BRM_Home/sys/dd/data/dd_objects_telco_aaa.source</td>
</tr>
</tbody>
</table>

   a. Create an flist that contains the POID of the objects you want to delete.

   See "Understanding flists and Storable Classes" in BRM Developer’s Guide.

   b. Execute the PMC_OP_SDK_DEL_OBJ_SPECS opcode with the input flist you created.

   See "Executing Opcodes" in BRM Developer’s Guide.

5. Stop the CM and Oracle DM processes.

   See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.

6. Drop the optional component tables from your database.
7. Using SQL*Plus, log into your database as the SYSTEM user and execute the following command using the values in Table 15–4:

```
SQL> @path/file_name
```

<table>
<thead>
<tr>
<th>Optional Component</th>
<th>Path</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_content_oracle.source</td>
</tr>
<tr>
<td>GPRS Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_gprs_oracle.source</td>
</tr>
<tr>
<td>GSM Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_service_order_oracle.source drop_tables_settlement_oracle.source</td>
</tr>
<tr>
<td>Invoice Data Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables.source</td>
</tr>
<tr>
<td>Number Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_num_oracle.source</td>
</tr>
<tr>
<td>Rated Event Loader</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_rel_oracle.source</td>
</tr>
<tr>
<td>Resource Reservation Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_reservation_oracle.source</td>
</tr>
<tr>
<td>SIM Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_sim_oracle.source</td>
</tr>
<tr>
<td>Vertex Quantum Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_telephony_oracle.source</td>
</tr>
<tr>
<td>Vertex Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_telephony_oracle.source</td>
</tr>
<tr>
<td>SMS Settlement Reports</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_sms_settle_report_oracle.source</td>
</tr>
<tr>
<td>Services Framework AAA Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_telco_aaa_oracle.source</td>
</tr>
<tr>
<td>GSM AA Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_gsm_aaa_oracle.source</td>
</tr>
<tr>
<td>Suspense Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_suspend_oracle.source</td>
</tr>
<tr>
<td>Services Framework Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_telco_oracle.source drop_tables_config_accountera_oracle.source</td>
</tr>
<tr>
<td>IP Address Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_ip_oracle.source drop_tables_apn_oracle.source</td>
</tr>
<tr>
<td>Voucher Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_voucher_oracle.source</td>
</tr>
<tr>
<td>Collections Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_collections_oracle.source</td>
</tr>
<tr>
<td>Conversion Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_cmt_oracle.source</td>
</tr>
<tr>
<td>Revenue Assurance Manager</td>
<td>BRM_Home/sys/dd/data</td>
<td>drop_tables_process_audit_oracle.source</td>
</tr>
</tbody>
</table>

8. Restore the entries in your Oracle DM configuration file to their original value.
   a. Open your Oracle DM configuration file (BRM_Home/sys/dm_oracle/pin.conf).
   b. Return the following entries to their original value:
      - dm_dd_write_enable_objects 0
      - dm_dd_write_enable_fields 0
      - dm_dd_write_enable_portal_objects 0
   c. Save and close the file.
Removing BRM Data from the Database

Follow these steps to completely remove BRM data, including tables, indexes, and triggers, from the Oracle database:

**Caution:** When you remove the data, you cannot restore it. Perform this task only if you are certain you won’t need to access any data in the database or you have backed up the data and have confirmed that you can restore it.

1. Use SQL to connect to the database as the system user:

   ```
   % sqlplus system/manager@databaseAlias
   SQL>
   ```

2. Stop all BRM processes.

   See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.

3. Enter the following command, replacing `pin_user` with the user you created for BRM, such as `pin`:

   ```
   SQL> DROP USER pin_user CASCADE;
   ```

4. Log in to the database server as `pin_user`.

   If you receive an error indicating an invalid user name, the operation was successful.

9. Stop and restart the CM and Oracle DM processes.

   See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.

All optional component tables have been dropped from your system. You can start adding test accounts to your database and continue testing.
This chapter describes the tasks you perform to uninstall the Oracle Communications Billing and Revenue Management (BRM) software, the server application, and client applications from your computer.

For details on how to uninstall or reinstall Oracle, see the database vendor’s documentation for your platform.

Uninstalling the BRM Software

Uninstalling BRM requires three tasks:

1. Uninstalling Optional Components
2. Uninstalling BRM
3. Uninstalling BRM Client Applications

Uninstalling Optional Components

To uninstall optional components:

1. Back up the BRM database.
   See "Maintaining a BRM Database".
2. Stop all BRM daemons, processes, and managers.
   See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.
3. Log in as user pin.
4. Go to the directory where you installed the Third-Party package and source the source.me file:
   Bash shell:
   ```bash
   source source.me.sh
   ```
   C shell:
   ```csh
   source source.me.csh
   ```
5. Run the `BRM_Home/uninstaller/ProductName/uninstaller.bin` program, where `BRM_Home` is the directory in which you installed BRM.

**Note:** You can use the `-console` parameter to run the uninstallation in command-line mode.
6. Select the features you want to uninstall, and follow the interactive prompts.

---

**Note:** Optional components must be uninstalled before uninstalling BRM.

---

## Uninstalling BRM

To uninstall BRM:

1. Back up the BRM database.
   
   See "Maintaining a BRM Database".

2. Stop all BRM daemons, processes, and managers. See “Starting and Stopping the BRM System” in *[BRM System Administrator’s Guide]*.

3. Log in as user pin.

4. Go to the directory where you installed the Third-Party package and source the *source.me* file:
   
   **Bash shell:**
   
   
   `source source.me.sh`
   
   **C shell:**
   
   `source source.me.csh`

5. Run the `BRM_Home/uninstaller/Portal_Base/uninstaller.bin` program.

   ---

   **Note:** You can use the `-console` parameter to run the uninstallation in command-line mode.

6. Select the features you want to uninstall, and follow the interactive prompts.

---

## Uninstalling BRM Client Applications

This section describes how to uninstall BRM client applications on UNIX and Windows.

### Uninstalling UNIX Client Applications

To uninstall BRM client applications on UNIX, you need to manually delete the files from your computer.

### Uninstalling Windows Client Applications

To uninstall BRM client applications on Windows:

1. Back up the BRM database.
   
   See "Maintaining a BRM Database".

2. Go to the Start menu and choose **Programs - Portal - Uninstall ProductName**.

3. In the BRM Software Uninstallation tool window, select one of the following:
   
   - **View Products Only:** This shows a list of BRM products currently installed on your Windows machine.
■ **View Products and Components**: This expands each BRM product and its components. This is useful for uninstalling individual components.

4. Select the product or component you want to uninstall, and click **OK**.
This chapter provides reference information for Oracle Communications Billing and Revenue Management (BRM) installation utilities.
**pin_setup**

Use this utility to configure the Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager.

See "Running the pin_setup Utility".

---

**Note:** This utility does not access the BRM database, so it does not need a *pin.conf* file.

---

**Important:** Pipeline Configuration Manager is an optional component.

---

**Location**

Pipeline_home/bin

**Syntax**

```
pin_setup [-recover_last] [-runone step_name] [-h] [-notee]
```

**Parameters**

- `*recover_last*`
  Restarts the configuration. The configuration begins where it stopped.

  **Important:** This option recovers from the last point of failure. It does not roll back the changes made by the successful steps.

- `*runone step_name*`
  Runs the files from a single step directory.

- `*h*`
  Displays online help for the *pin_setup* utility.

- `*notee*`
  Turns off displaying the progress as the utility runs.

**Results**

The utility records results in two log files in the `Pipeline_home/setup/log` directory:

- `pin_setup.log`: All messages and output from the scripts that the utility runs.
- `steptracker.log`: Each step that has been processed.
uninstaller

Use this utility to uninstall the Oracle Business and Revenue Management (BRM) server software, client applications, and optional components from a single machine. If your BRM system is distributed among multiple machines, you must run the uninstaller utility on each machine.

This utility does not remove all BRM files and directories from your system or reverse changes made to your configuration files and database. For a list of files and directories that you must remove manually, see "Uninstalling Optional Components".

---

**Important:** To use the uninstaller on Solaris, you must first install the latest patch for your version of Solaris.

---

Location

`BRM_Home/uninstaller`

Syntax

```
uninstaller -log BRM_Home/uninstaller/uninst
[ + | - | = ] product product_name
[ + | - | = ] component component_name product_name
read text_file_name
```

Parameters

- `+` Registers the product or component to uninstall.
- `-` Points to the product or component to uninstall.
- `=` Verifies that the product or component is registered for uninstallation.

Commands

- `product product_name`
  Uninstalls the specified product. You can only uninstall one product at a time.

  The `Infranet.prod` file, located in the directory where you downloaded and extracted your BRM software, stores the names of all products installed on your system. `product_name` must match one of the names in this file.

  For example, to uninstall BRM, type:

  ```bash
  $ uninstaller -log BRM_Home/uninstaller/uninst -product Portal_Base
  ```

- `component component_name product_name`
  Uninstalls the specified component. You must specify the component name as well as the parent product.
The **comps** directory, located in the directory where you downloaded and extracted your BRM software, lists the names of all components installed on your system. *component_name* must match one of the file names, minus the extension, in this directory.

The **Infranet.prod** file, located in the directory where you downloaded and extracted your BRM software, stores the names of all products installed on your system. *product_name* must match one of the names in this file.

For example, to remove the Connection Manager (CM) only, type:

```
% uninstaller -log BRM_Home/uninstaller/uninst -component CM Portal_Base
```

- **read text_file_name**

  Reads the text file and performs any batch operations specified in the text file.

### Results

The **uninstaller** utility does not notify you whether it was successful or unsuccessful. You must look in your directory structure to see if your files were removed.
Part III describes how to install Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager. It contains the following chapters:

- Installing Pipeline Manager
- About Pipeline Configuration Manager
- Testing Pipeline Manager
This chapter describes how to install the Oracle Communications Billing and Revenue Management (BRM) Pipeline Manager.

You should be familiar with the following topics:

- Oracle database administration and commands.
- UNIX system administration and commands.
- The Pipeline Manager framework. See “Configuring Pipeline Manager” in *BRM System Administrator’s Guide*.
- How Pipeline Manager works. See "About Pipeline Rating" in *BRM Configuring Pipeline Rating and Discounting*.

**Installation Overview**

To install and configure Pipeline Manager, follow these steps in these sections:

1. Determining your System Requirements
2. Creating a User and Configuring Environment Variables
3. Setting the Maximum Allowed Number of Open Files
4. Installing Pipeline Manager
5. Installing Pipeline Manager
6. Installing Pipeline Configuration Manager
7. Installing Roaming Settlement Package
8. Increasing Heap Size to Avoid “Out of Memory” Error Messages
9. Configuring an Oracle Pipeline Manager Database
10. (Solaris) Configuring Memory Allocation and Block Transfer Mode on Solaris Systems

After you complete the installation, configure and test Pipeline Manager. See:

- About Pipeline Configuration Manager
- Testing Pipeline Manager

**Determining your System Requirements**

Before you install Pipeline Manager, ensure that requirements described in this section are met.
Determining your System Requirements

**Supported Platforms**

For information on supported platforms and required patches, see "BRM Software Compatibility".

**Hardware Requirements**

Pipeline Manager requires the following hardware listed in Table 18–1:

<table>
<thead>
<tr>
<th>Table 18–1 Pipeline Manager Required Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
</tr>
<tr>
<td><strong>RAM</strong></td>
</tr>
<tr>
<td><strong>Disk Type</strong></td>
</tr>
</tbody>
</table>

**Note:** The more pipelines you configure and the more CPUs you use, the more important it is to put input and output on systems that are managed by different Controllers.

**Third-Party Software Requirements**

Table 18–2 describes the required third-party software.

**Important:** These software components are not part of the Pipeline Manager package or license. You must obtain these products separately.

<table>
<thead>
<tr>
<th>Table 18–2 Pipeline Manager Required Third-Party Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline Manager Requirement</strong></td>
</tr>
<tr>
<td>Database server</td>
</tr>
<tr>
<td>Database client</td>
</tr>
<tr>
<td>GUI server</td>
</tr>
</tbody>
</table>
| Scripting |     - Perl 5.04+ for 64-bit  
          - The following CPAN Perl modules for 64-bit:  
          - File-Spec-0.88  
          - DBI  
          - DBD-Oracle  
          - DBD-DB2  
          - ParseLex  
          - ParseTemplate  
          - Curses  
          **Note:** The Perl files required for scripting is installed with the BRM Third-Party package. |
| BRM Third-Party package | Perl libraries and JRE |
Creating a User and Configuring Environment Variables

Follow these steps to create a Pipeline Manager user and set up system environment variables on a system:

1. Create a user that owns the Pipeline Manager software. The examples in this document use the default user integrate with the bash shell as the default shell.

   Note: You must create a Pipeline Manager user and set the user’s environment before installing Pipeline Manager.

2. Log in as user integrate.

3. Go to the Pipeline_home directory, where Pipeline_home is the directory in which you installed Pipeline Manager.

   Note: The default Pipeline_home directory is /opt/ifw.

4. Open the source.me.sh file for your shell in a text editor.

   Note: The source.me file is for a bash shell. If you use a C shell, open the source.me.csh file.

5. Set the following environment variables for Pipeline Manager using the information in Table 18–3:

   Table 18–2 (Cont.) Pipeline Manager Required Third-Party Components

<table>
<thead>
<tr>
<th>Pipeline Manager Requirement</th>
<th>Third-Party Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline Manager Tools</td>
<td>CPAN generic Perl database interface</td>
</tr>
</tbody>
</table>
### Table 18–3  Pipeline Manager Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Description</th>
</tr>
</thead>
</table>
| IFW_EVENTHANDLER_PORT                | The port number on which the event handler daemon listens for events.  
**Important:**  
- If you are starting more than one framework process, change the value of this parameter before starting each process. Each process must have a unique event handler port for all users on a host. A framework process won’t start if it cannot start the event handler daemon, and the event handler daemon won’t start if it cannot listen on the specified port.  
- Don’t set this variable to a well-known port number, such as port 11960 used by BRM. |
| INTEGRATE_HOME                       | The directory where the Pipeline Manager software is installed.  
**Note:** This documentation refers to this directory as the Pipeline_home.                                                                                                                                                                                                  |
| LD_LIBRARY_PATH_64                   | The library path.  
**Set this to include Pipeline_home/lib.**  
If your system already has this variable set to another value for other applications, Pipeline Manager might not find the proper 64-bit libraries.  
To determine if a pre-existing value is present, enter the following command:  
`echo $LD_LIBRARY_PATH_64`  
If the variable is already set in your system, add the new variable as follows:  
`export LD_LIBRARY_PATH_64=${LD_LIBRARY_PATH_64}; Pipeline_home/lib`  
**C shell:**  
`setenv LD_LIBRARY_PATH_64 ${LD_LIBRARY_PATH_64}; Pipeline_home/lib`  
**AIX**  
**LD_PRELOAD_64**                     | A variable that can be used to configure libumem memory allocation. Set using the ifw-start script. See “libumem Memory Allocator”.                                                                                                                                                                                                 |
| MALLOCTYPE                           | On AIX Pipeline Manager platforms, modify the MALLOCTYPE, MALLOCOPTIONS, and LDR_CNTRL environment variables with these values:  
  - MALLOCTYPE = buckets  
  - MALLOCOPTIONS = number_of_buckets:64,buckets,multiheap:16  
  - LDR_CNTRL = “TEXTPSIZE=4K:STACKPSIZE=64K:DATAPSIZE=64K”  
For more information on these variables, see the IBM documentation Web site ([http://www.ibm.com/support/publications/us/library](http://www.ibm.com/support/publications/us/library)). |
| MALLOC_TRIM_THRESHOLD_               | On Linux Pipeline Manager platforms, modify the MALLOC_TRIM_THRESHOLD_, MALLOC_MMAP_MAX_, and MALLOC_TOP_PAD_ environment variables with these values:  
  - MALLOC_TRIM_THRESHOLD_ = -1  
  - MALLOC_MMAP_MAX_ = 0  
  - MALLOC_TOP_PAD_ = 268435456  
For more information on these variables, see the Linux documentation Web site ([http://www.linux.com/learn/docs](http://www.linux.com/learn/docs)). |
| MALLOC_MMAP_MAX_                     |                                                                                                                                  |
| MALLOC_TOP_PAD_                      |                                                                                                                                  |
### Setting the Maximum Allowed Number of Open Files

To avoid causing a failure of Pipeline Manager, you must configure the maximum number of pipeline files allowed per process in the kernel. The recommended value is 2048. You should also set the maximum number of open files allowed for the system to 20480 (ten times the number of files per process).

To modify the number of open files allowed:

- **(Linux) Setting Maximum Open Files on Linux**
- **(Solaris) Setting Maximum Open Files on Solaris**
- **(HP-UX IA64) Setting Maximum Open Files on HP-UX IA64**
- **(AIX) Setting Maximum Open Files on AIX**

### (Linux) Setting Maximum Open Files on Linux

To set the maximum open files on Linux:

1. Log on as `root`.
2. Open the system file (`/etc/sysctl.conf`).
3. Add the following lines to the end of the file, or modify the values if these lines are already present:

