FUJITSU Software
Interstage Business Process Manager
V11.3.1

Server and Console Installation Guide
(JBoss Application Server)

Table of Contents

About this Manual

This manual describes how to configure the system environment and setup the Interstage Business Process Manager (Interstage BPM) Server and Console.

Note that the Interstage BPM Tenant Management Console setup is automatically performed when you setup Interstage BPM Console.

Intended Audience

This manual is intended for Interstage BPM Super Users, who are administrators managing Interstage BPM Server. It assumes that the reader has a working knowledge of

- Operating system administration
- Application server administration
- Database administration
- Directory Service administration

This Manual Contains

Here is a list of what is in this manual:

Chapter	Title	Description
1	System Configurations for Interstage BPM Server	Description of the typical system configurations for the setup of Interstage BPM Server.
2	System Configurations for Interstage BPM Console	Description of the typical system configurations for the setup of Interstage BPM Console.
3	System Requirements for Interstage BPM Server and Console	Description of the minimum system requirements by platform.
4	Preparing for Setup of Interstage BPM Server and Console	Instructions for preparing external systems like the database or the application server.
5	Setting-up Interstage BPM Server and Console	Instructions for performing setup of Interstage BPM Server and Console.
6	Configuring Interstage BPM Console to work with Interstage Analytics	Instructions to run the Wizard for integrating Interstage Analytics with Console.
7	Setting Up a Directory Service	Instructions for setting up your Directory Service.
8	Un-setup Interstage BPM Server and Console	Instructions for removing an instance of Interstage BPM Server and Console from the application server

Chapter	Title	Description
9	Upgrading Interstage BPM from Previous Versions	Instructions for performing an upgrade.
Appendix A	Security	Instructions for security implementation on Interstage BPM.
Appendix B	Clustering, Load Balancing, and Failover	Instructions for setting up a cluster of Interstage BPM Servers.
Appendix C	Overview of NTLM Authentication Protocol	Instructions to enable NTLM Authentication Protocol for Interstage BPM Console
Appendix D	Overview of SSO Authentication	Instructions to enable SSO Authentication Protocol for Interstage BPM Console
Appendix E	Troubleshooting	Information to help you troubleshoot problems associated with using Interstage BPM.

Screenshots of the products that appear in this manual are approximations only. What you see when using the product may differ in appearance due to platform or product version differences.

Typographical Conventions

The following conventions are used throughout this manual:

Example	Meaning
`command`	Text, which you are required to type at a command line, is identified by `Courier` font.
screen text	Text, which is visible in the user interface, is **bold**.
Reference	Reference material is in *italics*.
`Parameter`	A command parameter is identified by `Courier` font.

Other References

The following references for Interstage Business Process Manager are also available:

• *Release Notes*

Contains an overview of Interstage Business Process Manager, setup tips, and late-breaking information that could not make it into the manuals.

• *Interstage Business Process Manager Server and Console Installation Guide*

Describes software and hardware requirements, setup procedure for Interstage Business Process Manager Server and Console

- *Interstage Business Process Manager Server Administration Guide*

  Explains how to configure and administrate Interstage Business Process Manager Server. This guide also describes the configuration parameters of the Interstage BPM Server.

- *Interstage Business Process Manager Developer's Guide*

  Describes how to use the Interstage Business Process Manager API to customize and extend Interstage BPM to fit the unique needs of your organization.

- *Interstage Business Process Manager Studio User's Guide*

  Explains how to model processes using the Interstage Business Process Manager Studio.

- *Interstage Business Process Manager Tenant Management Console Online Help*

  Explains how to use the Interstage Business Process Manager Tenant Management Console user interface.

- *Interstage Business Process Manager Console Online Help*

  Explains how to use the Interstage Business Process Manager Console user interface.

- *API Javadoc Documentation*

  This HTML documentation provides the API and syntax of the packages, interfaces and classes for developing custom applications or embedding Interstage Business Process Manager into other products.