   ```bash
   # sets the hard limit on file descriptors:
   _M_ARENA_OPTS
   _M_CACHE
   PTHREAD_SCOPE_SYSTEM
   (HP-UX only)
   ``

### Table 18–3 (Cont.) Pipeline Manager Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_M_ARENA_OPTS</td>
<td>On HP-UX IA64 Pipeline Manager platforms, modify the _M_ARENA_OPTS, _M_CACHE_OPTS, and PTHREAD_SCOPE_SYSTEM environment variables with these values:</td>
</tr>
<tr>
<td>_M_CACHE_OPTS = 32:4</td>
<td></td>
</tr>
<tr>
<td>_M_CACHE_OPTS = 40:12:1</td>
<td></td>
</tr>
<tr>
<td>PTHREAD_SCOPE_SYSTEM = 1</td>
<td></td>
</tr>
<tr>
<td><strong>Important</strong>: To achieve acceptable system performance:</td>
<td></td>
</tr>
<tr>
<td>- You must set the _M_CACHE_OPTS environment variable.</td>
<td></td>
</tr>
<tr>
<td>- Do not set the _M_SBA_OPTS environment variable.</td>
<td></td>
</tr>
<tr>
<td>For more information on these variables, see the Hewlett-Packard documentation Web site (<a href="http://docs.hp.com/index.html">http://docs.hp.com/index.html</a>).</td>
<td></td>
</tr>
<tr>
<td>NLS_LANG</td>
<td>Set this to LANG American_America.UTF8. <strong>Important</strong>: You must use American_America as the language and territory, regardless of your locale, and the UTF8 character set.</td>
</tr>
<tr>
<td>PATH</td>
<td>The Pipeline Manager executable path. Set this to include <code>Pipeline_home/bin</code>.</td>
</tr>
<tr>
<td>SHLIB_PATH</td>
<td>The library path. Set this to include <code>Pipeline_home/lib</code>.</td>
</tr>
</tbody>
</table>

6. Save and close the `source.me.sh` file.
7. Update the environment for the current shell session:

   ```bash
   source source.me.sh
   ```

---

### Setting the Maximum Allowed Number of Open Files

To avoid causing a failure of Pipeline Manager, you must configure the maximum number of pipeline files allowed per process in the kernel. The recommended value is 2048. You should also set the maximum number of open files allowed for the system to 20480 (ten times the number of files per process).

To modify the number of open files allowed:

- **(Linux) Setting Maximum Open Files on Linux**
- **(Solaris) Setting Maximum Open Files on Solaris**
- **(HP-UX IA64) Setting Maximum Open Files on HP-UX IA64**
- **(AIX) Setting Maximum Open Files on AIX**

### (Linux) Setting Maximum Open Files on Linux

To set the maximum open files on Linux:

1. Log on as `root`.
2. Open the system file (`/etc/sysctl.conf`).
3. Add the following lines to the end of the file, or modify the values if these lines are already present:

   ```bash
   # sets the hard limit on file descriptors:
   ```
fs.file-max = 2605192

4. Run `sysctl -p` to reload all the settings from the system file.

**(Solaris) Setting Maximum Open Files on Solaris**

To set the maximum open files on Solaris:

1. Log on as `root`.
2. Open the system file (`/etc/system`).
3. Add the following lines to the end of the file, or modify the values if these lines are already present:
   * sets the hard limit on file descriptors:
   ```
   set rlim_fd_max = 20480
   ```
   * sets the soft limit on file descriptors:
   ```
   set rlim_fd_cur = 2048
   ```
4. Restart your computer to enable the new kernel parameters.

**(HP-UX IA64) Setting Maximum Open Files on HP-UX IA64**

To set the maximum open files on HP-UX IA64:

1. Log on as `root`.
2. Enter the command to start the System Administration Manager (SAM) program. For example:
   ```
   /usr/bin/sam
   ```
3. Double-click the Kernel Configuration icon.
4. Double-click the `Configurable Parameters` icon.
5. Double-click the `maxfiles` parameter and enter **2048** in the `Formula/Value` field.
6. Double-click the `nfiles` parameter and enter **20480** in the `Formula/Value` field.
7. Click `OK`.
8. Select `Actions - Process New Kernel` from the menu bar.
9. Restart your computer to enable the new kernel parameters.

**(AIX) Setting Maximum Open Files on AIX**

To set the maximum open files on AIX:

1. Log on as `root`.
2. Open the limits file (`/etc/security/limits`).
3. Add the following lines to the end of the file, or modify the values if these lines are already present:
   * sets the hard limit on file descriptors:
   ```
   nofiles_hard = 20480
   ```
   * sets the soft limit on file descriptors:
   ```
   nofiles = 2048
   ```
4. Restart any application in a new user session to begin using the new kernel parameters.
Installing Pipeline Manager

This section describes how to install and uninstall Pipeline Manager.

Important: If you are installing Pipeline Manager to replace an identical release (for example, to restore a clean version of the package), you must first uninstall the existing installation. See "Uninstalling Pipeline Manager".

To install Pipeline Manager:

1. Install the Third-Party software package or set the PORTAL_JRE environment variable:
   - If the Third-Party software package isn’t installed already, install it.
     See "Installing the Third-Party Software".
   - If the Third-Party software package is already installed, set the PORTAL_JRE environment variable to the path to the JRE directory.

2. Go to the directory where you installed the Third-Party package and source the source.me:

   source source.me.sh

   C shell:

   source source.me.csh

3. Download the Pipeline Manager package to a temporary directory (temp_dir).
   See “Downloading the BRM Applications Media Pack”.

Important: You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

4. Go to the temp_dir, uncompress the file and enter this command:

   7.4_Pipeline_platform_64_opt.bin

Note: To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the patch. To ensure a command line installation starts, use the -console parameter.

5. Follow the instructions displayed during installation.

Note: If you do not specify the installation directory, Pipeline Manager is installed in the /opt/ifw directory.
Installing Pipeline Manager

Configuring the Registry File for Linux and AIX

If you installed Pipeline Manager on a Linux or AIX operating system, you must change the registry file’s AccessLib entry to point to the correct database library.

To configure the registry file for Linux or AIX:

1. Open your system’s registry file in a text editor.
2. Change all AccessLib entries to oci10g63. For example:
   
   ```
   AccessLib = oci10g63
   ```

   **Note:** By default, the AccessLib entry is set to oci61.

3. Save and close the file.

Uninstalling Pipeline Manager

To uninstall Pipeline Manager:

1. Run the uninstaller.bin program from Pipeline_home/uninstaller/Pipeline.
2. Delete the Pipeline_home/uninstaller directory and its contents.

Pipeline Manager Directory Structure

Installation creates the following directory structure shown in Table 18–4:

**Important:** If you are also using AAA Gateway Manager, make sure you install Pipeline Manager in the same directory as the AAA Gateway Manager.

**Note:** Pipeline_home is the Pipeline Manager installation directory, /opt/ifw.

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline_home/bin/</td>
<td>Server binaries, such as the main Pipeline Manager binary ifw.</td>
</tr>
<tr>
<td>Pipeline_home/database/</td>
<td>Database creation scripts and database documentation.</td>
</tr>
<tr>
<td>Pipeline_home/etc/</td>
<td>Error messages. <strong>Note:</strong> You can copy the error messages to another directory and customize them; for example, as preparation for translation into other languages.</td>
</tr>
<tr>
<td>Pipeline_home/formatDesc/</td>
<td>External file format definitions and internal container definitions.</td>
</tr>
<tr>
<td>Pipeline_home/info/</td>
<td>Info registry, which shows the current system status.</td>
</tr>
<tr>
<td>Pipeline_home/ScriptLib/</td>
<td>iScript libraries.</td>
</tr>
<tr>
<td>Pipeline_home/lib/</td>
<td>Shared libraries.</td>
</tr>
<tr>
<td>Pipeline_home/log/</td>
<td>Process log.</td>
</tr>
</tbody>
</table>
Installing Pipeline Configuration Manager

This section describes how to install Pipeline Configuration Manager.

For information about Pipeline Configuration Manager, see "About Pipeline Configuration Manager".

---

**Note:** Pipeline Configuration Manager is available for the HP-UX IA64, Linux, AIX, and Solaris operating systems.

---

**Important:** If you are installing Pipeline Configuration Manager to replace an identical release (for example, to restore a clean version of the package), you must first uninstall the existing installation. See "Uninstalling Pipeline Configuration Manager".

---

Before installing Pipeline Configuration Manager, you must install:

- BRM.
  See "Installing BRM".
- Pipeline Manager.
  See "Installing Pipeline Manager".

To install Pipeline Configuration Manager:

1. If the Third-Party software package isn’t installed already, install it.
   See "Installing the Third-Party Software".
2. Go to the directory where you installed the Third-Party package and source the `source.me`:

   ```
   source source.me.sh
   ```
   C shell:

   ```
   source source.me.csh
   ```
3. Download the software to a temporary directory (`temp_dir`).

---

**Important:** You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages".
4. Go to temp_dir and enter the following command:

```
7.4_Pipeline_ConfMgr_platform_64_opt.bin
```

**Note:** You can use the `-console` parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

5. Follow the instructions displayed during installation.

**Note:** If you don’t specify an installation directory, Pipeline Configuration Manager is installed in the /opt/ifw directory.

---

**Uninstalling Pipeline Configuration Manager**

To uninstall Pipeline Configuration Manager, run the `uninstaller.bin` program from `Pipeline_home/uninstaller/Pipeline_ConfMgr`.

---

**Installing Roaming Settlement Package**

This section describes how to install Roaming Settlement Package.

For information about managing settlement for roaming charges, see "About Managing Settlement for Interconnect Charges" in *BRM Configuring Roaming in Pipeline Manager*.

The hardware and software requirements for Roaming Settlement Package are the same as for Pipeline Manager. For more information, see "Installing Pipeline Manager". In addition to this, install BRM before proceeding.

The Roaming Settlement Package includes the utility and template files for extracting settlement data from the pipeline database and loading it into the BRM database. It also includes the files needed to load SMS settlement data, which is used to generate SMS settlement reports. For information about SMS settlement reports, see "About Generating SMS Usage Reports" in *BRM Configuring Roaming in Pipeline Manager*.

To install Roaming Settlement Package, see "Installing Roaming Settlement Package".

---

**Installing Roaming Settlement Package**

**Note:** If you have already installed the feature, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

1. Download the software to a temporary directory (temp_dir).
Installing Roaming Settlement Package

Important:

- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.
- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file.

For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages”.

2. Go to the directory where you installed the Third-Party package and source the source.me file.

Caution: You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.

Bash shell:

source source.me.sh

C shell:

source source.me.csh

3. Go to the temp_dir directory and enter this command:

7.4_SMSSettlement_Reports_platform_32_opt.bin

Note: You can use the -console parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

4. When prompted, enter the directory where you want to install the roaming settlements package.

The default directory is opt/portal/7.4.

The installation program installs the package files in the specified directory.

5. Go to the directory where you installed the roaming settlements package and source the source.me file:

Bash shell:

source source.me.sh

C shell:

source source.me.csh

6. Go to the BRM_Home/setup directory and run the pin_setup script.

Your Roaming Settlement Package installation is now complete.
Increasing Heap Size to Avoid “Out of Memory” Error Messages

To avoid "Out of Memory" error messages in the log file after installation, increase the maximum heap size used by the Java Virtual Machine (JVM). The exact amount varies greatly with your needs and system resources. By default, the JVM used has a maximum heap size of 60 MB. Increase the maximum heap size to 120 MB by entering the following sample code in a text editor:

```
%IF_EXISTS%("INIT_JAVA_HEAP", "@INIT_JAVA_HEAP@20m") %IF_EXISTS%("MAX_JAVA_HEAP", "@MAX_JAVA_HEAP@120m")
```

where 20m and 120m indicate the minimum and maximum heap sizes respectively.

Save the file as `Packagename.ja` in the temporary directory (`temp_dir`) to which you downloaded the installation software.

`Packagename` indicates the name of the installation software. For example, if you downloaded the `7.4_Pipeline_solaris_64_opt.bin` file on Solaris then, save the file as `7.4_Pipeline_solaris_64_opt.ja`.

Configuring an Oracle Pipeline Manager Database

This section describes how to configure the Pipeline Manager database on Oracle.

Before proceeding, you should be familiar with executing database scripts.

Before setting up the Oracle database for Pipeline Manager, make sure that:

- An Oracle database instance is mounted and open.
- You have administrator access to the database instance.

To install and configure the Pipeline Manager database, follow the steps in these sections:

1. **Setting the Environment for the Pipeline Manager Database**
2. **Setting Up the Oracle JSA Database Schema**
3. **Setting Up the Oracle Pipeline Manager Framework Database Schema**
4. **Loading Procedures for FCT_DuplicateCheck**
5. **Encrypting the Database Password**
6. **(Solaris) Configuring Memory Allocation and Block Transfer Mode on Solaris Systems**
7. **Loading the Tailor-Made Stored Procedure**
8. **Loading the Discount Stored Procedure**

Setting the Environment for the Pipeline Manager Database

Before setting up the database schemas for your Oracle Pipeline Manager database, you must configure database environment variables.

1. Open the configuration file for the login shell. This is the file in which your user profile is stored; for example, `.profile` or `.bashrc`. By default it is stored in your home directory.
2. Change the following variables shown in Table 18–5 to match your Pipeline Manager environment:
Configuring an Oracle Pipeline Manager Database

Installing Pipeline Manager

3. Save and close the file.

Setting Up the Oracle JSA Database Schema

This section describes how to run scripts to set up the Oracle JSA database schema.

Run the scripts described in the following steps to set up the database schema for the JSA tables and tablespaces:

### Table 18–5  Pipeline Manager Environment Variables

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORACLE_HOME</td>
<td>Include or set this variable to point to the Oracle installation path.</td>
</tr>
<tr>
<td>LD_LIBRARY_PATH</td>
<td>(32-bit systems) Include or set entries to point to the database /lib directories. Example for Oracle databases: LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$ORACLE_HOME/lib32:$ORACLE_HOME/rdbms/lib32</td>
</tr>
<tr>
<td>LD_LIBRARY_PATH_64</td>
<td>(64-bit systems) Include or set entries to point to the database /lib directories. Example for Oracle databases: LD_LIBRARY_PATH_64=$IFW_HOME/lib:$ORACLE_HOME/lib:$ORACLE_HOME/rdbms/lib</td>
</tr>
<tr>
<td>PATH</td>
<td>Include or set entries to point to the database /bin directory. Example for Oracle databases: $(ORACLE_HOME)/bin</td>
</tr>
</tbody>
</table>

Note: All scripts are located in the Pipeline_home/database/Oracle/Scripts directory.

1. Open the JSA_Tablespaces.sql file with a text editor.
2. Replace all occurrences of the string *** with the path to the Oracle tablespace data file.
3. Save the file.
4. Log in as user database administration (DBA).
5. Run the JSA_Tablespaces.sql script.
   This script creates the tablespaces for the JSA server.
6. Run the JSA_Roles.sql script.
   This script creates roles and the default JSA user.
7. Log out and log in as user JSA.
8. Run the JSA_Create.sql script.
   This script creates the JSA tables.
9. Run the JSA_Synonyms.sql script.
   This script creates the JSA public synonyms.
10. Run the JSA_Prepare.sql script.
This script inserts some default values into the tables. The Oracle JSQ database schema is now set up.

Setting Up the Oracle Pipeline Manager Framework Database Schema

To set up the database schema for the Pipeline Manager framework work tables and tablespaces:

1. Open the `ifw_Tablespaces.sql` file with a text editor.
2. Replace the occurrences of the string ORA_DAT_PATH and ORA_IDX_PATH with the path that leads to the *.dbf files shown in the script file.
3. Save the file.
4. Log in as user DBA.
5. Run the `ifw_Tablespaces.sql` script.
   This script creates the tablespaces for the Pipeline Manager framework.
6. (Optional) Change the default Pipeline Manager user name (pipeline_user) from integrate to another name:
   a. Open the `ifw_Roles.sql` file by using a text editor.
   b. In the User: INTEGRATE section, replace the two occurrences of INTEGRATE in the following string with the new default user name:
      
      `INTEGRATE` identified by `INTEGRATE`

   c. In the GRANT commands that follows the QUOTA commands in the User: INTEGRATE section, replace all occurrences of INTEGRATE with the new default user name.
   d. Save the file.
7. Run the `ifw_Roles.sql` script.
   This script creates the appropriate roles and the default user.
8. Log out and log in as pipeline_user.
9. Run the `ifw_Create.sql` script.
   This script creates the Pipeline Manager framework tables.
10. Run the `ifw_Synonyms.sql` script.
    This script creates the public synonyms.

The Oracle Pipeline Manager framework database schema is now set up.

You can create only one instance of the pipeline schema in a particular database. You can create multiple users and give permission to access the same tables. Creating multiple instances lead to public synonym conflict.

To avoid public synonym conflicts in a multi-user environment, change the public synonyms to private synonyms for specific users. See "Changing Public Synonyms to Private Synonyms for a User in a Multi-user Environment" for more information.
For example, if you create table1 for user1, you can create user2 and assign permissions to access table1. Typically, you access the table as user1.table1. However, using synonyms, you can directly access the table as table1. No prefix (user1) is required.

**Changing Public Synonyms to Private Synonyms for a User in a Multi-user Environment**

Changing public synonyms to private synonyms for a user is required for avoiding public synonym conflict in a multi-user environment.

---

**Note:** All scripts are located in the Pipeline_home/database/Oracle/Scripts directory

---

To change public synonyms to private synonyms for a user:

1. Connect to the Oracle database with SQL*Plus:

   ```
   % sqlplus system/manager@databaseAlias
   
   where databaseAlias is the database alias of the Oracle database.
   ```

2. Drop the public synonyms for IFW tables for the user.

3. Grant CREATE ANY synonym access to the user you created for the Pipeline Manager tables. For example:

   ```
   SQL>CREATE ROLE synonym_role;
   SQL>GRANT CREATE ANY SYNONYM TO synonym_role;
   SQL>GRANT synonym_role TO pin_user;
   
   where pin_user is the BRM user.
   ```

4. Open the ifw_Synonyms.sql file with a text editor.

5. Remove the occurrences of the string public and add the Pipeline Manager database user. For example, for ifw_SEQ_AGGREGATION table, change the string to:

   ```
   create synonym ifw_SEQ_AGGREGATION for ifw_user.ifw_SEQ_AGGREGATION;
   
   where ifw_user is the is the Pipeline Manager database user.
   ```

6. Save the file.

7. Run the ifw_Synonyms.sql script.

   This script creates the private synonyms for the user.

8. Exit SQL*Plus.

   The public synonyms are now changed to private synonyms for the user.

**Loading Procedures for FCT_DuplicateCheck**

Before using the FCT_DuplicateCheck module, you need to load the duplicate check stored procedures in the Pipeline Manager database:

1. Load the DuplicateCheck_Oracle.plb file from Pipeline_home/database/Oracle/Scripts/DuplicateCheck.
2. Verify that there is an unique index BIDX_DUPCHK_DATA on the DATA column of the IFW_DUPLICATECHECK table. If not, then create it before starting Pipeline Manager.

The duplicate check stored procedures are now loaded.

**Encrypting the Database Password**

If your database is encrypted with the MD5 format, use the `pin_crypt_upgrade` utility to migrate your data to the AES encryption scheme, and then use the `pin_crypt_app` utility to encrypt the Pipeline Manager password. For information about these utilities, see "pin_crypt_app" and "pin_crypt_upgrade" in BRM Developer’s Guide.

For information on updating your encryption scheme, see "Migrating Data from MD5 to AES Encryption" in BRM Developer’s Guide.

For information on encryption, see "About Encrypting Information" in BRM Developer’s Guide.

1. Go to the `BRM_Home/bin` directory.
2. Run the `pin_crypt_app` utility with the `enc` parameter, and specify the plaintext password:

   ```
   pin_crypt_app -enc Plaintext_password
   ```

   The output is the AES tag followed by a vertical bar and the encrypted password. For example:

   ```
   &aes|0D5E11BFDD97D2769D9B0DBFBDB1BBF7EE03F1642861DFA57502C7FB85A654267
   ```

3. Write down the encrypted password or copy it to a text editor.
4. Open the Pipeline Manager startup registry file.
5. In the DataPool section, enter the user name, encrypted password, and database name.

   For example:

   ```
   UserName = INTEGRATOR
   PassWord = &aes|0D5E11BFDD97D2769D9B0DBFBDB1BBF7EE03F1642861DFA57502C7FB85A654267
   DatabaseName = IFWDB
   ```

   **Important:** Be sure that these lines are uncommented. (The default is commented.)

6. Save the registry file.

**Solaris) Configuring Memory Allocation and Block Transfer Mode on Solaris Systems**

If you are running Pipeline Manager on the Solaris platform, you should configure:

- `libumem Memory Allocator`
- `Block Transfer Mode`
libumem Memory Allocator

By default, the Hoard memory allocator is used on Solaris systems. If you are running Pipeline Manager on Solaris 9, you might achieve better performance by using the libumem memory allocator.

To enable the libumem memory allocator, edit the ifw-script file (ifw-start.sh or ifw-start.csh, depending on your system needs) to set the LD_PRELOAD_64 environment variable to /usr/lib/sparcv9/libumem.so.1 and to change the executable from ifw to ifw_nomalloc as shown in the following examples:

For the ifw-start.sh file, change:

```bash
./opt/ifw/source.me.sh
ifw $*
```

To the following:

```bash
export LD_PRELOAD_64=/usr/lib/sparcv9/libumem.so.1
./opt/ifw/source.me.sh
ifw_nomalloc $*
```

For the ifw-start.csh file, change:

```bash
source /opt/ifw/source.me.csh
ifw $*
```

To the following:

```bash
setenv LD_PRELOAD_64=usr/lib/sparcv9/libumem.so.1
source /opt/ifw/source.me.csh
ifw_nomalloc $*
```

Block Transfer Mode

On Solaris systems, you should set up Pipeline Manager buffers to function in block transfer mode. This mode addresses performance and scalability issues that occur when two or more threads are accessing the same buffer (thread contention).

When buffers operate in block transfer mode, EDR blocks of a configurable size are transferred simultaneously between the threads. If, for example, the block size is set to 100, concurrent buffer access is reduced to 1/100 of the number without the block transfer mode.

Specifying Block Transfer Mode and Block Size

To specify block transfer mode and block size, use the following example in the system registry:

```plaintext
Buffer
{
    Size = 4000
    BlockTransfer = TRUE    # Optional, defaults to FALSE
    BlockSize = 500         # Only needed when BlockTransfer = TRUE
}
```

This example specifies a buffer size of 4000 and a block size of 500. Up to eight (4000/500) blocks can be in the buffer.

Loading the Tailor-Made Stored Procedure

Loading of the stored procedure is required for the Tailor-Made Plan feature.
The following are the requirements to load the tailor-made stored procedure:

- BRM and Pipeline Manager should be installed.
- The BRM schema and the Pipeline Manager schema should reside on the same database.

To load the stored procedure, do the following:

1. Connect to the Oracle database with SQL*Plus:
   ```
   % sqlplus system/manager@databaseAlias
   ``

2. Grant access of pipeline schema to user pin by doing the following:
   a. Run the SQL grant select, update, insert, delete commands on the Pipeline Manager tables.
      For example, for the ifw_rateplan table, run the following command:
      ```sql
      grant select, update, insert, delete on ifw_rateplan to pin;
      ``
      Run this command on the following tables:
      - ifw_rateplan
      - ifw_rateplan_cnf
      - ifw_rateplan_ver
      - ifw_model_selector
      - ifw_selector_detail
      - ifw_selector_rule
      - ifw_selector_rule_lnk
      - ifw_selector_ruleset
      - ifw_pricemodel
      - ifw_pricemdl_step
   b. Run the SQL grant select commands on the Pipeline Manager tables mentioned below.
      For example, for the ifw_service table, run the following command:
      ```sql
      grant select on ifw_service to pin;
      ``
      Run this command on the following tables:
      - ifw_service
      - ifw_timezone
      - ifw_timemodel
      - ifw_impact_cat
      - ifw_zonemodel
      - ifw_calendar
   c. Run the SQL grant select commands on the Pipeline Manager sequences.
      For example, for the ifw_seq_selectordetail sequence, run the following command:
      ```sql
      grant select ifw_seq_selectordetail to pin;
      ```
Run this command on the following tables:
- ifw_seq_selectordetail
- ifw_seq_selectorrule
- ifw_seq_modelselector
- ifw_seq_pricemodel
- ifw_seq_rateplan

3. Type `exit` to exit SQL*Plus.

4. Go to the `ifw/database/Oracle/Scripts` directory.

5. Enter the following command to open SQL*Plus:

   ```sql
   sqlplus pin/pin@database_Name
   ```

   where `database_Name` is the service name or database alias of the Oracle database.