Abbreviations

The products described in this manual are abbreviated as follows:

- "Interstage Business Process Manager" is abbreviated as "Interstage BPM".
- "Microsoft® Windows Server® 2008" and "Microsoft® Windows Server® 2012" are abbreviated as "Windows Server".
- "Oracle Solaris" might be described as "Solaris", "Solaris Operating System", and "Solaris OS" in this document.
- "Microsoft® SQL Server 2008 Standard Edition", "Microsoft® SQL Server 2008 Enterprise Edition", "Microsoft® SQL Server 2012 Standard Edition", "Microsoft® SQL Server 2012 Business Intelligence Edition" and "Microsoft® SQL Server 2012 Enterprise Edition" are abbreviated as "Microsoft® SQL Server", "Microsoft SQL Server", or "SQL Server".
- "Oracle 10g R2 Standard Edition", "Oracle 10g R2 Standard Edition One", "Oracle 10g R2 Enterprise Edition", "Oracle 11g Standard Edition", "Oracle 11g Standard Edition One", "Oracle 11g Enterprise Edition" are abbreviated as "Oracle".
- "JBoss Enterprise Application Platform" is abbreviated as "JBoss EAP".

1 System Configurations for Interstage BPM Server

Interstage Business Process Manager (Interstage BPM) is a server-based workflow engine with APIs (Application Programming Interfaces) for workflow application development.

The Interstage BPM Server runs on an application server providing load balancing and failover capabilities, and it operates with a database, which persistently stores and maintains all process information.

A user and group store is required to manage Interstage BPM user accounts and to expand a group into a list of users. Depending on your choices when setting up the server, users are managed either in Interstage BPM's local user store or in a Directory Service. Groups can be managed in Interstage BPM's local group store, in a Directory Service or in both systems.

The Interstage BPM Server is shipped with setup script, which is used to

- Configure the database and the application server
- Setup the Interstage BPM Server and Console to the application server

The system configurations described in the next sections are typically used. The decision of the configuration to be used depends on the desired performance of the employed systems.

1.1 Minimum Configuration: All Systems on the same Computer

You can copy the Interstage BPM software from the product media to your machine and use the Interstage BPM setup script to setup the Interstage BPM Server and Console into the application server. The Interstage BPM Server is setup as EJB application and the Interstage BPM Console is setup as WebApplication. The setup script also creates database on the machine, and if you plan to use a remote user store, the Directory Service on the same computer.
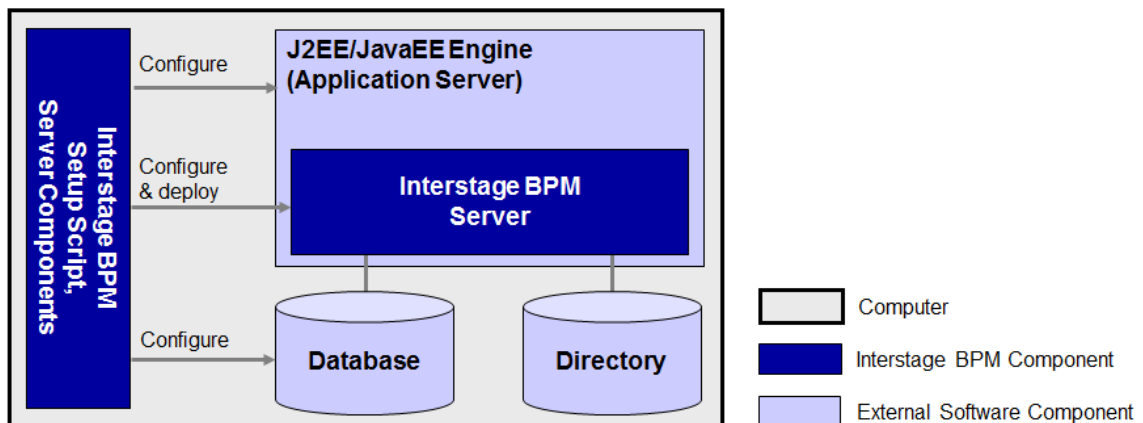
Figure 1: All systems on the same computer

For details about the architecture of Interstage BPM, refer to the *Interstage Business Process Manager Server Administration Guide.*