6. Enter the following command to load the stored procedure:

   ```sql
   SQL> @create_pricing_tailormadeplan_procedures.plb
   ```

7. Type `exit` to exit SQL*Plus.

### Loading the Discount Stored Procedure

Loading of the stored procedure is required for discount configuration.

The following are the requirements to load the discount stored procedure:
- BRM and Pipeline Manager should be installed.
- The BRM schema and the Pipeline Manager schema should reside on the same database.

To load the stored procedure, do the following:

1. Connect to the Oracle database with SQL*Plus:

   ```bash
   % sqlplus system/manager@databaseAlias
   ```

2. Grant access of pipeline schema to user `pin` by doing the following:

   a. Run the SQL grant select, update, insert, delete commands on the Pipeline Manager tables.

   For example, for the `ifw_discountmodel` table, run the following command:

   ```sql
   SQL> grant select, update, insert, delete on ifw_discountmodel to pin;
   ```

   Run this command on the following tables:
   - ifw_discountmodel
   - ifw_dscmdl_ver
   - ifw_dscmdl_cnf
   - ifw_dsctrigger
   - ifw_dsccondition
   - ifw_discountrule
b. Run the SQL grant select commands on the Pipeline Manager sequences. For example, for the ifw_seq_discountmodel sequence, run the following command:

```sql
SQL> grant select ifw_seq_discountmodel to pin;
```

Run this command on the following tables:
- ifw_seq_discountmodel
- ifw_seq_discountconfig
- ifw_seq_discounttrigger
- ifw_seq_discountcondition
- ifw_seq_discountrule
- ifw_seq_discountstep
- ifw_seq_discountbalimpact
- ifw_seq_discountmaster

3. Type `exit` to exit SQL*Plus.

4. Go to the `ifw/database/Oracle/Scripts` directory.

5. Enter this command to open SQL*Plus:

```
sqlplus pin/pin@database_Name
```

Where `database_Name` is the service name or database alias of the Oracle database.

6. Enter this command to load the stored procedure:

```sql
SQL>@create_pricing_discountmodel_procedures.plb
```

7. Type `exit` to exit SQL*Plus.

**What’s Next?**

See "About Pipeline Configuration Manager".
About Pipeline Configuration Manager

This chapter describes how to use Pipeline Configuration Manager to configure Pipeline Manager.

Before you read this chapter, read "Installing Pipeline Manager".

---

**Note:** To install Pipeline Configuration Manager, see "Installing Pipeline Configuration Manager".

---

**About Using Pipeline Configuration Manager**

You can use Pipeline Configuration Manager to configure pipelines and load sample data into the Pipeline Manager database.

---

**Important:** Pipeline Configuration Manager is an optional feature that requires a separate license.

---

Pipeline Configuration Manager includes the **pin_setup** utility and a set of configuration scripts. The **pin_setup** utility:

- Configures the Pipeline Manager registry files.
- Creates Pipeline Manager database tables and loads sample data into them.
- Installs a set of scripts that you can use to execute various actions, such as starting and stopping a pipeline.

---

**Important:** One of the scripts (**01copypipelinefiles**) removes existing Pipeline Manager configuration files. You should back up your existing Pipeline Manager configuration files before running the **pin_setup** utility.

---

**Note:** The **pin_setup** utility creates a reorganized directory structure for the Pipeline Manager configuration files.

---

By default, the **pin_setup** utility configures a standard set of pipelines that you can use to test your installation, but you can customize the way **pin_setup** configures Pipeline Manager by configuring:

- The **pin_setup.values** file.
Using Pipeline Configuration Manager to Configure Pipeline Manager

See “Setting Up Basic Configuration Data”.

■ The setup scripts used by the pin_setup utility.
  See “Specifying Script Execution Order”.
■ The EDR container description file.
■ Input and output mapping files.

Note: For the default Pipeline Manager configuration created by the pin_setup utility, see “About the Default Pipeline Manager Configuration”.

Important: When you upgrade, you must manually merge your customizations with the new versions of these files. Upgrading is easier if you keep a record of the changes you make to the files.

Tip: You can create scripts to implement your customizations, which can be run during an upgrade.

After you run the pin_setup utility, you can further customize your Pipeline Manager configuration. In most cases, you don’t need to. You should make as many customizations as possible to the configuration scripts and files so the configuration can be easily copied to another system.

Using Pipeline Configuration Manager to Configure Pipeline Manager

To configure Pipeline Manager by using the pin_setup utility, follow the procedures in these sections:

1. Setting Up Basic Configuration Data
2. (Optional) Customizing the Setup Scripts
3. Running the pin_setup Utility

Setting Up Basic Configuration Data

To set up basic configuration data, you edit the pin_setup.values file. This file specifies basic configuration values, such as database names and passwords, and specifies the location and execution order of the subscripts that the pin_setup utility calls.

To edit the pin_setup.values file:

1. Open the file in a text editor. The file is located in Pipeline_hom/setup.
2. Edit the file.

Table 19–1 shows the entries in the pin_setup.values file:
### Table 19–1 Entries in pin_setup.values

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>InstallDir</td>
<td>The directory where you installed Pipeline Manager and Pipeline Configuration Manager.</td>
</tr>
<tr>
<td>MasterDir</td>
<td>The top level directory where the pin_setup utility copies the configured files (Pipeline_home).</td>
</tr>
<tr>
<td>StepDirs</td>
<td>The directories that contain the scripts run by the pin_setup utility. The format includes the directory names separated by commas:</td>
</tr>
<tr>
<td></td>
<td>( \text{StepDirs} = \text{Dir1, Dir2, Dir3} )</td>
</tr>
<tr>
<td></td>
<td>You can add directories that include your custom scripts.</td>
</tr>
<tr>
<td></td>
<td>Do not remove the entries for the standard directories.</td>
</tr>
<tr>
<td></td>
<td>See &quot;Specifying Script Execution Order&quot;.</td>
</tr>
<tr>
<td>PLDBSid</td>
<td>The SID of the Pipeline Manager database.</td>
</tr>
<tr>
<td>PLDBUserId</td>
<td>The user ID of the Pipeline Manager database.</td>
</tr>
<tr>
<td>PLDBPasswd</td>
<td>The password of the Pipeline Manager database.</td>
</tr>
<tr>
<td>JSDBUserId</td>
<td>The user ID of the JSA database.</td>
</tr>
<tr>
<td>JSDBPasswd</td>
<td>The password of the JSA database.</td>
</tr>
<tr>
<td>InfraDBUserId</td>
<td>The user ID of the BRM database.</td>
</tr>
<tr>
<td></td>
<td>This is the user ID specified in the BRM Oracle Data Manager pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm sm_id PIN_DB_ID})</td>
</tr>
<tr>
<td>InfraDBPasswd</td>
<td>The password of the BRM database.</td>
</tr>
<tr>
<td></td>
<td>This is the password specified in the BRM Oracle Data Manager pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm sm_pw PIN_DB_PW})</td>
</tr>
<tr>
<td>InfraDBSID</td>
<td>The SID of the BRM database.</td>
</tr>
<tr>
<td></td>
<td>This is the database specified in the BRM Oracle Data Manager pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm sm_database PIN_DB_SID})</td>
</tr>
<tr>
<td>QuDBUserId</td>
<td>The user ID of the Oracle queues.</td>
</tr>
<tr>
<td></td>
<td>This is the user ID specified in the Account Synchronization DM (dm_ifw_sync) pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm_ifw_sync sm_id PIN_DB_ID})</td>
</tr>
<tr>
<td>QuDBPasswd</td>
<td>The password of the Oracle queues.</td>
</tr>
<tr>
<td></td>
<td>This is the password specified in the Account Synchronization DM (dm_ifw_sync) pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm_ifw_sync sm_pw PIN_DB_PW})</td>
</tr>
<tr>
<td>QuDBSID</td>
<td>The SID of the Oracle queues.</td>
</tr>
<tr>
<td></td>
<td>This is the database specified in the Account Synchronization DM (dm_ifw_sync) pin.conf file; for example:</td>
</tr>
<tr>
<td></td>
<td>(- \text{dm_ifw_sync sm_database PIN_DB_SID})</td>
</tr>
<tr>
<td>QName</td>
<td>The name of the queue.</td>
</tr>
<tr>
<td></td>
<td>This is the queue specified in the Account Synchronization DM (dm_ifw_sync ifw_sync_queuename) file; for example:</td>
</tr>
</tbody>
</table>
|              | QName=IFW_SYNC_QUEUE
Table 19–1  (Cont.) Entries in pin_setup.values

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SystemPasswd</td>
<td>The password for the system user ID on the Oracle server.</td>
</tr>
<tr>
<td>DatafilePath</td>
<td>The path to the directory where Pipeline Manager data files are created (/data).</td>
</tr>
<tr>
<td>DBLibrary</td>
<td>The database library; for example: DBLibrary=or952</td>
</tr>
<tr>
<td>port</td>
<td>The TCP/IP port number to be used for the wireless registry (ifw.DataPool.RealtimePipeline.Module.ThreadPool section of wirelessRealtime.reg). This is the port to be used by the CM’s pin.conf emulation entry; for example: port=1234</td>
</tr>
<tr>
<td>DiscountOpcodeMapXml</td>
<td>The custom XML file that maps the input flist fields to EDR container fields. The pin_setup utility uses this value when it creates the OpcodeMapping entry of the DiscountPipeline section in the wirelessRealtime.reg registry file.</td>
</tr>
<tr>
<td></td>
<td>If this parameter isn’t specified, the pin_setup utility adds the following entry to the DiscountPipeline section of wirelessRealtime.reg: OpcodeMapping = ./formatDesc/Formats/Realtime/discount_event.xml</td>
</tr>
<tr>
<td>GSMOpcodeMapXml</td>
<td>The custom XML file that maps the input flist fields to EDR container fields. The pin_setup utility uses this value when it creates the OpcodeMapping entry of the RealtimePipelineGSM section in the wirelessRealtime.reg registry file.</td>
</tr>
<tr>
<td></td>
<td>If this parameter isn’t specified, the pin_setup utility adds the following entry to the RealtimePipelineGSM section of wirelessRealtime.reg: OpcodeMapping = ./formatDesc/Formats/Realtime/rate_event.xml</td>
</tr>
<tr>
<td>GPRSOpcodeMapXml</td>
<td>The custom XML file that maps the input flist fields to EDR container fields. The pin_setup utility uses this value when it creates the OpcodeMapping entry of the RealtimePipelineGPRS section in the wirelessRealtime.reg registry file.</td>
</tr>
<tr>
<td></td>
<td>If this parameter isn’t specified, the pin_setup utility adds the following entry to the RealtimePipelineGPRS section of wirelessRealtime.reg: OpcodeMapping = ./formatDesc/Formats/Realtime/rate_event.xml</td>
</tr>
<tr>
<td>ZoneOpcodeMapXml</td>
<td>The custom XML file that maps the input flist fields to EDR container fields. The pin_setup utility uses this value when it creates the OpcodeMapping entry of the RealtimePipelineZone section in the wirelessRealtime.reg registry file.</td>
</tr>
<tr>
<td></td>
<td>If this parameter isn’t specified, the pin_setup utility adds the following entry to the RealtimePipelineZone section of wirelessRealtime.reg: OpcodeMapping = ./formatDesc/Formats/Realtime/zonemap_event.xml</td>
</tr>
</tbody>
</table>
Creating Multiple Test Installations

You can use Pipeline Configuration Manager to create multiple test installations using the same configuration. To do so, install Pipeline Configuration Manager in one location. Then use multiple `pin_setup.values` files to specify different target installation systems, as shown in Figure 19–1.

### Figure 19–1  Configuration Files and Scripts

Configuration files and scripts

- **pin_setup.values files**
- **Pipeline Manager installations**

### (Optional) Customizing the Setup Scripts

Pipeline Configuration Manager includes a set of scripts (called steps) that are run by the `pin_setup` utility in alphabetical order.

You can customize these scripts; for example, by adding modules to the registry. You can also choose whether to run the default scripts or add custom scripts.

Table 19–2 shows the default scripts that the `pin_setup` utility runs:

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>InpMappingScript</td>
<td>The output mapping script (isc) file to use for the wireless registry (ifw.DataPool.RealtimePipeline.Module.ThreadPool section of wirelessRealtime.reg); for example:</td>
<td><code>InpMappingScript = ./iScriptLib/iScriptLib_Standard/ISC_InMap.isc</code></td>
</tr>
<tr>
<td>SystemPasswd</td>
<td>The system password for the system user ID of the database:</td>
<td><code>SystemPasswd = system_password</code></td>
</tr>
</tbody>
</table>

3. Save and close the file.
Specifying Script Execution Order

The setup scripts are located in subdirectories of the steps directory. You specify which sets of scripts are run by using the StepDirs parameter in the pin_setup.values file, as in this example:

StepDirs = Setup,Oracle

To run the scripts, the pin_setup utility collates scripts from all subdirectories into a single list, and runs the scripts in alphabetical order. You can specify the order in which the scripts run by renaming the script files.

To make script execution order easier to specify and maintain, rename the script files by adding 2-digit numbers to the front of the file names.

For example, if your installation uses the following directories and scripts:

- Oracle directory
  - 12insertpasswd
  - 16dbinit
  - 20dbccreate
  - 24jsacreate
  - 28pipelinecreate
Running the pin_setup Utility

About Pipeline Configuration Manager

– 32DBLoad

■ Setup directory
  – 01copypipelinefiles
  – 02source.pl
  – 04regsetup
  – 06regsetupRerating
  – 07realtimeRegSetup
  – 08genTestReg.pl
  – 40xmlconfig

If StepDirs = Setup,Oracle the scripts are run in this order:

1. 01copypipelinefiles
2. 02source.pl
3. 04regsetup
4. 06regsetupRerating
5. 07realtimeRegSetup
6. 08genTestReg.pl
7. 12insertpasswd
8. 16dbinit
9. 20dbcreate
10. 24jsacreate
11. 28pipelinecreate
12. 32DBLoad
13. 40xmlconfig

You can add your own directories. If you do not want to run a script, remove the directory name from the StepDirs parameter.

Running the pin_setup Utility

**Important**: Before running the pin_setup utility, customize the setup files and edit the pin_setup.values file. See "Setting Up Basic Configuration Data" and "(Optional) Customizing the Setup Scripts".

By default, the pin_setup utility runs all of the scripts in the directories specified in the StepDirs parameter in the pin_setup.values file. (See "Specifying Script Execution Order"). You can also do the following:

■ Use the -recover_last parameter to restart the configuration if it was stopped. The configuration begins where it stopped.

**Important**: This parameter recovers from the last point of failure. It does not roll back the changes made by the successful steps.
Use the -runone parameter to run the files from a single script directory.

For information on running the utility, see "pin_setup".

Note: The pin_setup utility configures the configuration file used by the LoadIfwConfig utility (LoadIfwConfig.reg). See "LoadIfwConfig" in BRM Configuring Pipeline Rating and Discounting.

About the Default Pipeline Manager Configuration

By default, the pin_setup utility runs scripts that configure the following pipelines:

- A rating pipeline
- A backout pipeline for rerating
- A rerating pipeline

The configuration includes the input and output formats and the BRM EDR container format. The pipelines can rate CDRs for the following services:

- GSM (Voice, data, fax, and SMS)
- GPRS

The configuration supports extended rating attributes (ERAs).

Default Data Modules

The following data modules are configured by default:

Note: Some modules might be configured disabled by default. Check the registry file entry for each module.

- Database Connect (DBC)
- DAT_Listener
- DAT_AccountBatch
- DAT_AccountRealtime
- DAT_Zone
- DAT_PrefixDesc
- DAT_Calendar
- DAT_Rateplan
- DAT_PriceModel
- DAT_TimeModel
- DAT_ExchangeRate
- DAT_Dayrate
- DAT_Discount
- DAT_ScenarioReader
- DAT_Currency
Default Function Modules

The following function modules are configured by default:

- FCT_PreRecycle
- FCT_ServiceCodeMap
- FCT_UsageClassMap
- FCT_Discard
- FCT_DuplicateCheck
- FCT_CallAssembling
- FCT_PrefixDesc
- FCT_Account
- FCT_CustomerRating
- FCT_PreRating
- FCT_IRules
- FCT_APN_Map
- FCT_USC_Map
- FCT_RSC_Map
- FCT_MainRating
- FCT_Dayrate
- FCT_RateAdjust
- FCT_DiscountAnalysis
- FCT_Discount
- FCT_BillingRecord
- FCT_AggreGate
- FCT_Reject
- FCT_Recycle

For information about these function modules, see "Pipeline Manager Function Modules" in *BRM Configuring Pipeline Rating and Discounting*.

Default Database Tables

The `pin_setup` utility creates all of the Pipeline Manager tables in the Pipeline Manager database. Some are populated with default data.

What's Next?

See "Testing Pipeline Manager" for more information.
This chapter describes basic start, stop, and configuration tests for Pipeline Manager.

About Testing Pipeline Manager

To test Pipeline Manager, follow the procedures in these sections:

1. Starting Pipeline Manager
2. Using Pipeline Configuration Manager to Configure Pipeline Manager
3. Testing Pipeline Manager without a Database Connection
4. Testing Pipeline Manager with a Database Connection
5. Testing Single and Multiple Pipeline Rating with BRM

Note: To perform a test start and stop of the Pipeline Manager database, contact your database administrator.

Important: After testing basic pipeline operation, see “Configuring Pipeline Manager” and “Optimizing Pipeline Manager Performance” in BRM System Administrator’s Guide for more information on configuration and tuning.

Starting Pipeline Manager

You start Pipeline Manager by using one of the following methods:

- The pin_ctl utility. See “Starting a Component by Using the pin_ctl Utility” in BRM System Administrator’s Guide.
- The ifw command from the Pipeline_home directory:

  ```
  % Pipeline_home/bin/ifw -r RegistryFile
  ```

  where RegistryFile is your registry file name.
Stopping Pipeline Manager

You stop Pipeline Manager by using HP OpenView, the pin_ctl utility, or a semaphore. See "Starting and Stopping the BRM System" and "Starting and Stopping Pipeline Manager Manually" in BRM System Administrator’s Guide.

Testing Pipeline Manager without a Database Connection

To test Pipeline Manager without database access:

1. Go to the system directory.
2. Source the source.me.sh for the shell:

   % source source.me.sh

   **Note:** The source.me.sh is for a bash shell. If you use a C shell, enter source.me.csh.

3. Go to the Pipeline_home directory.
4. Start Pipeline Manager with the simple.reg registry file:

   `bin/ifw -r Pipeline_home/samples/simple/simple.reg`

   The system starts without a database connection and two sample EDR files are processed.

5. To confirm that the sample EDR files are processed, go to the Pipeline_home/samples/simple/data/out directory and open the output file.

6. If an error occurs:
   - An output reject file is created in the Pipeline_home/samples/simple/data/rej directory.
   - The input file is moved to the err directory. You can find it in the Pipeline_home/samples/simple/data/err directory.

7. Stop Pipeline Manager. See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.
Testing Pipeline Manager with a Database Connection

To test Pipeline Manager with database access:

1. Go to the system directory.
2. Source the source.me.sh for the shell:
   ```bash
   source source.me.sh
   ```
   
   **Note:** The source.me.sh is for a bash shell. If you use a C shell, enter `source.me.csh`.
3. Open the `Pipeline_home/samples/simple/simple.reg` file by using a text editor such as vi.
4. In the `ifw.DataPool.PrefixDescData` section:
   - Comment out the `Source` parameter entry with the `File` value and uncomment the entry with the `Database` value.
   - Be sure that the `DataConnection` parameter is set to `ifw.Datapool.Login`.
5. Be sure that the DBC module is configured with values for the `UserName`, `PassWord`, and `DataBaseName` parameters.
   See "Database Connect (DBC)" in BRM Configuring Pipeline Rating and Discounting.
6. Save the file.
7. Start Pipeline Manager with the `simple.reg` registry file.
   ```bash
   bin/ifw -r Pipeline_home/samples/simple/simple.reg
   ```
8. If you previously tested Pipeline Manager without a database connection, move the done EDR files from the `/samples/simple/data/done` directory to the `/samples/simple/data/out` directory and rename the file to `*edr`.
   The system is running without a database connection; and it processes two sample EDR files.
9. To confirm that the sample EDR files are processed, go to the `Pipeline_home/samples/simple/data/out` directory and open the output file.
10. If an error occurs:
    - An output reject file is created in the `Pipeline_home/samples/simple/data/rej` directory.
    - The input file is moved to the `err` directory.
      You can find it in the `Pipeline_home/samples/simple/data/err` directory.
11. Stop Pipeline Manager.
    See "Starting and Stopping the BRM System" in BRM System Administrator’s Guide.

Testing Single and Multiple Pipeline Rating with BRM

This test uses the whole range of Pipeline Manager functions. To perform a wireless test run:
**Important:** All steps in this section are required. This procedure uses a sample wireless price plan, pipeline registry file, and CDR. For your implementation, you must perform these steps using either your custom price plan and registry file or the samples.

1. Go to the **system** directory.

2. Source the **source.me.sh** for the shell:

   ```
   source.me.sh
   ```

   **Note:** The **source.me.sh** is for a bash shell. If you use a C shell, enter **source.me.csh**.

3. Run the **Pipeline_home/conf/pricingdata/Oracle/insertWIRELESS_SAMPLE.pl** script.

   ```
   insertWIRELESS_SAMPLE.pl
   ```

   This script loads the sample wireless price plan configuration into your Pipeline Manager database.

   **Note:** If you ran this script in a previous test, you don’t have to run it again.

4. Open a sample wireless registry file.

   For single pipeline testing: **Pipeline_home/conf/wireless.reg**.

   **Tip:** To isolate potential problems, perform a single pipeline test first.

5. Be sure that the DBC module is configured with values for the **UserName**, **PassWord**, and **DataBaseName** parameters.

   See "Database Connect (DBC)" in **BRM Configuring Pipeline Rating and Discounting**.

6. Start Pipeline Manager.

   For single pipeline testing, use the **wireless.reg** registry file:

   ```
   bin/ifw -r conf/wireless.reg
   ```

7. Create sample CDRs.

   See "Creating a Sample CDR File".

   **Important:** Use the file naming format **teststring.edr**, where **string** is any string. The CDRs must match your BRM data (service, origin, timestamps).

8. Stop Pipeline Manager.

   See "Starting and Stopping the BRM System" in **BRM System Administrator’s Guide**.
Creating a Sample CDR File

Your sample CDR must be formatted using:

- Plain ASCII
- Semi-colon-separated
- One record per line

All lines, including the last record, must end with a NL (new line) character.

Example 20–1 Sample Format:

```
service-code;a-number;b-number;start-time;duration;vol-sent;vol-recieved;callclass ;cell-id;apn
```

Table 20–1 describes CDR field formats and restrictions:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description and Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>service-code</td>
<td>The service code. Maximum length: 3 characters</td>
</tr>
<tr>
<td></td>
<td>The following service code values are predefined in the sample rate plan:</td>
</tr>
<tr>
<td></td>
<td>■ TEL</td>
</tr>
<tr>
<td></td>
<td>■ GPR</td>
</tr>
<tr>
<td></td>
<td>■ SMS</td>
</tr>
<tr>
<td></td>
<td>■ WAP</td>
</tr>
<tr>
<td></td>
<td>■ DAT</td>
</tr>
<tr>
<td></td>
<td>■ FAX</td>
</tr>
<tr>
<td>a-number</td>
<td>The call’s originating number. Maximum length: 40 characters</td>
</tr>
<tr>
<td></td>
<td>Sample value: 00491729183333</td>
</tr>
<tr>
<td>b-number</td>
<td>The call’s target number. Maximum length: 40 characters</td>
</tr>
<tr>
<td></td>
<td>Sample value: 004941067600</td>
</tr>
<tr>
<td>start-time</td>
<td>The call start time. Format: YYYYMMDDHHMISS</td>
</tr>
<tr>
<td></td>
<td>Sample values: 20011114184510 (for ‘14.11.2001 18:45:10’)</td>
</tr>
<tr>
<td>duration</td>
<td>The call duration in seconds. Maximum length: 11 digits</td>
</tr>
<tr>
<td></td>
<td>Sample value: 300 (for 5 minutes)</td>
</tr>
<tr>
<td>vol-sent</td>
<td>The number of bytes sent in the call. Maximum length: 11 digits</td>
</tr>
<tr>
<td></td>
<td>Sample value: 1024 for 1 KB</td>
</tr>
<tr>
<td>vol-received</td>
<td>The number of bytes received in the call. Maximum length: 11 digits</td>
</tr>
<tr>
<td></td>
<td>Sample value: 1024 for 1 KB</td>
</tr>
</tbody>
</table>
Troubleshooting

If you cannot start Pipeline Manager, it can be due to the following problems or errors:

Note: Error messages are written into the process log file and into the pipeline log files. For more information on pipeline log files, see "About Pipeline Manager Log Files" in *BRM System Administrator’s Guide*.

- The user environment is not set correctly.
  Solution: Correct the errors in the environment settings.

- The registry contains errors.
  Solution: Check the registry for type errors, missing brackets, missing or incorrect entries, etc.

  Note: Registry entries are case-sensitive.

- Paths are missing.
Solution: Create the missing paths according to the definition in the startup registry.

- **A lock file already exists.**
  
  Solution: If the BRM framework has not been stopped correctly, a lock file already exists. Delete the lock file and then stop and restart Pipeline Manager framework.

- **The database is not opened/the listener has not been started.**
  
  Solution: Open the database and start the listener.

- **The database entries contain errors.**
  
  Solution: Check the created database schemes.
Part IV describes how to install the Oracle Communications Billing and Revenue Management (BRM) Account Synchronization Data Manager. It contains the following chapters:

- About Sending Account Data to Pipeline Manager
- Installing and Configuring the Account Synchronization DM
- Account Synchronization DM Installation Utilities
This chapter describes the Oracle Communications Billing and Revenue Management (BRM) Account Synchronization Data Manager (DM) and how account synchronization works. Anyone who installs, configures, or administers the Account Synchronization DM should read this chapter.

Before installing the Account Synchronization DM, you should be familiar with how a BRM wireless system works. See the following chapters in BRM Telco Integration:

- “About Integrating Wireless Services”
- “Overview of BRM Wireless Services Installation”

About Account Synchronization

The Account Synchronization DM synchronizes customer and service data with pipeline rating data.

Account Synchronization allows Pipeline Manager to take action on events that occur in BRM based on the event type. For example, when account information changes, such as when products are purchased or account status is changed, the account information needs to be updated in the Pipeline Manager database so that service usage events can be rated properly. The Account Synchronization DM sends the updated account information to Pipeline Manager, enabling Pipeline Manager to rate events using the updated information.

You set up the following modules to receive events through Account Synchronization:

- **DAT_Listener**
  All events are retrieved by this module first. This module passes the events to the other modules that are set up to receive them.

- **DAT_AccountBatch**
  This module receives account update information to ensure that Pipeline Manager uses the most current account information when rating events.

- **DAT_BalanceBatch**
  This module receives balance update information to ensure that Pipeline Manager uses the most current balance information when rating events.

- **DAT_Discount**
  This module receives discount balance update information to ensure that Pipeline Manager uses the most current discount balance configuration when rating events.
How Account Synchronization Works

The Account Synchronization DM notifies Pipeline Manager when certain account information changes; for example, when a customer service representative (CSR) adds, cancels, or modifies an account or when an adjustment such as a cycle fee is applied to an account balance. The Account Synchronization DM sends information about updates through a database queue, and Pipeline Manager retrieves the information from the queue. For more information about the queue, see "About the Database Queues".

**Note:** When an account is created, Account Synchronization DM notifies Pipeline Manager about the new account, but the account details (such as the account’s products, discounts, and other account information) are not loaded into Pipeline Manager memory until the first call data record (CDR) is rated for the account. This is because Pipeline Manager does not require the account details until the account has some usage that needs to be rated.

The Account Synchronization DM can send any event data to Pipeline Manager that it is configured to send. Pipeline modules register to receive events through the DAT_Listener module. When a module receives a business event, it can either use the enqueued event data for processing or access the BRM database for the most current data.

All business events sent to Pipeline Manager are stored in the database queue. If Pipeline Manager terminates, the Account Synchronization DM continues to send events to the queue. When Pipeline Manager is restarted, it retrieves the events from the queue. Likewise, if Account Synchronization terminates, Pipeline Manager continues to retrieve events already in the queue.

If billing is being run while Pipeline Manager is starting, events are queued while the DAT modules are being initialized. Events are not processed until the DAT models are ready.

**Figure 21–1** shows the data flow from event notification to Pipeline Manager:
The following actions take place when account synchronization is performed:

1. An event listed in the Account Synchronization event notification list (pin_notify_ifw_sync) is generated, triggering a call to the opcode associated with that event in the list. See "About Event Notification" in BRM Developer's Guide.

2. One of the following actions occurs:

   - If the event is associated with the PCM_OP_IFW_SYNC_PUBLISH_EVENT opcode, it is passed to the PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT policy opcode for modification. The policy opcode passes the event, along with any modifications, to the Payload Generator External Module (EM).

     See "About the Account Synchronization Opcodes"

   - If the event is not associated with PCM_OP_IFW_SYNC_PUBLISH_EVENT, it is sent directly to the Payload Generator EM.

3. The Payload Generator EM collects events in its payload until they compose a complete business event.

   See "About the EAI Framework".

4. When the business event is complete, the Payload Generator EM sends it to the Account Synchronization DM.

   See "About the Account Synchronization DM".

5. The Account Synchronization DM sends the business event to a database queue.

   See "About the Database Queues".

6. DAT_Listener retrieves the business event from the database queue and sends the event to pipeline modules that are registered for that event.

   See "About the DAT_Listener Module".

7. The module uses the event as needed.
About the EAI Framework

The Account Synchronization DM works with the Enterprise Application Integration (EAI) framework. You use the EAI framework to define business events for account synchronization, capture the BRM events that make up the business events, and send the completed business events to the Account Synchronization DM.

The Account Synchronization EAI framework consists of the following components:

- **BRM event notification**
  The Account Synchronization event notification list (pin_notify_ifw_sync) contains all the BRM events that make up the business events defined in the Account Synchronization payload configuration file (payloadconfig_ifw_sync.xml). In the list, each event is associated with an opcode. When a listed event is generated, its associated opcode is called to pass the event to the Payload Generator EM. For more information, see "About Event Notification" in BRM Developer’s Guide and "Configuring Event Notification for Account Synchronization".

- **The Payload Generator EM**
  This module notifies the Account Synchronization DM when a business event occurs that requires some action such as an account update. Default business events for account synchronization are defined in the payload configuration file. For more information, see “Configuring the EAI Payload for Account Synchronization”.

  The payloadconfig_ifw_sync.xml file includes a set of default business events. If you create custom business events, use the DAT_BalanceBatch CustomEvents registry entry to enable Pipeline Manager to be notified of those events. For information on creating business events, see 'Defining Business Events’ in BRM Developer’s Guide.

  The Payload Generator EM notifies the Account Synchronization DM when business events, such as account creation, product purchase, account status change, and account balance adjustment occur. As soon as the Payload Generator EM collects all the BRM events that belong to a specific business event, it sends the business event payload to the Account Synchronization DM.

  Although the Account Synchronization DM relies on the EAI framework, you don’t need to install EAI Manager separately. All necessary EAI files are included with the Account Synchronization DM.

  For information about using the Payload Generator EM and the payload configuration file, see the following EAI Manager topics in BRM Developer’s Guide:

  - "About BRM Business Events"
  - "About Publishing Additional Business Events"
  - "About the Payload Configuration File Syntax"

About the Account Synchronization Opcodes

Account Synchronization uses a set of opcodes to modify the content of certain BRM events that make up business events before the business events are sent to the Account Synchronization DM.

To enable this, the BRM events are associated with the PCM_OP_IFW_SYNC_PUBLISH_EVENT opcode in your system’s event notification list. When these BRM
About Account Synchronization

When events occur, PCM_OP_IFW_SYNC_PUBLISH_EVENT is called to pass them to the PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT policy opcode for processing.

You can use the policy opcode to customize certain aspects of the BRM events based on your business needs. For more information, see "Modifying Business Events before Sending Them to Pipeline Manager".

After the Account Synchronization opcodes process the BRM events, they pass them to the EAI framework publishing opcode, which compiles them into business events to publish to Pipeline Manager.

---

**Tip:** Not all BRM events that make up Account Synchronization business events need to be passed through the Account Synchronization opcodes. If you don’t need to customize the BRM events, associate them with the EAI framework publishing opcode (number 1301) in your system’s event notification list instead. See "Configuring Event Notification for Account Synchronization".

---

### About the Account Synchronization DM

The Account Synchronization DM sends business events to the database queue. You define how the DM connects to the database queue and which business events to send to the queue through two configuration files:

- The Account Synchronization DM configuration file (`pin.conf`) specifies how to connect to the queuing database. To send events to multiple queues, you create database links. The Account Synchronization DM connects to only one database and uses the links to send events to queues on other databases. See "Linking Oracle Databases".

- The `ifw_sync_queuenames` file specifies the business events to send to your database queues.

See "Mapping Business Events to the Database Queue"s.

---

**Important:** If your system contains multiple BRM databases, you install and configure one Account Synchronization DM for each BRM database. For information, see "Configuring Account Synchronization for Multiple Databases".

---

When the Account Synchronization DM receives a business event, it does the following:

1. Determines to which queue to send the event by checking the `ifw_sync_queuenames` file.
2. Enqueues the event in the appropriate queue.
3. Sets the event in the queue to a READY state.

For information, see "About Event Status Flags".

### About Disconnecting the Account Synchronization DM from the Queue

You can prevent the Account Synchronization DM from enqueuing events to the database queue by using the `pin_ctl` utility. This allows you to make changes to the queuing database without affecting the account synchronization process.
You control the connection between the Account Synchronization DM and the database queue by using the pin_ctl utility. For more information, see "Disconnecting and Reconnecting Account Synchronization DM to the Queue".

About the Database Queues

Account Synchronization uses a persistent database queue to pass business events from the Account Synchronization DM to Pipeline Manager. The queue enables Account Synchronization to pass events asynchronously, so BRM and Pipeline Manager are not required to be running at the same time.

Creating Database Queues

The Account Synchronization DM installer automatically creates a default queue on a specified database. If your system requires multiple queues, you must create additional queues by manually running the pin_ifw_sync_oracle utility. For information, see "pin_ifw_sync_oracle".

---

**Important:** To avoid system errors, do not run Pipeline Manager while you are running the pin_ifw_sync_oracle utility.

---

When you create a queue, you must decide:

- The database in which to create the queue.
  
  You can create the queue in your BRM database, in the Pipeline Manager database, or in its own separate database.

- The tablespace in which to create the queue.
  
  You can create the queue in an existing tablespace or in its own separate tablespace.

---

**Note:** For optimal performance in production systems, create the queue in its own tablespace in the Pipeline Manager database.

---

- The number of queues to create.
  
  The number of queues to create depends on your system’s configuration. Each Pipeline Manager instance connects to its own database queue. Therefore, if your system contains only one instance of Pipeline Manager, you create only one database queue; if your system contains two instances of Pipeline Manager, you create two database queues.

  In multidatabase systems, each BRM database has one corresponding instance of Pipeline Manager and one corresponding database queue. For more information, see "Configuring Account Synchronization for Multiple Databases".

About Event Status Flags

Events in the Oracle Advanced Queuing (AQ) queue are set to the following states:

- READY indicates that the event has not been dequeued and processed by DAT_Listener.

- PROCESSED indicates that the event was dequeued by DAT_Listener. The Oracle Queue Monitor process (QMn) removes the event from the queue after a configurable amount of time.
You can check the status of events in your queue by running a report. For information, see "Generating Queue Reports".

**About the DAT_Listener Module**

Pipeline Manager uses DAT_Listener to retrieve business events from the database queue. When Pipeline Manager is running, DAT_Listener continuously checks the queue for events to process.

When DAT_Listener finds an event to process, it:

1. Dequeues the event from the database queue.
2. Sets the event in the queue to a PROCESSED state.
3. Determines where to route the event by using the Pipeline Manager registry.
4. Sends the event to the appropriate pipeline module.

On Oracle AQ systems, DAT_Listener can control whether Pipeline Manager processes business events or CDRs by interleaving the two processes. You can configure DAT_Listener for concurrent or interleaved processing. See "About Controlling the Business Event Backlog".

**About Using Multiple Threads to Dequeue Events**

By default, DAT_Listener uses one thread for dequeuing events. All events in the queue are processed in the order in which they are queued.

You can generate additional threads by using the DAT_Listener EventThreadAllocation registry entry:

- You can generate separate threads for processing different business events. This can enhance performance when the type of business event, such as RecycleRequest business events, takes longer to process.
- You can generate additional threads for the same type of business event. This can further enhance performance when there are multiple business events of the same type that are queued in succession.

A new thread can begin processing an event as soon as processing for the previous event has begun.