1.2   Database on Remote Computer

The following figure shows a configuration where the Interstage BPM Server and the database are setup on separate computers.
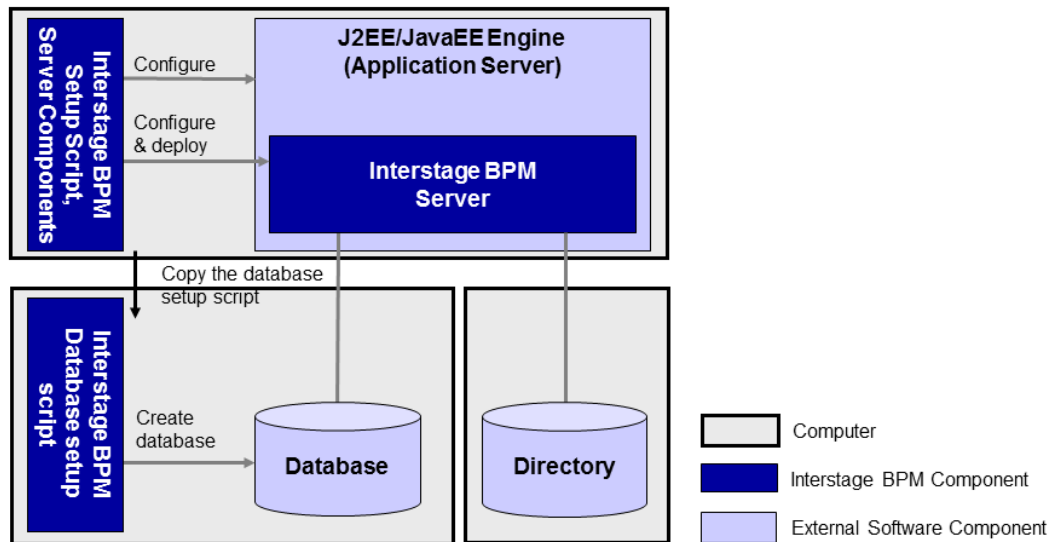
Figure 2: Database on Remote Computer

To set up this configuration, you copy the database setup script from the Interstage BPM Server-computer to the database server computer. And, you can use the database setup script to create the database.

The Interstage BPM setup script can then be run from that Interstage BPM Server-computer to configure the application server and setting up the Interstage BPM Server to the application server.

In the configuration shown above, the Directory Service is also installed on a remote computer. However, this has no impact on the Interstage BPM setup procedure.

2 System Configurations for Interstage BPM Console

The Interstage BPM Console is the Client that connects to the Interstage BPM Server.

The Interstage BPM Console must run on the same application server on the same machine as the Interstage BPM Server to which it connects.

2.1 Minimum Configuration: All Systems on the same Computer

Interstage BPM Server and Console is always setup together on the same computer.
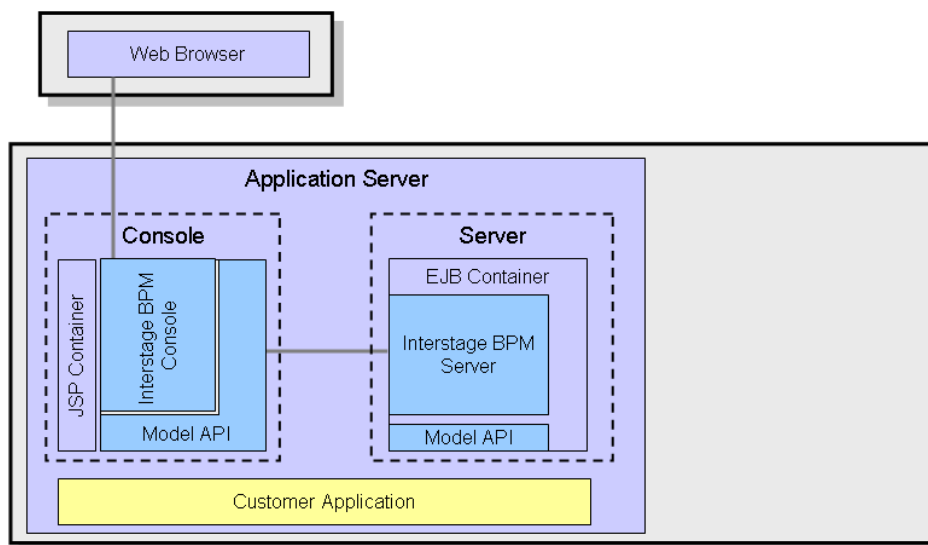
Figure 3: All systems on the same computer

For details about the architecture of the Interstage BPM Server, refer to the *Interstage Business Process Manager Server Administration Guide* .