For example, the following registry entry will generate four threads: one thread for RecycleRequest business events, two threads for OpenNewActgCycle business events, and one default thread (for which no entry is required) for all other types of events:

```plaintext
EventThreadAllocation
{
  RecycleRequest = 1
  OpenNewActgCycle = 2
}
```

Based on this registry configuration, if the following events are queued in the following order:

1. RecycleRequest #1
2. CycleForward #1
3. OpenNewActgCycle #1
4. OpenNewActgCycle #2
5. OpenNewActgCycle #3

Then the events will be processed in the order they were queued, with each type of event being processed by its own thread, and the default thread handling any other event types.
6. OpenNewActgCycle #4
7. CycleForward #2
8. RecycleRequest #2
9. CycleForward #3

They are processed during account synchronization in the following order:

1. The RecycleRequest thread starts processing RecycleRequest event #1.
2. The default thread starts processing CycleForward event #1.
3. Two OpenNewActgCycle threads process OpenNewActgCycle events #1 through #4, in order.
   For example, thread 1 processes event #1 and thread 2 processes event #2. Whichever thread finishes first processes event #3, and so on.
4. When processing starts for OpenNewActgCycle event #4, the default thread starts processing CycleForward event #2 (assuming it has completed CycleForward event #1).
5. When processing starts for CycleForward event #2, the RecycleRequest thread starts processing RecycleRequest event #2 (assuming it has completed RecycleRequest event #1).
6. When processing starts for RecycleRequest event #2, the default thread starts processing CycleForward event #3 (assuming it has completed CycleForward event #2).

You can allocate only one thread for recycle requests.

**Dequeuing in Batches**

Dequeuing business events from the Account Synchronization queue takes longer than sending them to Pipeline Manager. To shorten the time it takes to process business events, DAT_Listener dequeues business events in batches. It then sends one event at a time to Pipeline Manager.

DAT_Listener retrieves events in batches only for events that require account synchronization, such as account data changes. These are the most frequent types of business events sent through the queue. Other events, for example, those that invoke a process such as recycling a job, continue to be dequeued one at a time.

If a business event in a batch of dequeued events contains an error, all events in the batch are rolled back in BRM and Pipeline Manager is shut down. Shutting down Pipeline Manager clears the batch of business events from the pipeline memory. After you correct the error and stop and restart Pipeline Manager, BRM resends the business events to Pipeline Manager.

**About Disconnecting DAT_Listener from the Queue**

You can keep Pipeline Manager online when you tune or shut down the queuing database by disconnecting DAT_Listener from the queue. You can then reconnect the module to the queue after you finish making changes to the database.

When you disconnect DAT_Listener, it performs the following actions:

1. Waits for the total counter of active threads to become 0.
2. Disconnects each active thread:
About Account Synchronization

- If a thread is currently processing an event, DAT_Listener waits for the event to finish, inactivates the thread, and decrements the counter.
- If a thread is not currently processing an event, DAT_Listener inactivates the thread and decreases the counter.

3. When the counter becomes 0, DAT_Listener wakes up from the wait state. It returns to the caller that all connections between it and the database queue have been terminated.

When you reconnect DAT_Listener, it reconnects to the queuing database and activates all threads.

You control the connection between DAT_Listener and the database queue by using DAT_Listener semaphores. For more information, see "Disconnecting and Reconnecting DAT_Listener to the Queue".

About Account Synchronization in a Multidatabase System

When you use a multidatabase system, you set up an instance of Pipeline Manager for each database. On one instance, you configure the multidatabase router module FCT_AccountRouter in BRM Configuring Pipeline Rating and Discounting. This module keeps track of which database each account belongs to.

To set up Account Synchronization for multiple databases, you install and configure the Account Synchronization DM on all BRM systems. You also do the following:

- **Add a database queue for each BRM database.**
  
  Each Account Synchronization DM connects to only one database and uses Oracle database links to put event messages in queues on other databases.

- **Configure an instance of Pipeline Manager for each BRM database.**
  
  Each instance of Pipeline Manager has a DAT_Listener module that retrieves events for that instance. You specify the events for each instance in the DAT_Listener registry.

---

**Note:** It is recommended that you install an instance of the Account Synchronization DM and have a corresponding instance of Pipeline Manager for every BRM database, but it is not required. How you configure multiple databases depends on your business needs and should be determined by your system and database administrators. For more information, see "BRM Installation Overview" and "Installing a Multischema or Multidatabase System".

---

Figure 21–2 shows the data flow from the Account Synchronization DM to multiple instances of Pipeline Manager:
About Account Synchronization

Figure 21–2  Data Flow from Account Synchronization DM to Pipeline Manager Instances

To set up Account Synchronization for a multidatabase system, see "Configuring Account Synchronization for Multiple Databases".

About the Payload Configuration File

The Account Synchronization DM is an EAI publisher. All EAI publishers in your BRM system use the same payload configuration file. This file defines how EAI applications accumulate and format published information. The name and location of this file is specified in the infranet.eai.configFile entry in the EAI properties file (BRM_Home/sys/eai_js/Infranet.properties, where BRM_Home is the directory in which you installed BRM).

The Account Synchronization DM includes a payload configuration file (payloadconfig_ifw_sync.xml). This file defines the business events that the Account Synchronization DM uses to update data in Pipeline Manager.

If your BRM system doesn’t already have an EAI-based publisher, the Account Synchronization installation program sets the infranet.eai.configFile entry to point to the Account Synchronization payload configuration file.

If your BRM system already has an EAI-based publisher installed, the Account Synchronization installation program automatically merges the Account Synchronization payload configuration file with the existing payload configuration file. The merged file is named payloadconfig_MergedWithIfw_sync.xml, and the infranet.eai.configFile entry is updated accordingly. The names and contents of the original files used to create the merged file are not changed by the Account Synchronization installation program.

For more information, see "Specifying the Default Payload Configuration File".

Caution:  In rare cases, it may not be possible to use the merged payload configuration file. This can happen when entries in the two original payload configuration files have conflicting definitions. You must check for conflicts between the two original files before running the Account Synchronization DM. See "Checking for Conflicts in EAI Payload Configuration Files".
About Controlling the Business Event Backlog

When you use Pipeline Manager for batch rating, the Account Synchronization database queue can become backlogged with business events waiting to be processed. This can delay account synchronization and slow Pipeline Manager performance, causing a greater number of CDRs to be suspended.

To control the number of events waiting to be processed, you can configure DAT_Listener to interleave CDR and business event processing. For information about how interleaved processing works, see "About Interleaved Processing". For information about configuring DAT_Listener for interleaved processing, see "Configuring Interleaved Processing".

Why Event Backlog Occurs

Event backlog can occur for the following reasons:

- When Pipeline Manager modules update account data, they lock the accounts they’re updating in each transaction. When more than one transaction needs to access the same account, the transactions must wait until the account is unlocked. If the account stays locked for a relatively long time, business events can become backlogged while they wait for processing.

- When business events arrive that change account information during CDR processing, Pipeline Manager must update its memory before continuing to rate events in the CDR. This requires accessing the database, which adds to the number of times the accounts are locked. With concurrent business event and CDR processing, there could be multiple updates required, further reducing overall Pipeline Manager performance.

- When an account is currently being billed, Pipeline Manager must receive a business event notifying it that billing is complete before it can process new event data records (EDRs) for the account. If a billing business event is waiting to be processed behind a backlog of other events, there might be many new EDRs for the account that require suspending until the billing event is processed. Each time a suspended EDR is recycled, it creates a new business event that is added to the account synchronization queue.

About Interleaved Processing

You can configure Pipeline Manager to process CDRs and business events exclusively rather than concurrently. With interleaved processing, business event and CDR processing are interleaved so that multiple business events can be processed before rating the CDRs, and multiple CDRs can be rated before updating Pipeline Manager memory. This balances the event backlog and improves processing time by decreasing the number of times Pipeline Manager must access the database and lock accounts. Exclusive processing reduces the likelihood that you will need to recycle events due to delayed synchronization or to stop Pipeline Manager to catch up on business event processing.

DAT_Listener controls whether business events or CDRs are processed based on the following criteria:

- How many business events are waiting to be processed in the Account Synchronization queue.
- The time that Pipeline Manager has been currently processing either business events or CDRs.
You can use the first or both of these criteria, depending on how much control you want over the interleaving process. For more information, see “About Setting Processing Thresholds”.

You specify the thresholds for event processing in the DAT_Listener module registry. For more information, see "Configuring Interleaved Processing".

Assuming both the number of events and the processing time are configured, DAT_Listener performs the following actions to control interleaved processing:

1. Periodically checks the number of business events waiting to be processed in the Account Synchronization queue and tracks the amount of time that Pipeline Manager has been currently processing either business events or CDRs.

2. Stops pipeline CDR processing when the number of business events in the queue reaches the maximum threshold or when the maximum CDR processing time is reached, whichever comes first.

   DAT_Listener stops Pipeline Manager by sending a stop command to the pipeline controller. This command suspends CDR processing but allows business event processing to proceed.

3. Dequeues business events and sends them to pipelines for processing.

4. Stops dequeuing business events when the number of business events in the queue reaches the minimum threshold or when the maximum business event processing time is reached, whichever comes first.

5. Restarts Pipeline Manager CDR processing by sending a start command to the pipeline controller.

The Account Synchronization DM continues to send business events to the queue while Pipeline Manager processes CDRs.

When tracking the number of business events in the queue, DAT_Listener counts only the business events that have a state of READY. All other business events are not considered.

### About Setting Processing Thresholds

For basic process interleaving, you set the minimum and maximum business event thresholds. For more control over CDR and business event interleaving, you can also set the maximum CDR and business event processing times.

For example, if you typically process fewer events in the middle of the night, it might take longer to reach the specified maximum number of business events in the queue. Account synchronization will be delayed during this time and you might have a higher incident of CDRs that need suspending or rerating. In this case, you limit the amount of time spent on CDR processing. When this time threshold is reached, DAT_Listener switches to business event processing even if the number of events in the queue has not reached the maximum.

You might want to limit business event processing time if there are certain times when many business events accumulate in the queue; for example, when you shut down Pipeline Manager for an extended period. When you stop and restart Pipeline Manager, rather than waiting until the minimum business event threshold is reached, Pipeline Manager switches to CDR processing when the maximum business event processing time is reached.

To set the processing thresholds, see "Configuring Interleaved Processing".
Note: DAT_Listener doesn’t check whether there are CDRs waiting to be processed. It only checks for business events and processing times. Therefore, if there are no CDRs to process, DAT_Listener waits until either the CDR processing time threshold is reached or the maximum number of business events is reached before switching to business event processing. If this wait period is too long, you can update the DAT_Listener registry to switch from CDR to business event processing. See "Switching to Business Event Processing When No CDRs Are Waiting".
This chapter describes how to install and configure the Oracle Communications Billing and Revenue Management (BRM) Account Synchronization Data Manager (DM). Anyone who installs, configures, or administers Account Synchronization DM should read this document.

Before installing Account Synchronization DM, you should be familiar with how a BRM wireless system works and Account Synchronization DM. See:

- The description of integrating wireless services in BRM Telco Integration.
- The overview of installing wireless services in BRM Telco Integration.
- About Sending Account Data to Pipeline Manager

### About Installing Account Synchronization

Before setting up Account Synchronization, you should be familiar with BRM concepts and architecture. See *BRM Concepts*.

**Important:** Account Synchronization DM is an optional feature that requires a separate license.

### System Requirements

Account Synchronization DM is available for the HP-UX IA64, Solaris, AIX, and Linux operating systems.

### Software Requirements

Before installing Account Synchronization DM, you must install:

- Oracle 9.2.0.3 database server with the Oracle Advanced Queuing (AQ) component, Oracle 10g, or Oracle 11g.
- Third-Party software, which includes the PERL libraries and JRE required for installing BRM components.
  
  See "Installing the Third-Party Software".
- BRM.
  
  See "About Planning and Installing a BRM System".
- (Multidatabase systems only) MultiDB Manager.
See "Installing a Multischema or Multidatabase System".

Information Requirements
You need the following information about your existing BRM system during the Account Synchronization DM installation:

1. Queuing alias name.
2. Queuing database user name and password.
3. Database name and retention time of the queuing database.

Account Synchronization Software Features
Account Synchronization DM software includes Connection Manager (CM), Data Manager (DM), and EAI Java server features. When you install Account Synchronization, you can install all features on the same machine (typical install) or install them individually on the same or different machines (custom install).

When you install Account Synchronization DM, the installation program updates your \texttt{BRM\_Home/setup/pin\_setup.values} files with information about the Account Synchronization component, where \texttt{BRM\_Home} is the directory in which you installed BRM.

Account Synchronization DM installation features:

- **Account Synchronization CM**

  The Account Synchronization Connection Manager (CM) is a CM module that contains the EAI framework Facilities Module (FM) and the Account Synchronization FMs.

  \begin{itemize}
  \item \textbf{Important:} The Account Synchronization CM is dependent on the CM and must be installed on all hosts on which the CM will run.
  \end{itemize}

- **Account Synchronization DM**

  The Account Synchronization DM (\texttt{dm\_ifw\_sync}) contains files to start and stop the Account Synchronization DM and perform other Account Synchronization DM functions. This component has no dependencies.

- **Account Synchronization EAI Java server**

  This Java server contains the files that start and stop the EAI Java server and perform other EAI Java server functions such as merging payload configuration files. This component has no dependencies.

  \begin{itemize}
  \item \textbf{Important:} If a Payload Generator External Module (another EAI Java server) has already been installed (as part of installing the EAI Manager or another EAI-based publisher), the Account Synchronization EAI Java server must be installed on the same host where the existing EAI server is installed.
  \end{itemize}

You can run the Account Synchronization DM and the Payload Generator External Module (EM) on computers other than the computer on which the CM is running. To do this, you must run the Account Synchronization installation program on each computer that hosts one or more of these features.
Installing and Configuring Account Synchronization

**Important:** Perform all installation and configuration steps before starting Account Synchronization.

To install Account Synchronization:
1. Configure Account Synchronization for Oracle.
   See "Configuring Account Synchronization".
2. Install Account Synchronization DM.
   See "Installing Account Synchronization DM".
3. Create additional Account Synchronization queues.
   See "Creating Additional Account Synchronization Queues".
4. If your database queues are on multiple databases, link the databases.
   See "Linking Oracle Databases".
5. Configure the EAI payload for Account Synchronization.
   See "Configuring the EAI Payload for Account Synchronization".
6. Enable event notification.
   See "Configuring Event Notification for Account Synchronization".
7. Configure Account Synchronization.
   See "Configuring Account Synchronization".
8. Configure the DAT_Listener module.
   See "Configuring the DAT_Listener Module".
9. Set up service-level bill items.
   See "Setting Up Service-Level Bill Items".
10. Configure Account Synchronization for multiple databases.
    See "Configuring Account Synchronization for Multiple Databases".

Configuring Account Synchronization

Before you install the Account Synchronization DM, you must configure all queuing database machines for advanced queuing (AQ).

Perform the following on each queuing database machine in your system:
1. Open the `Oracle_home/dbs/initSID.ora` file.
2. Set the `compatible` parameter to `9.0` to specify the Oracle 9i database.

**Important:** If you use an entry lower than `9.0`, your BRM and Pipeline Manager systems fail.

3. Set the `aq_tm_process` parameter to `1` to specify one queue monitor process (QMn).
Queue monitor process removes from the queue any processed events that are over an hour old.

4. Save and close the file.

5. Using SQL*Plus, log in to your database as the SYS user and grant AQ privileges to user pin:

```sql
% sqlplus sys/password@databaseAlias
SQL> grant execute on dbms_aq to pin;
Grant succeeded.

SQL> grant execute on dbms_aqadm to pin;
Grant succeeded.

SQL> grant select on sys.gv_$aq to pin;
Grant succeeded.

SQL> grant execute on dbms_lock to pin;
Grant succeeded.
```

6. To initialize the database instance with your changes, stop and restart Oracle.

### Installing Account Synchronization DM

**Note:** If you have already installed the product, features that are already installed cannot be reinstalled without uninstalling them first. To reinstall a feature, uninstall it and then install it again.

To install Account Synchronization DM:

1. Download the software to a temporary directory (temp_dir).

**Important:**

- If you download to a Windows workstation, use FTP to copy the .bin file to a temporary directory on your UNIX server.

- You must increase the heap size used by the Java Virtual Machine (JVM) before running the installation program to avoid “Out of Memory” error messages in the log file. For information, see "Increasing Heap Size to Avoid “Out of Memory” Error Messages".

2. Go to the directory where you installed the Third-Party package and source the source.me file.

**Note:** You must source the source.me file to proceed with installation, otherwise “suitable JVM not found” and other error messages appear.
Bash shell:

```
source source.me.sh
```

C shell:

```
source source.me.csh
```

3. Go to the temp_dir directory and enter this command:

```
7.4_AccountSynchTool_platform_32_opt.bin
```

**Note:** You can use the \(-console\) parameter to run the installation in command-line mode. To enable a graphical user interface (GUI) installation, install a GUI application such as X Windows and set the DISPLAY environment variable before you install the software.

4. (Optional) If you want to install Account Synchronization features separately, either on this computer or on another computer, select custom install when asked to specify the setup type.

Select the features you are installing by typing their respective numbers and click Next. The features are:

- AcctSync_CM
- AcctSync_DM
- AcctSync_EAI_JS

5. Follow the instructions displayed during installation.

The default installation directory for Account Synchronization DM is opt/portal/7.4.

**Note:** The installation program does not prompt you for the installation directory if BRM or Account Synchronization DM is already installed on the machine and automatically installs the package at the BRM_Home location.

6. Go to the directory where you installed the Account Synchronization DM package and source the source.me file:

   Bash shell:

   ```
   source source.me.sh
   ```

   C shell:

   ```
   source source.me.csh
   ```

7. Go to the BRM_Home/setup directory and run the pin_setup script.

   **Note:** The pin_setup script starts all required BRM processes.

   The script creates a queue on the specified database, configures your pin.conf files, and starts all of your BRM processes.

8. Stop the Account Synchronization DM process.
Creating Additional Account Synchronization Queues

The Account Synchronization DM installer automatically creates a default queue in a specified database. If your system requires multiple queues, create additional queues by manually running the `pin_ifw_sync_oracle` utility.

---

**Important:** To avoid system errors, do not run Pipeline Manager while you are running the `pin_ifw_sync_oracle` utility.

---

To create an additional database queue:

1. Verify default queue storage and retention time settings in the `create_ifw_sync_queue.conf` file.
   
   For information, see:
   - Configuring the Queue Location
   - Configuring How Often Processed Events Are Removed from the Queue

2. Enter the following command, which logs you in as the `pin` user:
   ```
   su - pin
   ```

3. Run the following command, which creates a new queue:
   ```
   pin_ifw_sync_oracle.pl create -q queue_name -t queue_table -l user/password@database_alias
   ```
   
   where:
   - `queue_name` is the name of the new queue. If you omit this parameter the utility creates a database queue named IFW_SYNC_QUEUE.
   - `queue_table` is the name of the database table that contains the `queue_name`. If you omit this parameter the utility creates a queue table named IFW_SYNC.
   - `user` is a valid user name for accessing the database.
   - `password` is the password for the specified `user`. If you omit this parameter the utility will prompt you for this information.
   - `database_alias` is the BRM database alias of the database to which you are adding a queue. If you omit this parameter the utility will prompt you for this information.

4. Run the following command, which verifies that the queue was created and functions properly by attempting to enqueue and dequeue 20 test events:
Installing and Configuring Account Synchronization

5. Run the following command, which generates a summary report that displays the state of each event in the queue:

```
pin_ifw_sync_oracle.pl report -r summary -q queue_name -l user/password@database_alias
```

6. Run a summary report to verify that the queue processed the test events properly:

```
pin_ifw_sync_oracle.pl report -r summary
```

If the tests were successful, the report lists all 20 events with a processed state:

<table>
<thead>
<tr>
<th>Evt. Stat</th>
<th>Event Name</th>
<th>Event Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESSED</td>
<td>LongTestEvent</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>ShortTestEvent</td>
<td>10</td>
</tr>
<tr>
<td>sum</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

If unsuccessful, you must drop and then recreate the queue and queue table. For information, see "Dropping the Queue and Queue Tables".