3 System Requirements for Interstage BPM Server and Console

3.1 Hardware Requirements for Interstage BPM Server and Console

Machine and Processor

Operating System	Machine	Processor
Windows	Fujitsu PRIMERGY or other Intel Architecture servers	Minimum: Intel® Xeon® processor, 2GHz, 2 Core or greater
Solaris	Fujitsu PRIMEPOWER or other Solaris servers	Minimum: SPARC64 V (kernel arch: sun4u/sun4us/sun4d) processor, 1.1 GHz, 2 Core or greater
Linux	Fujitsu PRIMERGY or other Intel Architecture server	Minimum: Intel® Xeon® processor, 2GHz, 2 Core or greater

Memory

Minimum: 2 GB

Hard Drive

Interstage BPM setup: 300 MB

Database server installation: Please refer to the product documentation.

Database space: The amount of database space required depends upon your business situation. Please contact your Local Fujitsu Support Organization for more information about the estimation.

3.2 Minimum Software Requirements for Server and Console

For software requirements for the server, refer to the *Interstage BPM Server Release Notes*.

For software requirements for the Console, refer to the *Interstage BPM Console Release Notes*.

3.3 Minimum Software Requirements for Web Browser Clients

For software requirements for the client machines connecting to the Console remotely, refer to the Release Notes.

4 Preparing for Setup of Interstage BPM Server and Console

This chapter explains how to set up your environment before executing setup of Interstage BPM.

4.1 Database Server Preparation

This section provides instructions in configuring your database software for use by Interstage BPM.

You must create a new database instance for Interstage BPM. When setting up the Interstage BPM Server and Console, you will specify this instance. These instructions use the default database instance for the purpose of providing an example.

4.1.1 Configuring Microsoft® SQL Server

Prerequisites: Microsoft SQL Server is installed.

To configure Microsoft SQL Server:

1. Change SQL Server Authentication

   a) Interstage BPM only supports SQL Server Authentication. To enable this, install Microsoft® SQL Server by Mixed Mode in Authentication Mode.

   > **Note:** If Microsoft® SQL Server is already installed, you may have to run a configuration program such as **SQL Server Configuration Manager** if the default selection from the prior installation enabled Named Pipes. Run the **SQL Server Configuration Manager** and add TCP/IP. However, do not disable Named Pipes. Both must be selected.

2. Configure the network for SQL Server

   a) Confirm that **TCP/IP** is selected under Network Operations.

   b) Determine the port number of the Microsoft® SQL Server instance that Interstage BPM will connect to. To do so:

      1. Select **Start** > **Programs** > **Microsoft SQL Server <version>** > **Configuration Tools** > **SQL Server Configuration Manager**.

      2. Navigate to **SQL Server Network Configuration** > **Protocols for <MSSQLInstance>**. For the default instance, the value of `<MSSQLInstance>` is `MSSQLSERVER`.

      3. Confirm that TCP/IP is enabled. Then, go to the TCP/IP properties and click the **IP Addresses** tab. The **IPAll** section displays the **TCP port** and **TCP Dynamic Ports** parameters.

      4. If you are using the default Microsoft® SQL Server instance, note down the value of **TCP Port**. If you are using a named instance, note down the value of the **TCP Dynamic Ports**. You will need to specify the port number later when setting up the Interstage BPM Server.

3. Confirm Collation settings.

   The default Collation settings at the time of installing Microsoft SQL are usually correct.

   a) Use the following query to confirm the collation of your database case-insensitive:

      ```
      SELECT convert(varchar(100), SERVERPROPERTY ('COLLATION')) as Collation
      ```

      Please change the collation of the server if it is not case insensitive (collation including 'CI').

> **Note:** If you have changed the CaseSensitivity parameter to `cs` for the server level collation, you cannot create database via the setup script. In such a case, you need to first create Interstage BPM database using the database creation script, and change the database collation to CaseSensitive.
>
> `ALTER DATABASE teamflowdb COLLATE <collationName>`
>
> where `<collationName>` is the name of the collation, example, `Latin1_General_CI_AS`.
>
> **Ensure this is case-insensitive, that is, it contains the 'CI' characters.**
>
> Then you need to select the **Use existing database** option in the `setup.config` file.

4. Install the SQL Server Driver for JDBC.

   You need to copy the required Microsoft SQL Server JDBC driver files from Microsoft SQL Server WebSite to the application server computer. You will need to specify the driver location later when setting up the Interstage BPM Server. For the exact version of the JDBC driver supported, refer the Release Notes. If you are running your **database on a remote computer**, you need to copy the required jdbc driver files to the application server computer.

   In case of UNIX environments you need to confirm whether the 'read' permissions are provided for the JDBC driver jar files.

4.1.2 Configuring Oracle

Prerequisite: Oracle is installed.

To configure Oracle for Interstage BPM:

1. Set the `ORACLE_HOME` environment variable to the installation directory of the database server you are setting up on.
   - Example on Oracle 10g:

     `ORACLE_HOME=/opt/oracle/app/oracle/product/10.2.0/db_1; export ORACLE_HOME`

   - Example on Oracle 11g:

     `ORACLE_HOME=/opt/Oracle/Oracle11gR2/product/11.2.0/dbhome_1; export ORACLE_HOME`

2. Create a new database instance for Interstage BPM.

   When setting up the Interstage BPM Server, you will specify this instance. The default database instance for Oracle is `ORCL`.

   Make sure that the database instance is created with the following character sets:
   - AL32UTF8 as the database character set
   - AL16UTF16 as the national character set

   These settings are required to support Unicode UTF-16 characters.

3. Make sure that a TCP/IP version of Oracle's SQL*Net is installed.

   The Oracle JDBC driver requires a TCP/IP version of Oracle's SQL*Net. This is the default for a standard installation.

> **Note:** If you need to uninstall Oracle or require recovery from a failed installation, contact Oracle Technical Support for instructions before reinstalling.

4. Install the Oracle Driver for JDBC.

   a) You need to copy the required Oracle JDBC driver files from Oracle WebSite to the application server computer. You will need to specify the driver location later when setting up the Interstage BPM Server. For the exact version of the JDBC driver supported, refer the Release Notes. If you are running your **database on a remote computer**, you need to copy the required jdbc driver files to the application server computer.

   b) In case of UNIX environments you need to confirm whether the 'read' permissions are provided for the JDBC driver jar files.

4.1.3 Starting the Database Server

Since configuration information must be written to the database during setup, ensure that the database server is running prior to setting up Interstage BPM Server. Start the database server according to the documentation provided with your database server.

4.2 Application Server Preparation

4.2.1 Installing and Configuring JBoss EAP for Interstage BPM Server and Console

The JBoss Application Server can be installed in different ways using different server configurations. To make sure that your JBoss installation is configured properly for Interstage BPM, you are recommended to perform the steps described below.

To install JBoss for Interstage BPM:

1. Prepare the JBoss Application Server:

   For JBoss EAP 5.0.0, download the `jboss-eap-5.0.0.GA.zip` from the Red Hat website. The zip file contains a ready-to-use JBoss Application Server installation.

   For JBoss EAP 5.1.1, download the `jboss-eap-5.1.1.GA.zip` from the Red Hat website. The zip file contains a ready-to-use JBoss Application Server installation.

2. Unzip the downloaded file to a directory of your choice.

Note: The JBoss installation path must not contain blanks or special characters such as `~` `$` `@`.