For more information about the `pin_ifw_sync_oracle` utility, see "pin_ifw_sync_oracle".

**Linking Oracle Databases**

**Note:** If your database queues reside on a single database, skip this section and go to "Configuring the EAI Payload for Account Synchronization".

If your system contains queues on multiple databases, you must create a link from each queuing database to every other queuing database. This allows Oracle to forward events to queues residing on other databases.

Before linking your Oracle databases, verify that the database alias names are defined in each `tnsnames.ora` file (`Oracle_home/network/admin/tnsnames.ora`).

**Note:** You can check this by logging in to one database as user `pin` and connecting to the other databases by using the database alias. For example:

```
SQL> connect pin/password@databaseAlias
```

To link your databases, perform the following steps from each database:

1. Using SQL*Plus, log in to your database as the SYSTEM user and grant database linking privileges to the BRM user `pin`:
Installing and Configuring Account Synchronization

2. Log in to the database as user pin:

```
SQL> connect pin/password@databaseAlias
```

3. Create a link to other databases by entering the following command:

```
SQL> CREATE DATABASE LINK RemoteDatabaseAlias CONNECT TO pin IDENTIFIED BY pin_password USING 'RemoteDatabaseAlias';
```

For example, if you have two databases with the alias names BRM1 and BRM2, log in to BRM1 and give the following SQL command:

```
SQL> CREATE DATABASE LINK BRM2 CONNECT TO pin IDENTIFIED BY pin_password USING 'BRM2';
```

and log in to BRM2 and give the following SQL command:

```
SQL> CREATE DATABASE LINK BRM1 CONNECT TO pin IDENTIFIED BY pin_password USING 'BRM1';
```

Configuring the EAI Payload for Account Synchronization

You must modify your BRM system’s payload configuration file in the following situations:

- If you have another EAI-based publisher, you must do the following:
  - Check for conflicts in the EAI payload configuration files.
    See "Checking for Conflicts in EAI Payload Configuration Files".
  - Specify the default configuration file.
    See “Specifying the Default Payload Configuration File”.

- If your Account Synchronization DM database number is not the default (0.0.9.9), see “Specifying the Account Synchronization DM Database Number”.

- If you uninstall Account Synchronization DM, see "Revising the Payload Configuration File When Uninstalling Account Synchronization DM".

For information about defining business events in the EAI payload configuration file, see *BRM Developer’s Guide*.

Checking for Conflicts in EAI Payload Configuration Files

If your BRM system already has an EAI publisher, the Account Synchronization DM installation program merges this file with the existing payload configuration file.

---

Note: If you do not already have an existing EAI publisher application, skip this section and go to "Specifying the Account Synchronization DM Database Number".

---

In rare cases, conflicts can occur when the Account Synchronization DM payload configuration file is merged with an existing payload configuration file. This can
happen when entries in the two original configuration files have conflicting definitions.

---

**Important:** You must determine if there are merge conflicts before you run the Account Synchronization DM.

---

Compare the Account Synchronization DM payload configuration file (`BRM_Home/sys/eai_js/payloadconfig_ifw_sync.xml`) with the existing payload configuration file (referenced in `BRM_Home/sys/eai_js/Infranet.properties`). If any of the following conditions exist, it is not possible to run both EAI publishers in the same BRM system:

- Two different business event definitions specify the same **StartEvent**.
- The same business event definitions have different values for one or more of these attributes: **StartEvent**, **EndEvent**, or **Source**.
- The same business event or element definitions have different search criteria.
- The same element definitions have different values for one or more of these attributes: **Source**, **PinFld**, **DataFrom**, **UseOnlyElement**, or **Tag**.
- The same element definitions have different **OnEvent** values.

### Specifying the Default Payload Configuration File

If your BRM system already has an EAI publisher, you must make the `payloadconfig_MergedWithIfw_sync.xml` file your system’s default payload configuration file.

---

**Note:** If you do not already have an existing EAI publisher application, skip this section and go to "Specifying the Account Synchronization DM Database Number".

---

To specify the default payload configuration file, do one of the following:

- Change the EAI **configFile** entry so that it points to the merged payload configuration file:
  a. In a text editor, open the `eai_js` properties file (`BRM_Home/sys/eai_js/Infranet.properties`).
  b. Change the `infranet.eai.configFile` entry to refer to the `BRM_Home/sys/eai_js/payloadconfig_MergedWithIfw_sync.xml` file:

      `infranet.eai.configFile=./payloadconfig_MergedWithIfw_sync.xml`

  c. Save and close the file.

- Rename the configuration file and the **configFile** entry to match each other:
  a. Change the name of the file specified in the `infranet.eai.configFile` entry.

      For example, change `payloadconfig.xml` to `payloadconfig_eai.xml`.

  b. Change the name of the `BRM_Home/sys/eai_js/payloadconfig_MergedWithIfw_sync.xml` file to match the file name specified in the `infranet.eai.configFile` entry.
Specifying the Account Synchronization DM Database Number

The default BRM database number for your Account Synchronization DM is 0.0.9.9. If you change your database number, you must change the value of the DB attribute in the Account Synchronization DM publisher definition.

---

**Note:** If you did not change the default database number for your Account Synchronization DM, go to “Configuring Event Notification for Account Synchronization”.

---

1. In a text editor, open the payload configuration file in the BRM_Home/sys/eai_js directory (payloadconfig_ifw_sync.xml, or the merged file if you merged payload configuration files).
2. Find the `<PublisherDefs>` section.
3. In the Publisher DB entry, type the correct BRM database number.
   
   For example, if your Account Synchronization DM database number is 0.0.9.5, change this entry:
   ```xml
   <PublisherDefs>
   <Publisher DB="0.0.9.9" Format="FLIST">
   ```
   to this:
   ```xml
   <PublisherDefs>
   <Publisher DB="0.0.9.5" Format="FLIST">
   ```
   4. Save and close the file.

Revising the Payload Configuration File When Uninstalling Account Synchronization DM

To remove Account Synchronization elements from your system’s EAI payload configuration file after uninstalling Account Synchronization DM:

1. In a text editor, open the payload configuration file in the BRM_Home/sys/eai_js directory (payloadconfig_ifw_sync.xml, or the merged file if you merged payload configuration files).
2. Find the `<PublisherDefs>` section.
3. Remove the following publisher definition:
   ```xml
   <Publisher DB="0.0.9.9" Format="FLIST">
   ```

---

**Note:** This is the default Account Synchronization DM publisher definition. Your definition might have a different DB attribute. For more information, see “Specifying the Account Synchronization DM Database Number”.

---

4. Save and close the file.
5. Stop and restart the Payload Generator External Module (the EAI Java server) by entering this command from the BRM_Home/bin directory:
   ```
   pin_ctl bounce eai_js
   ```
Configuring Event Notification for Account Synchronization

When a BRM event that is included in a business event defined in the Account Synchronization DM payload configuration file occurs, the EAI framework uses event notification to call the opcode that caches the BRM event in the Payload Generator. See "About Event Notification" in BRM Developer’s Guide.

Before you can use Account Synchronization, you must configure the event notification feature as follows:

1. If your system has multiple configuration files for event notification, merge them.
2. Ensure that the merged file includes the entire event notification list in the BRM_Home/sys/data/config/pin_notify_ifw_sync file.
3. (Optional) If you defined new business events for Account Synchronization, you must edit your final event notification list to include all the BRM events in the new business events.
4. Load your final event notification list into the BRM database.

Configuring Account Synchronization

You configure the Account Synchronization DM to connect to the BRM database and the database queue by performing these tasks:

1. Connect the Account Synchronization Manager’s EAI framework to BRM by editing the CM configuration file (pin.conf).
   See "Configuring the CM for Account Synchronization".
2. Map BRM business events to the appropriate database queue by editing the ifw_sync_queuenames file.
   See "Mapping Business Events to the Database Queue".
3. Connect the Account Synchronization DM to the database queue by editing the Account Synchronization DM configuration file (pin.conf).
   See "Configuring the Account Synchronization DM Configuration File".

Configuring the CM for Account Synchronization

You must modify the CM pin.conf file to enable the EAI framework to notify Account Synchronization when specific events occur. You should also verify that the pointer to the Account Synchronization DM specifies the correct database and port numbers.

---

**Important:** If you use a multidatabase system and set up more than one CM, you must edit the configuration file for each CM.

---

1. Open the CM configuration file (BRM_Home/sys/cm/pin.conf) in a text editor.
2. Set the enable_publish entry to 1:
   - `fm_publish enable_publish 1`
3. Verify that the ifw_sync_dm_pointer entry specifies the correct database and port:
   - `cm dm_pointer 0.0.9.9 ip host_name/ip_address 11999`
   
   where:
   - 0.0.9.9 is the default Account Synchronization DM database number.
Installing and Configuring Account Synchronization

- `host_name/ip_address` is the host name or IP address of the computer on which the Account Synchronization DM runs.
- `11999` is the default Account Synchronization DM port number.

**Note:** If you change the location of the Account Synchronization DM, you need to modify this pointer. For more information, see "Using Configuration Files to Connect and Configure Components" in BRM System Administrator’s Guide.

**Important:** The Account Synchronization DM database number must match the number in these entries:

- The `dm_db_no` entry in the Account Synchronization DM configuration file (BRM_Home/sys/dm_ifw_sync/pin.conf).
- The `DB` entry of the Account Synchronization Publisher definition in the payload configuration file (BRM_Home/sys/eai_js/payloadconfig_ifw_sync.xml).

The Account Synchronization DM port number must match the number in the `dm_port` entry in the Account Synchronization DM configuration file (BRM_Home/sys/dm_ifw_sync/pin.conf).

4. Save and close the file.
5. Stop and restart the CM:
   - From the `BRM_Home/bin` directory, enter this command:
     ```sh
pin_ctl bounce cm
     ```

**Mapping Business Events to the Database Queue**

You must configure which events the Account Synchronization DM sends to each database queue by editing the `ifw_sync_queuenames` file. This file specifies the names of all queues in your system and which events to send to each queue.

**Note:**

- Only business events that are defined in the `payloadconfig` file can be sent to the database queue.
- Account Synchronization does not send events to queues until you edit the `ifw_sync_queuenames` file.

To map business events to the database queue:

1. Open the `BRM_Home/sys/dm_ifw_sync/ifw_sync_queuenames` file in a text editor.
2. Add entries for each queue in your system by using the following syntax:

```python
queue_Name@database_Link
{
  Criteria
}
```
where:

- **queue_Name** specifies the queue name. The queue name must match the name you assigned the queue when you created it. Each queue name must also match the queue name in the corresponding DAT_Listener registry.

- **database_Link** Use the database link names you created in "Linking Oracle Databases"

- **Criteria** specifies which events to send to the queue. You can configure the Account Synchronization DM to send all business events, only events from a specific database, or only specific event types. Table 22–1 shows the syntax for each criteria:

<table>
<thead>
<tr>
<th>To Send This</th>
<th>Use This Syntax</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>All business events</td>
<td>ALL</td>
<td>ALL</td>
</tr>
<tr>
<td>Only business events from a specific database</td>
<td>0.0.0.x</td>
<td>0.0.0.1</td>
</tr>
<tr>
<td>Only specific event types</td>
<td>eventName</td>
<td>CustCreate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ProductCancel</td>
</tr>
</tbody>
</table>

For example, to send all business events from BRM database 0.0.0.1 to the IFW_SYNC_QUEUE queue, and only CustCreate events to the IFW_SYNC_QUEUE2 queue, which resides in another database:

```
IFW_SYNC_QUEUE
{
  0.0.0.1
}

IFW_SYNC_QUEUE2@database_Link
{
  CustCreate
}
```

3. Save and close the file.

**Configuring the Account Synchronization DM Configuration File**

During installation, the Account Synchronization DM installer generates a `pin.conf` configuration file that specifies how to connect to your BRM database and database queue and that contains other configuration settings. The installer populates the connection entries with values from your `pin_setup.values` file and provides default information for the other configuration entries. Before you start Account Synchronization DM, verify that the file contains accurate information for connecting to your BRM database and database queue.

In multidatabase systems, each BRM database has its own Account Synchronization DM. Verify that each Account Synchronization DM `pin.conf` file contains accurate information for its associated BRM database and database queue.

Perform the following for each instance of Account Synchronization DM:

1. Open the Account Synchronization configuration file (`BRM_Home/sys/dm_ifw_sync/pin.conf`) in a text editor.

2. Verify that the `plugin_name` entry specifies the path and file name of the correct shared library file:
- `dm plugin_name path/name`

where `name` is `libplugin_ifw_sync9i.so` for Solaris, Linux, and HP-UX IA64; and `libplugin_ifw_sync9i.a` for AIX.

3. Verify that the `queue_map_file` entry specifies the path and file that maps the Oracle database queues to the events they are to receive.

For example:

- `dm_ifw_sync queue_map_file ./ifw_sync_queue_names`

For more information, see "Mapping Business Events to the Database Queue".

4. Verify that the `queue_database` entry specifies the alias name of the Oracle queuing database to which Account Synchronization DM connects.

The value of this entry should be the TNSNAMES.ORA alias, which can be found in the `Oracle_home/network/admin/tnsnames.ora` file:

- `dm_ifw_sync sm_database alias_name`

5. Verify that the `queuing_database_id` entry specifies the database user name that Account Synchronization DM uses to log in to the queuing database:

- `dm_ifw_sync sm_id user_name`

6. Verify that the `queuing_database_pw` entry specifies the password for the user specified in the `queuing_database_id` entry:

- `dm_ifw_sync sm_pw password`

7. (Optional) You can also edit the entries in Table 22–2:

<table>
<thead>
<tr>
<th>Entry Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect_retries</td>
<td>Specifies the number of times that Account Synchronization DM attempts to connect to the database queue.</td>
</tr>
<tr>
<td>retry_interval</td>
<td>Specifies the length of time, in seconds, that Account Synchronization waits before attempting to reconnect to the database queue.</td>
</tr>
</tbody>
</table>

For more information, see "Configuring Account Synchronization DM Database Connection Attempts".

For other entries you can edit, see the comments in the `pin.conf` file.

8. Save and close the file.

**Configuring the DAT_Listener Module**

Each instance of Pipeline Manager is connected to one database queue. You must configure each instance’s DAT_Listener module to connect to its corresponding database queue by modifying the Pipeline Manager registry.

**Configuring the Registry**

Perform the following tasks for each instance of Pipeline Manager:

1. Open the registry file.

2. Add the following lines to the Listener section of the registry file:
Installing and Configuring Account Synchronization

Installing and Configuring the Account Synchronization DM

Listener
{
  ModuleName = DAT Listener
  Module
  {
    InfranetConnection = #mandatory
    QueueName = #mandatory
    QueueLibrary = #mandatory
    ConnectRetries = #optional
    RetryInterval = #optional
    LogEvents = #optional
  }
}

where:

- **InfranetConnection** points to the section of the registry file that specifies how Account Synchronization DM connects to the database queue. For example, `ifw.DataPool.LoginAccountSync`. This entry is mandatory.

- **QueueName** specifies the queue name. For example, `IFW_SYNC_QUEUE`. This entry is mandatory.

- **QueueLibrary** specifies if the Listener should use Oracle queue libraries. Enter `OracleQueue`.

- **ConnectRetries** specifies the number of times the DAT_Listener module retries to connect to the database queue. This entry is optional. The default is 0.

- **RetryInterval** specifies the time, in seconds, between reconnection attempts. This entry is optional. The default is 5.

- **LogEvents** specifies whether the entire contents of each business event is copied to a log file. This entry is optional. The default is `FALSE`.

3. Save and close the file.

Configuring Interleaved Processing

You can control how many events are waiting to be processed at one time by configuring DAT_Listener to interleave CDR and business event processing. For more information, see "About Controlling the Business Event Backlog".

To interleave processing between CDR and business events:

1. Open the registry file.
2. Add the interleaving entries in the Listener section of the registry file:

```plaintext
Important: The Listener section must be listed after the pipeline and BRM database connection sections. Otherwise, Pipeline Manager fails to start.

Listener
{
  ModuleName = DAT Listener
  Module
  {
    InfranetConnection = #mandatory
    QueueName = #mandatory
    QueueLibrary = #mandatory
    ConnectRetries = #optional
    RetryInterval = #optional
    LogEvents = #optional
  }
}
```

Note: These entries are optional. If not present, Pipeline Manager processes CDRs and business events concurrently.
Listener
{
    ModuleName = DAT_Listener
    Module
    {
        #Add the following lines for interleaved processing:
        InterleavingReqd = true       #default is False
        MaxNumEvents =                #default is 900
        MinNumEvents =                #default is 300
        CheckInterval =               #default is 60
        EnableInterLeavingStatistics = #default is False
        ProcessAllEvents =            #default is False
        MaxEventProcessTime =         #default is 60
        MaxCDRProcessTime =           #default is 300
    }
}

where:

- **InterleavingReqd** specifies whether interleaved processing is enabled.
  The default is **False**. When set to **False** or not specified, interleaved processing is not performed; CDRs and events are processed simultaneously.

- **CheckInterval** specifies (in seconds) how frequently DAT.Listener checks the number of events waiting in the queue (specified by **MaxNumEvents** and **MinNumEvents**) and the amount of processing time that has passed (specified by **MaxCDRProcessTime** and **MaxEventProcessTime**).
  The default is **60**. If this entry is not present, the default interval is used.

  **Note:** This entry takes precedence over **MaxNumEvents**, **MinNumEvents**, **MaxEventProcessTime**, and **MaxCDRProcessTime**. If **CheckInterval** is set too high, DAT.Listener won’t switch between CDR and event processing even if the thresholds have been reached. For example, if **MaxEventProcessTime** is set as **3600** seconds and **CheckInterval** is set to **7200** seconds, events are processed for **7200** seconds before the processing time is checked.

- **MaxNumEvents** specifies the maximum number of business events allowed in the queue.
  The default is **900**. When the number of events in the queue reaches or exceeds this amount, DAT.Listener stops CDR processing and starts business event processing. When this entry is specified, **MinNumEvents** must also be specified.
  For example, suppose **CheckInterval** is set to **60** seconds and **MaxNumEvents** is set to **900**. When the business event queue is checked, there are **850** events in the queue. Because the number of events in the queue is less than **900**, CDR processing does not stop. When the queue is checked again after the **60**-second interval, there are **950** events in the queue. Because the number of events in the queue is greater than **900**, CDR processing is stopped and queue processing is started.

- **MinNumEvents** specifies the minimum number of business events allowed in the queue.
The default is 300. When the number of events in the queue reaches or drops below this amount, DAT Listener stops business event processing and starts CDR processing. When this entry is specified, MaxNumEvents must also be specified.

For example, suppose CheckInterval is set to 60 seconds and MinNumEvents is set to 400. When the business event queue is checked, there are 401 events in the queue. Because the number of events in the queue is greater than 400, queue processing does not stop. When the queue is checked again after the 60-second interval, there are 10 events in the queue. Because the number of events in the queue is less than 400, queue processing is stopped and CDR processing is started.

- **EnableInterLeavingStatistics** specifies whether to log only interleaving statistical data.

  The default is False. By default, DAT Listener logs all processing messages in the pipeline processing log (`process.log`). If this entry is set to True, only statistical data related to the rate of interleaved processing is logged. You can use this entry to monitor your event processing performance.

- **ProcessAllEvents** specifies whether to process all events in the queue when Pipeline Manager is started.

  A value of True processes all events in the queue before activating interleaved processing. A value of False activates interleaved processing at startup, and events are processed according to the interleaving settings.

  If set to True at startup, after processing all events, this entry is reset to False. To use this feature, you must reset this entry to True each time you restart Pipeline Manager.

- **MaxEventProcessTime** specifies the maximum number of seconds that business events are processed.

  The default is 60. When Pipeline Manager has been processing business events for this amount of time, DAT Listener stops business event processing and starts CDR processing regardless of how many business events are in the queue. When this entry is specified, MaxNumEvents, MinNumEvents, and MaxCDRProcessTime must also be specified.

- **MaxCDRProcessTime** specifies the maximum number of seconds that CDRs are processed.

  The default is 300. When Pipeline Manager has been processing CDRs for this amount of time, DAT Listener stops CDR processing and starts business event processing regardless of how many CDRs are in the queue. When this entry is specified, MaxNumEvents, MinNumEvents, and MaxEventProcessTime must also be specified.

---

**Important:** The default values for interleaved processing are also the minimum required values. If you specify a value less than the default for any entry, that value is ignored and the default value is used.

Some entries can be used in a semaphore to update the processing thresholds. If these semaphores contain an error, the pipeline is deactivated and you must reactivate it. See "Starting and Stopping the BRM System" in *BRM System Administrator’s Guide.*
3. Save and close the file.

**Switching to Business Event Processing When No CDRs Are Waiting**

When there are no CDRs to process, DAT_Listener waits until either the CDR processing time threshold is reached or the maximum number of business events is reached before switching to business event processing. If this wait period is too long, you can shorten the CDR processing time by using a semaphore to update the DAT_Listener registry. The new semaphore value becomes effective the next time DAT_Listener checks for the number of events and elapsed processing time. This is determined by the **CheckInterval** registry entry. For example, if **CheckInterval** is set to 180 seconds, the semaphore update becomes effective after 180 seconds have elapsed.

Use one of the following semaphores to shorten the CDR processing time so that business events are processed sooner:

- Shorten the CDR processing time by changing the **MaxCDRProcessTime** value:
  

- Reduce the maximum number of business events by changing the **MaxNumEvents** value:
  

If the number of business events waiting in the queue exceeds the new value, DAT_Listener immediately switches to business event processing when it checks the number of events.

**Setting Up Service-Level Bill Items**

To enable Pipeline Manager to choose the correct bill item for an event, you need to configure BRM to pre-create service-level items. (For more information, see "How Pipeline Manager Assigns Delayed Events to Items" in **BRM Configuring Pipeline Rating and Discounting**.)

To set up service-level bill items, you run the **load_config_item** utilities to load the contents of the **config_item_tags** and **config_item_types** files into the BRM database. For more information, see "Creating Custom Bill Items" in **BRM Configuring and Running Billing**.

**Turning On Object Auditing**

After installing the Account Synchronization DM, you must enable BRM to audit GSM (Global System for Mobile Communication) objects by running the **object_auditing.pl** script. Auditing objects create a history of certain information, such as phone numbers and logins, so that BRM can track changes.

For a list of default objects, see "Required Objects to Be Audited".

The **object_auditing.pl** script invokes the "pin_history_on" utility to load the file containing the objects to audit and turn on object auditing. It then creates the audit table indexes in the BRM database.
Installing and Configuring Account Synchronization

To enable additions of GSM objects, use the following command to run the `object_auditing.pl` script:

```
perl object_auditing
```

For more information, see "object_auditing".

You can customize audit table indexes or the list of audited objects by modifying the input files before running the `object_auditing` script:

- To customize the list of audited objects, edit the `pin_history_on` input file (`BRM_Home/apps/integrate_sync/pin_history_on_input`).
- To customize your audit table indexes, edit the index file (`BRM_Home/sys/dd/data/create_indexes_audit_tables_oracle.source`).

### Required Objects to Be Audited

Pipeline Manager requires certain objects to be audited, which are included in the `pin_history_on_input` file in `BRM_Home/apps/integrate_sync`. Table 22-3 lists the default objects and their fields configured in the file:

<table>
<thead>
<tr>
<th>Object</th>
<th>Fields Audited By Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>/account</td>
<td>PIN_FLD_BRAND_OBJ, PIN_FLD_ACCOUNT_NO, PIN_FLD_CURRENCY,</td>
</tr>
<tr>
<td></td>
<td>PIN_FLD_RESIDENCE_FLAG, PIN_FLD_PRODUCTS.PIN_FLD_USAGE_END_T,</td>
</tr>
<tr>
<td></td>
<td>PIN_FLD_PRODUCTS.PIN_FLD_USAGE_START_T</td>
</tr>
</tbody>
</table>
Configuring Account Synchronization for Multiple Databases

For an overview of how Account Synchronization works in a multidatabase system, see "About Account Synchronization".

To synchronize accounts in BRM and Pipeline Manager on a multidatabase system:

1. Set up your multidatabase system and create multiple instances of Pipeline Manager for each database.

2. Configure each queuing database for Account Synchronization.
   
   See "Configuring Account Synchronization".

3. Link your queuing databases so that the database can forward events to the appropriate database queue when necessary.
   
   See "Linking Oracle Databases".

4. Install Account Synchronization DM on all systems that have the CM installed by following the instructions in "Installing Account Synchronization DM".

   **Note:** You don’t need to perform all the configuration steps for secondary Account Synchronization installations. For example, you don’t need to configure the EAI payload, enable event notification, set up service-level items, turn on object auditing, and validate rate plans. These updates will be propagated to each database by the BRM multidatabase software.

5. (Optional) Create additional database queues.
See "Creating Additional Account Synchronization Queues".

6. Map each instance of the DAT_Listener module to its corresponding database queue.

   See "Configuring the DAT_Listener Module".

7. Map the business events to each database queue in the ifw_sync_queuesnames files.

   See "Mapping Business Events to Multiple Database Queues".

8. Edit the configuration file (pin.conf) for each instance of Account Synchronization DM.

   See "Configuring the Account Synchronization DM Configuration File".

9. In the registry section for the DAT_AccountBatch module, add the UseAsRouter entry and set it to True, as in this example:

    ```
    CustomerData
    {
        ModuleName = DAT_AccountBatch
        Module
        {
            IntegrateConnection = ifw.DataPool.Login
            InfranetConnection = ifw.DataPool.LoginInfranet
            LogEvents = True
            LoadLogins = True
            Listener = ifw.DataPool.Listener
            Connections = 10
            Threads = 10
            UseAsRouter = True
        }
    }
    ```

    For more information on this parameter, see "DAT_AccountBatch" in BRM Configuring Pipeline Rating and Discounting.

10. In the registry section for the FCT_AccountRouter module, map each BRM database identifier to an output stream, as in this example:

    ```
    AccountRouter
    {
        ModuleName = FCT_AccountRouter
        Module
        {
            Active = True
            DataModule = ifw.DataPool.CustomerData
            Streams
            {
                1 = PinOutputStream1
                2 = PinOutputStream2
                3 = PinOutputStream3
                4 = PinOutputStream4
                5 = PinOutputStream5
            }
        }
    }
    ```

    Note: You can use any names for the output streams.
For more information on this parameter, see "FCT_AccountRouter" in BRM Configuring Pipeline Rating and Discounting.

11. Configure the registry of each Pipeline Manager instance to read accounts from their associated databases.

For example, Pipeline Manager 1 connects to database 1, Pipeline Manager 2 connects to database 2, and so forth.

Mapping Business Events to Multiple Database Queues

Each instance of Account Synchronization DM connects to only one database queue. In some cases, the Account Synchronization DM receives an event that belongs to another database; for example, when you move an account from one database to another. Oracle AQ uses the queue name entries in the ifw_sync_queuenames file to send the events to the appropriate queue.

The queuenames file in each database must include one or more queue entries for every database. Each queue entry includes the queue name and the events to send to that queue.

To map business events to multiple database queues:

1. Open the ifw_sync_queuenames file (BRM_Home/sys/dm_ifw_sync/ifw_sync_queuenames).

2. Add the queue names corresponding to each database and the business events to send to those queues.

   ____________
   Important: The queue names must match the names you assigned the queues when you created them. Each queue name must also match the queue name in the corresponding DAT_Listener registry.
   ____________

If the queue is on the local database, enter only the queue name. If the queue is on a remote database, you must append the queue name with a link to the database to which it belongs. This means that for each ifw_sync_queuenames file, the queue names will be identical, but the queues that include a link will vary.

For example, if you use three databases, the entries in the queuenames file on database 0.0.0.1 will look like this:

```plaintext
IFW_SYNC_ROUTER_QUEUE
{
 CustCreate
 ServiceLogin
 CustDelete
}

IFW_SYNC_QUEUE # local database queue
{
  0.0.0.1
}
IFW_SYNC_QUEUE2@BRM2 # remote database
{
  0.0.0.2
}
IFW_SYNC_QUEUE3@BRM3 # remote database
{
  0.0.0.3
}
```
And the entries in the `queuenames` file on database 0.0.0.2 will look like this:

```md
IFW_SYNC_ROUTER_QUEUE@BRM1
{
    CustCreate
    ServiceLogin
    CustDelete
}

IFW_SYNC_QUEUE@BRM1  # remote database queue
{
    0.0.0.1
}

IFW_SYNC_QUEUE2  # local database
{
    0.0.0.2
}

IFW_SYNC_QUEUE3@BRM3  # remote database
{
    0.0.0.3
}
```

In the above example, the queue that connects to the Pipeline Manager instance where the multidatabase router is configured (IFW_SYNC_ROUTER_QUEUE) is on the same database as the primary queue.

---

**Note:** The multidatabase router is only interested in `CustCreate`, `CustDelete`, and `ServiceLogin` events. However, you can alternatively specify `ALL` to have all events sent to the router.

---

For more information, see "Mapping Business Events to the Database Queue".

3. Save and close the file.

### Starting and Stopping Account Synchronization DM

To start Account Synchronization DM, enter this command at the prompt for Oracle AQ:

```
pin_ctl start dm_ifw_sync
```

To stop Account Synchronization DM, enter this command at the prompt for Oracle AQ:

```
pin_ctl stop dm_ifw_sync
```

### Monitoring and Maintaining the Account Synchronization Queue

This section provides information and guidelines to help you manage your Account Synchronization queues.

The main administrative tasks for database queues are:

- Creating Additional Queues
- Generating Queue Reports
Monitoring and Maintaining the Account Synchronization Queue

- Dropping the Queue and Queue Tables
- Configuring the Queue Location
- Configuring How Often Processed Events Are Removed from the Queue
- Configuring Account Synchronization DM Database Connection Attempts
- Disconnecting and Reconnecting Account Synchronization DM to the Queue
- Disconnecting and Reconnecting DAT_Listener to the Queue

Creating Additional Queues

You must create additional queues in the following situations:

- You add a new instance of Pipeline Manager to your system.
- You add a BRM database to your system.

To create additional queues in an existing system:

1. Stop Account Synchronization DM.
   See "Starting and Stopping Account Synchronization DM".
2. If necessary, configure the Oracle database for Account Synchronization.
   See "Configuring Account Synchronization".
3. If you are creating your queue in a new database, create internal database links between your database queues.
   See "Linking Oracle Databases".
4. Create the new database queue by using pin_ifw_sync_oracle.
   See "Creating Additional Account Synchronization Queues".
5. Specify which events the Account Synchronization DM sends to the new queue.
   See "Mapping Business Events to the Database Queue".
6. Connect the new queue to its corresponding DAT_Listener module.
   See "Configuring the DAT_Listener Module".
7. Restart Account Synchronization DM.
   See "Starting and Stopping Account Synchronization DM".

Generating Queue Reports

You can monitor the events in your database queue by running pin_ifw_sync_oracle.

---

**Important:** To avoid system errors, do not run Pipeline Manager while you are running the pin_ifw_sync_oracle utility.

---

The pin_ifw_sync_oracle utility creates the following reports:

- A summary report lists the number of events set to the READY and PROCESSED states.
- A detailed report lists each event’s ID, state, queuing time, and dequeuing time.
Generating Oracle AQ Reports
To run a summary report for Oracle AQ, enter the following command:

```
% pin_ifw_sync_oracle.pl report -r summary [-q queue_name]
```

where `queue_name` specifies the queue name. For information, see "pin_ifw_sync_oracle".

To run a detailed report for Oracle AQ, enter the following command:

```
% pin_ifw_sync_oracle.pl report -r detail [-q queue_name]
```

where `queue_name` specifies the queue name. For information, see "pin_ifw_sync_oracle".

Dropping the Queue and Queue Tables
To drop the queue and its queue table, run the `pin_ifw_sync_oracle` utility with the `drop` command:

```
% pin_ifw_sync_oracle.pl drop [-q queue_name]
```

The specified queue is dropped from the database. If the database contains no other queues for Account Synchronization, the utility also removes the Account Synchronization package, which contains stored procedures for queuing, dequeuing, and purging events.

For more information, see "pin_ifw_sync_oracle".

Configuring the Queue Location
By default, the `pin_ifw_sync_oracle` utility creates Oracle database queues in the tablespace you specified when you installed Account Synchronization DM. If you want to use a different tablespace, perform one of the following:

- Specifying Default Storage Settings by Using the Create_ifw_sync_queue.conf File
- Specifying Storage Settings by Using the pin_ifw_sync_oracle Utility

Specifying Default Storage Settings by Using the Create_ifw_sync_queue.conf File
You can specify the default storage settings by using the `create_ifw_sync_queue.conf` file. All database queues that you create use the default settings unless you override them with the `pin_ifw_sync_oracle` utility.

To specify your default storage settings:

1. Open the `BRM_Home/apps/pin_ifw_sync/create_ifw_sync_queue.conf` file in a text editor.
2. Specify the target tablespace and queue size by editing the `storage_clause` parameter:

```
Tip: For production systems, create your queue in its own, separate tablespace to improve processing performance.
```
Specifying Storage Settings by Using the pin_ifw_sync_oracle Utility

You can specify a queue’s storage settings by using the `pin_ifw_sync_oracle` utility with the `-s` parameter. This option overrides the storage settings in the `create_ifw_sync_queue.conf` file.

```
$storage_clause = "tablespace PIN00 initrans 5 storage (initial 200k next 200k maxextents unlimited pctincrease 0 )";
```

3. Save and close the file.

To specify storage settings by using the `pin_ifw_sync_oracle` utility:

```
% su - pin
% pin_ifw_sync_oracle.pl create [-q queue_name -t queue_table] -s storage_clause
```

where:

- `queue_name` specifies the queue name.
- `queue_table` specifies the queue table name.
- `storage_clause` specifies the queue’s storage parameters.

For more information, see "pin_ifw_sync_oracle".

**Tip:** For production systems, create your queue in its own, separate tablespace to improve processing performance.

Configuring How Often Processed Events Are Removed from the Queue

The Oracle queue monitor process (QMn) removes from the queue any event set to the PROCESSED state for a specified amount of time. You specified a default retention time when you installed Account Synchronization DM. If you want to use a different retention time, perform one of the following:

- Specifying Default Retention Times by Using the create_ifw_sync_queue.conf File
- Specifying Retention Times by Using the pin_ifw_sync_oracle Utility

**Specifying Default Retention Times by Using the create_ifw_sync_queue.conf File**

You can specify the default retention time setting by using the `create_ifw_sync_queue.conf` file. All database queues that you create use this default setting unless you override it with the `pin_ifw_sync_oracle` utility.

To specify how often processed events are removed:

1. Open the `BRM_Home/apps/pin_ifw_sync/create_ifw_sync_queue.conf` file in a text editor.

2. Set the `retention_time` parameter to the amount of time, in seconds, that you want to store processed events in the database queue:

   **Note:** For production systems, set the retention time to 0 to optimize your processing performance.
3. Save and close the file.

### Specifying Retention Times by Using the `pin_ifw_sync_oracle` Utility

You can specify a queue’s retention time by using the `pin_ifw_sync_oracle` utility with the `-r` parameter. This option overrides the retention time settings in the `create_ifw_sync_queue.conf` file.

**Important:** To avoid system errors, do not run Pipeline Manager while you are running the `pin_ifw_sync_oracle` utility.

To set the retention time by using the `pin_ifw_sync_oracle` utility:

```
% su - pin
% pin_ifw_sync_oracle.pl create [-q queue_name -t queue_table] -r retention_time
```

where:
- `queue_name` specifies the queue name.
- `queue_table` specifies the queue table name.
- `retention_time` specifies the queue’s retention time, in seconds.

For more information, see "`pin_ifw_sync_oracle`".

**Tip:** For production systems, set the retention time to 0 to optimize your processing performance.

### Configuring Account Synchronization DM Database Connection Attempts

You can configure how often Account Synchronization DM attempts to connect to the database that contains the Account Synchronization queue.

To configure connection attempts:

1. Open the Account Synchronization DM configuration file (`BRM_Home/sys/dm_ifw_sync/pin.conf`) in a text editor.
2. Specify the number of times Account Synchronization DM should retry to connect to the Oracle database server by editing the `connect_retries` entry.
   The default is 1.
   ```
   -dm_ifw_sync connect_retries number_of_retries
   ```
3. Specify the interval, in seconds, between each reconnection attempt by editing the `retry_interval` entry.
   The default is 0.
   ```
   -dm_ifw_sync retry_interval interval
   ```
4. Save and close the file.
5. Stop and restart Account Synchronization DM.
   See "Starting and Stopping Account Synchronization DM".
Disconnecting and Reconnecting Account Synchronization DM to the Queue

You can prevent the Account Synchronization DM from enqueuing business events when you tune or shut down the queueing database by using the `pin_ctl` utility. See "pin_ctl" in BRM System Administrator's Guide.

To disconnect from the queue, use the following command:

```
pin_ctl stop dm_ifw_sync
```

To reconnect to the database queue and begin enqueuing business events, use the following command:

```
pin_ctl start dm_ifw_sync
```

For more information, see "Starting and Stopping the BRM System" in BRM System Administrator's Guide.

Disconnecting and Reconnecting DAT_Listener to the Queue

You can keep Pipeline Manager online when you tune or shut down the queueing database by disconnecting the DAT_Listener module from the queue. For more information, see "About Disconnecting the Account Synchronization DM from the Queue".

To disconnect the module from the database queue, use the `Disconnect()` semaphore file entry, as shown below:

```
```

To reconnect the DAT_Listener module to the database queue, use the `Connect()` semaphore file entry, as shown below:

```
```

For more information about the semaphore entries, see "DAT_Listener" in BRM Configuring Pipeline Rating and Discounting.

Troubleshooting Account Synchronization DM

If an error occurs during an Account Synchronization operation, check the Account Synchronization log file (`BRM_Home/sys/dm_ifw_sync/dm_ifw_sync.pinlog`) for error codes. For a list of standard errors and codes, see "BRM Error Codes" in BRM System Administrator's Guide.

Database Queue Creation Error

To install Account Synchronization DM and create database queues, the `pin` user must have Oracle AQ privileges. If `pin` doesn’t have privileges, you receive the following error when you attempt to install Account Synchronization DM or create queues with the `pin_ifw_sync_oracle` utility:

```
PLS-00201 identifier 'SYS.DBMS_AQ' must be declared
```

To fix this error:

1. Using SQL*Plus, log in to your database as the SYS user and grant AQ privileges to user `pin`:

```
% sqlplus sys/password@databaseAlias
SQL> grant execute on dbms_aq to pin;
```
Grant succeeded.

SQL> grant execute on dbms_aqadm to pin;
Grant succeeded.

SQL> grant execute on dbms_lock to pin;
Grant succeeded.

2. Reinstall Account Synchronization DM or create your queue by running the `pin_ifw_sync_oracle` utility manually.

See "Creating Additional Account Synchronization Queues".

Interleaved Processing Errors

This section describes interleaved processing errors and their solutions.

Missing Registry Entries

If you enable interleaved event processing in DAT_Lister, and you specify the event and CDR processing time entries (MaxEventProcessTime and MaxCDRProcessTime), you must also specify the entries that set the number of event thresholds (MaxNumEvents and MinNumEvents). If you don’t do this, DAT_Lister throws a critical error (ERR_REG_VALUE_INVALID) during startup. However, if you update the registry by using a semaphore and the required entries are not specified, DAT_Lister throws a warning and disregards the semaphore update.

Semaphore Entry Errors

When an interleaving semaphore entry contains an error, the pipelines are deactivated. The following interleaving semaphore errors cause the pipelines to be deactivated:

- The values for MinNumEvents and MaxNumEvents are not numbers.
- MinNumEvents is less than MaxNumEvents.
- The values for MaxEventProcessTime and MaxCDRProcessTime are not numbers.
- CheckInterval is not a number.

To reactivate the pipelines, use the Active semaphore. For example:

```plaintext
ifw.Pipelines.PRE_PROCESS.Active=TRUE
ifw.Pipelines.PRE_RECYCLE.Active=TRUE
ifw.Pipelines.ALL_RATE.Active=TRUE
```

After the pipelines are reactivated, reissue the interleaving semaphore using the correct values.

Modifying Business Events before Sending Them to Pipeline Manager

You can modify the BRM events that make up a business event before the business event is sent to Account Synchronization DM for publishing to Pipeline Manager. You do this by customizing the Account Synchronization policy opcode, PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT. See BRM Developer’s Reference.
You might want to modify an event to filter out unneeded data, which can improve performance if you publish large quantities of events. You can also use a flag to specify how adjustments should be applied to the account balance; for example, to permit the account to have a negative balance. For more information, see the description of PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT in BRM Developer’s Reference.

To modify a business event before sending it to Pipeline Manager:

1. Ensure that all the BRM events that make up the business event are associated with opcode number 3626 (PCM_OP_IFW_SYNC_PUBLISH_EVENT) in your system’s event notification list.
   See "Configuring Event Notification for Account Synchronization".

2. Use PCM_OP_IFW_SYNC_PUBLISH_EVENT to process the BRM events that make up the business event.
   See "Processing BRM Events That Make Up Account Synchronization Business Events".

3. Use the PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT policy opcode to customize the BRM events that make up the business event.
   See "Modifying BRM Events That Make Up Account Synchronization Business Events".

Processing BRM Events That Make Up Account Synchronization Business Events

PCM_OP_IFW_SYNC_PUBLISH_EVENT passes BRM events that make up Account Synchronization business events to the PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT policy opcode for modification.

PCM_OP_IFW_SYNC_PUBLISH_EVENT is called by the event notification feature when an event associated with this opcode in your system’s event notification list occurs. See "Configuring Event Notification for Account Synchronization".

By default, PCM_OP_IFW_SYNC_PUBLISH_EVENT does not modify events; it only passes them to the policy opcode.

If the BRM event is published in the business event, PCM_OP_IFW_SYNC_PUBLISH_EVENT returns one of two POIDs:

- If the object passed in was an /event type object, the event POID is returned.
- If the object passed in was not an /event type object, a POID of type /publish is returned.

If the BRM event is not published (for example, if you filter out the event based on your business logic), the input flist is returned.

Modifying BRM Events That Make Up Account Synchronization Business Events

You can customize the PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT policy opcode to remove or enhance BRM events and event fields before they are assembled into business events and sent to Pipeline Manager. For example, you can customize this opcode to:

---

**Note:** Customizing the policy opcode requires programming knowledge and should be performed only by a developer.

---
Filter out BRM events that you don’t want to include in published business events for various business or performance reasons.

**Important:**
- Do not filter out balance impact fields based on the resource ID. If you do, you might remove fields needed by Pipeline Manager.
- Do not modify the code that prepares the login fields (the `fm_ifw_sync_pol_prep_logins` function). This code is required when a login is changed.

Modify the value of the PIN_FLD_FLAGS field that is added to PIN_FLD_BAL_IMPACT arrays. This field specifies how to apply adjustments. For example, you can permit a negative balance by specifying a value of 4. By permitting a negative balance, the negative amount will be deducted from the account balance with the next billing cycle.

You might use this method, for example, when a customer purchases a service that includes 60 free minutes per month and cancels the service before the end of the month. If the customer has used all 60 minutes, but you prorate the free minutes, the amount of usage for the canceled period can be deducted with the next billing cycle (provided the customer has a positive balance at that time).

By default, PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT modifies the following BRM events listed in Table 22–4:

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>/event/billing/debit</td>
<td>Adds a PIN_FLD_FLAGS field to each PIN_FLD_BAL_IMPACT array. This field indicates how adjustments should be applied:</td>
</tr>
<tr>
<td></td>
<td>- 1 applies the entire adjustment to the current month. This flag is the default for cycle forward events.</td>
</tr>
<tr>
<td></td>
<td>- 2 applies an adjustment over a period of months.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This flag value is not implemented.</td>
</tr>
<tr>
<td></td>
<td>- 4 permits a negative account balance. Use this flag when you want to specify a negative balance for resources, such as when prorating free minutes. If this field is not set, any balance that results in a negative value is removed.</td>
</tr>
<tr>
<td></td>
<td>- To specify more than one option, sum the values. For example, to apply the entire adjustment to the current month (1) and allow a negative balance (4), set this flag to 5.</td>
</tr>
</tbody>
</table>
If the BRM event is published in the business event, PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT returns one of two POIDs:

- If the object passed in was an /event type, the event POID is returned.
- If the object passed in was not an /event type object, a POID of type /publish is returned.

If the BRM event is not published (for example, if you filter out the event based on your business logic), the input flist is returned.

### Manually Configuring Object Auditing

To enable BRM to audit GSM objects, you run the `object_auditing.pl` script. For more information, see "Turning On Object Auditing".

The `object_auditing.pl` script performs a series of steps that can also be performed manually. This section describes these manual steps.

To manually enable BRM to audit GSM objects:

- Modify the DM configuration file (`pin.conf`) and run the `pin_history_on` utility.
  
  See "Running the pin_history_on Utility".

- Modify the `create_indexes_audit_tables_oracle.source` file and create the audit table indexes.
  
  See "Creating Audit Table Indexes".

---

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>/event/billing/product/fee</td>
<td>Filters out these event types after the first occurrence. These events are generated when a product is purchased and when billing is run. For product purchase, Pipeline Manager needs to be notified so it can update the in-memory account data. However, for billing, Pipeline Manager performs the account balance update and does not need this event passed in.</td>
</tr>
<tr>
<td>/event/billing/sub_bal_validity</td>
<td>Creates a PIN_FLD_SUB_BAL_IMPACTS array in the event. PCM_OP_IFW_SYNC_POL_PUBLISH_EVENT populates this array with information from element 1 of the existing PIN_FLD_SUB_BAL_AUDIT array for the event. Element 1 stores the updated validity period as well as the resource and balance group associated with the sub-balance. Adding PIN_FLD_SUB_BAL_IMPACTS with the new validity period enables the DAT_BalanceBatch module to dynamically update the rating basis.</td>
</tr>
<tr>
<td>/event/customer/login</td>
<td>Copies PIN_FLD_SERVICE_OBJ from the top level of the input flist into the new login field (element 1) in the PIN_FLD_LOGINS array. This ensures that Pipeline Manager knows which service is associated with the new login.</td>
</tr>
</tbody>
</table>
Running the `pin_history_on` Utility

**Caution:**

- When installing wireless managers such as Account Synchronization DM or GSM Manager, you must install all managers before running this utility. If you run this utility before installing a wireless manager, your installation will fail.

- If you are using a multidatabase system, you must perform these steps in the following order:
  1. Install all wireless managers.
  2. Install your multidatabase system.
  3. Run the `pin_history_on` utility.

**Important:**

- The `pin_history_on` utility requires a `pin.conf` configuration file. You can create one (see “Creating Configuration Files for BRM Utilities” in BRM System Administrator’s Guide), or you can run the script from a directory that contains a `pin.conf` file, such as `BRM_Home/sys/dm_ifw_sync`.

- Before you run this utility, you need to manually modify entries in the Oracle DM configuration file to give the DM write permission so that the objects in the input file can be written to the database. After running the utility, you restore the entries in the configuration file to their original values.

To run the `pin_history_on` utility:

1. In a text editor, open the Oracle DM configuration file (`BRM_Home/sys/dm_oracle/pin.conf`).

2. Note the value of the following entries:
   - `dm dd_write_enable_fields 1`
   - `dm dd_write_enable_objects 1`
   - `dm dd_write_enable_portal_objects 1`
   - `dm dd_mark_as_portal 1`

3. Set the values of the following entries to 1.
   - `dm dd_write_enable_fields 1`
   - `dm dd_write_enable_objects 1`
   - `dm dd_write_enable_portal_objects 1`
   - `dm dd_mark_as_portal 1`

   **Note:** If an entry is not in the file, add it.

4. Save and close the file.

5. Stop and restart the Oracle DM.

6. Run the `pin_history_on` utility:
Manually Configuring Object Auditing

**pin_history_on** [-dv] pin_history_on_input

**Note:** If you run the utility from another directory, include the path to the **pin_history_on** utility in the command line. For example:

```bash
pin_history_on [-dv] BRM_Home/bin/pin_history_on_input
```

For more information, see "pin_history_on".

7. In a text editor, open the Oracle DM **pin.conf** file (BRM_Home/sys/dm_oracle/pin.conf).

8. Restore the following entries to their original values (the values they had before you modified them):
   - `dm dd_write_enable_fields`
   - `dm dd_write_enable_objects`
   - `dm dd_write_enable_portal_objects`
   - `dm dd_mark_as_portal`

9. Save and close the file.

10. Stop and restart the Oracle DM.

**Creating Audit Table Indexes**

After running the **pin_history_on** utility, you need to create indexes for the new audit tables.

The Account Synchronization installation installs a file (**create_indexes_audit_tables_oracle.source**) that specifies the necessary indexes on the audit tables. You need to modify two entries in this file to match the values as specified in your **BRM_Home/setup/pin_setup.values** file:

1. Open the audit tables indexes file (BRM_Home/sys/dd/data/create_indexes_audit_tables_oracle.source).

2. Edit the **$PIN_CONF_TBLSPACE** entry to specify **pinx00**.

**Note:** This entry must have the same value as the variable **$MAIN_DB{'indexes_group'}** configured in the **BRM_Home/setup/pin_setup.values** file. The default value of this entry is **pinx00**.

3. Edit the **$PIN_CONF_STORAGE_MED** entry to specify the following:
   ```
   storage (initial 200k next 200k maxextents unlimited pctincrease 0)
   ```

4. Save and close the file.

5. Create the audit table indexes in SQL*Plus:

   ```sql
   sqlplus user/password@database_Alias @filepath/create_indexes_audit_tables_oracle.source
   ```
This chapter provides reference information for Oracle Communications Billing and Revenue Management (BRM) Account Synchronization DM installation utilities.
Use this utility to enable object auditing when using Oracle databases.

---

**Caution:**

- When installing wireless managers such as Account Synchronization DM or GSM Manager, you must install all managers before running this utility. If you run this utility before installing a wireless manager, your installation will fail.
- If you are using a BRM multidatabase system, you must install all wireless managers, then install your multidatabase system, and then run the `object_auditing.pl` utility, in that order.

---

For more information about auditing, see "About Tracking Changes to Object Fields" in *BRM Developer’s Guide*.

The `object_auditing.pl` script turns on object auditing by invoking the `pin_history_on` utility with the `-v` and `pin_history_on_input` input file parameters to turn on object auditing. The script then creates the specified audit table indexes by using the `create_indexes_audit_tables_oracle.source` file.

You define which objects are audited by editing the `pin_history_on_input` file (`BRM_Home/apps/integrate_sync/pin_history_on_input`) before running this utility to load the file, where `BRM_Home` is the directory in which you installed BRM.

You customize the audit table indexes by editing the `create_indexes_audit_tables_oracle.source` file (`BRM_Home/sys/dd/data/create_indexes_audit_tables_oracle.source`).

For more information, see "Turning On Object Auditing".

---

**Note:** To connect to the BRM database, the `object_auditing` script needs a configuration file in the directory from which you run the utility. See "Creating Configuration Files for BRM Utilities" in *BRM System Administrator’s Guide*.

---

**Location**

`BRM_Home/setup/scripts`

**Syntax**

`perl object_auditing`

**Results**

Look in the utility log file (`default.pinlog`) to find any errors. The log file is either in the directory from which the utility was started, or in a directory specified in the configuration file.
Use this utility to enable object auditing when using Oracle databases. Use the `object_auditing.pl` script to run this utility after installing all your wireless managers. See "Object Auditing".

---

**Caution:**
- When installing wireless managers such as Account Synchronization DM or GSM Manager, you must install all managers before running this utility. If you run this utility before installing any wireless manager, your installation will fail.
- If you are using a multidatabase system, you must install all wireless managers, then install your multidatabase system, then run the `pin_history_on` utility, in that order only.

---

If you choose to run this utility independently (not as part of the `object_auditing` script), you must also perform these tasks:
- Manually modify entries in the Oracle DM configuration file to give the DM permission to write the objects in the input file to the database.
- Create audit table indexes for the objects that you audit.

For more information, see "Manually Configuring Object Auditing".

For more information about auditing, see "About Tracking Changes to Object Fields" in BRM Developer’s Guide.

You define which objects are audited by editing the `pin_history_on_input` file and running this utility to load the file. For more information, see "Turning On Object Auditing".

---

**Note:** To connect to the BRM database, the `pin_history_on` utility needs a configuration file in the directory from which you run the utility. See "Creating Configuration Files for BRM Utilities" in BRM System Administrator’s Guide.

---

**Location**

`BRM_Home/bin`

**Syntax**

`pin_history_on [-d | -v | -h] pin_history_on_input`

**Parameters**

- `-d`
  Enables debugging mode.

- `-v`
  Displays information about successful or failed processing as the utility runs.
pin_history_on

Note: This parameter is always used in conjunction with other parameters and commands. It is not position dependent. For example, you can enter -v at the beginning or end of a command to initiate the verbose parameter. To redirect the output to a log file, use the following syntax with the verbose parameter. Replace filename.log with the name of the log file:

pin_history_on any_other_parameter -v> filename.log

-h
Displays the syntax and parameters for this utility.

pin_history_on_input
Name of the file that specifies which fields within the objects to audit. A sample file is included in the BRM_Home/apps/integrate_sync directory

Results
Look in the utility log file (default.pinlog) to find any errors. The log file is either in the directory from which the utility was started, or in a directory specified in the configuration file.
pin_ifw_sync_oracle

Use this utility to create, drop, and monitor Account Synchronization queues in your Pipeline Manager Oracle database.

The Account Synchronization Data Manager (DM) uses these queues to send Oracle Communications Billing and Revenue Management (BRM) business events to the Pipeline Manager Listener (DAT_Listener) module. For information, see "About Sending Account Data to Pipeline Manager".

Location

BRM_Home/apps/pin_ifw_sync

Syntax Overview

The following actions are supported for Oracle Pipeline Manager databases:

- Syntax for Creating a Queue
- Syntax for Dropping a Queue
- Syntax for Generating a Report
- Syntax for Testing a Queue
- Initializing the Pricing Admin Configuration Object
- Syntax for Getting Help

Syntax for Creating a Queue

Creates an Account Synchronization queue, queue table, and database package in your database. The database package contains stored procedures for queuing, dequeueing, and purging business events.

pin_ifw_sync_oracle.pl create

[-l username/password@DatabaseAlias]
[-q queue_name -t queue_table]
[-s storage_clause
[-r retention_time]

Parameters for Creating a Queue

-username/password@DatabaseAlias
Specifies how to connect to the database.

For example:

pin_ifw_sync_oracle.pl create -l pin/password@pindb.portal.com

If you omit this parameter, the utility prompts you for this information.

-queue_name -t queue_table
Specifies the queue name and queue table name.

If you omit these parameters, the utility automatically creates a queue named IFW_SYNC_QUEUE and a queue table named IFW_SYNC.
**-s storage_clause**
Specifies the storage settings for the queue table.

If you omit this parameter, the storage settings are set by the `storage_clause` parameter in the `BRM_Home/apps/pin_ifw_sync/create_ifw_sync_queue.conf` file. For information, see "Configuring the Queue Location".

For example:

```
pin_ifw_sync_oracle.pl create -s "tablespace PIN00 initrans 5 storage (initial 200k next 200k maxextents unlimited pctincrease 0 )"
```

**-r retention_time**
Specifies the amount of time, in seconds, until processed events are removed from the database queue.

If you omit this parameter, the retention time is set by the `retention_time` parameter in the `BRM_Home/apps/pin_ifw_sync/create_ifw_sync_queue.conf` file. For information, see "Configuring How Often Processed Events Are Removed from the Queue".

### Syntax for Dropping a Queue
Drops the specified queue and its associated queue table from your database. If the database contains no other Account Synchronization queues, this command also drops the Account Synchronization database package, which contains stored procedures for queuing, dequeuing, and purging events.

```
pin_ifw_sync_oracle.pl drop [-q queue_name] [-l username/password@DatabaseAlias]
```

#### Parameters for Dropping a Queue

**-q queue_name**
Specifies the name of the queue to drop.

If you omit this option, the utility automatically drops the default queue, IFW_SYNC_QUEUE.

**-l username/password@DatabaseAlias**
Specifies how to connect to the database.

If you omit this option, the utility prompts you for this information.

### Syntax for Generating a Report
Generates a report that displays the state of each event in an Account Synchronization queue.

```
pin_ifw_sync_oracle.pl report -r summary|detail [-q queue_name] [-l username/password@DatabaseAlias]
```

#### Parameters for Generating a Report

**-r summary | detail**
Generates the specified type of report.

- `-r summary` generates a report that summarizes the number of events in each state.
  Events can be in the following states shown in Table 23-1:
**Table 23–1  Pipeline Manager Event States**

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>READY</td>
<td>The event has not been dequeued or processed by Pipeline Manager.</td>
</tr>
<tr>
<td>PROCESSED</td>
<td>The event was dequeued and processed by Pipeline Manager.</td>
</tr>
</tbody>
</table>

- `-r detail` generates a report that details the ID, event state, queuing time, and dequeuing time for each event.

- `-q queue_name`
  Specifies the queue name.
  If you omit this parameter, the utility automatically generates a report for the default queue, IFW_SYNC_QUEUE.

- `-l username/password@DatabaseAlias`
  Specifies how to connect to the database.
  If you omit this parameter, the utility prompts you for this information.

**Syntax for Testing a Queue**

Tests the specified queue by attempting to enqueue and dequeue 20 test events. You run this command to test if a newly created queue functions properly.

---

**Note:** You need to test a queue only after it is first created.

```
pin_ifw_sync_oracle.pl test [-q queue_name]
[-l username/password@DatabaseAlias]
```

**Parameters for Testing a Queue**

- `-q queue_name`
  Specifies the queue name.
  If you omit this parameter, the utility automatically tests the default queue, IFW_SYNC_QUEUE, and default queue table, IFW_SYNC.

- `-l username/password@DatabaseAlias`
  Specifies how to connect to the database.
  If you omit this parameter, the utility prompts you for this information.

**Syntax for Listing Queues**

Lists all queues in the current user’s database.

```
pin_ifw_sync_oracle.pl list [-l username/password@DatabaseAlias]
```

**Parameters for Listing Queues**

- `-l username/password@DatabaseAlias`
  Specifies how to connect to the database.
  If you omit this parameter, the utility prompts you for this information.
Syntax for Getting Help

Displays the syntax for the \texttt{pin\_ifw\_sync\_oracle} utility.

\texttt{pin\_ifw\_sync\_oracle.pl help}

Results

The \texttt{pin\_ifw\_sync\_oracle} utility notifies you when it runs successfully. Otherwise, look in the \texttt{default.pinlog} file for errors. This file is either in the directory from which the utility was started or in a directory specified in the utility configuration file.