3. Verify that your JBoss installation directory contains at least the following subdirectories. 'JBoss installation directory' is assumed to be JBoss here.

```
<JBoss Installation Directory>
└─ jboss-as
      ├─ bin
      ├─ client
      ├─ docs
      ├─ lib
      └─ server
            └─ all
```
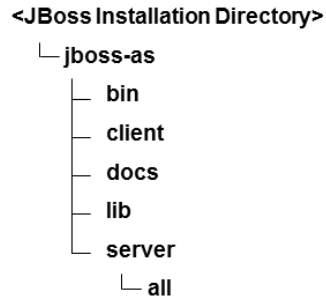
Figure 4: JBoss Installation Directory with Required Subdirectories

> **Note:** You are recommended not to use the JBoss Application Server installer. Ensure that the `all` directory is not changed after you have unzipped the downloaded file. If you have configured the `all` directory, setup might fail and Interstage BPM Server and Console may not start.

4.3 Directory Server Preparation

If you use local user management system, you do not need to do this step. Local user management system is user management function for Interstage BPM that is provided by Interstage BPM. In the Local user management system, all of the users for Interstage BPM are created in the database.

If you want to use external directory service to manage Interstage BPM users, you need to register LDAP Access for users before setting up Interstage BPM Server and Console. How to setup external directory service is described in *Setting Up a Directory Service* on page 34.

5 Setting-up Interstage BPM Server and Console

For Interstage BPM Server and Console, refer to *System Requirements for Interstage BPM Server and Console* on page 13. Refer to the Release Notes for details on the required components mentioned in the procedures described in this chapter.

If you want to change the Interstage BPM configuration after setup, you can do so by following the instructions in the *Interstage BPM Server Administration Guide*.

5.1 Permissions Required for Setup

Permissions Required for Setup

You must have read, write and execute permissions on the setup directory of the Interstage BPM Server and Console.

> **Note:** On Solaris and Linux, if you are setting up as a non-root user, Interstage BPM Server will not be installed as a package.

5.2 Overview of the Setup Procedure

This section summarizes the steps required to setup the Interstage BPM Server and Console. The setup procedure depends on whether the database and the application server are installed on the same or on different computers.

To connect to a Directory Service and login to Interstage BPM, you must configure and start the Directory Service before starting the Interstage BPM Server.

> **Note:** If you are upgrading from a previous version of Interstage BPM, refer *Upgrading Interstage BPM from Previous Versions* on page 57.

Running the Database and Interstage BPM Server, Console on the Same Computer

1. Prepare the database and make sure that the database server is running.

   Refer to section *Database Server Preparation* on page 14.

2. Prepare the application server and make sure it is running.

   Refer to section *Application Server Preparation* on page 16.

3. If you want to connect to a Directory Service, you must configure it before starting the Interstage BPM Server.

   Refer to chapter *Setting Up a Directory Service* on page 34.

4. Setup Interstage BPM.

   For setting Interstage BPM on the same computer, refer to section *Setup Database and Interstage BPM on the Same Computer* on page 19.

5. Switch on Java security.

   Refer to section *Switching on Java Security* on page 27.

6. Start the Interstage BPM Server.

   Refer to section *Starting Interstage BPM Server* on page 28.

> **Note:** Even if you intend to setup database and Application server on the same machine, you can use the steps below in case you want to create database and setup Interstage BPM Server at different times on the same machine.

Running the Database and Interstage BPM Server, Console on Different Computers

1. Prepare the database and make sure that the database server is running.

   Refer to section *Database Server Preparation* on page 14.

2. Prepare the application server and make sure it is running.

   Refer to section *Application Server Preparation* on page 16.

3. Copy `engine` directory from product media to the application server computer.

4. Setup Interstage BPM on the **application server computer**.

   Refer to section *Setup Database and Interstage BPM on the Different Computer* on page 23.

5. On the **database server computer**, execute the database creation script. To execute the database creation script you need to copy it from application server computer.

   Refer to section *Updating the database setup script on the database machine* on page 24.

6. If you want to connect to a Directory Service, you must configure it before starting the Interstage BPM Server.

   Refer to chapter *Setting Up a Directory Service* on page 34.

7. On the **application server computer**, run the setup script to setup the Interstage BPM Server and Console.

   Refer to section *Running the Interstage BPM Setup Script* on page 21.

8. Switch on Java security.

   Refer to section *Switching on Java Security* on page 27.

9. Start the Interstage BPM Server.

   Refer to section *Starting Interstage BPM Server* on page 28.

5.3 Setup Database and Interstage BPM on the Same Computer

To setup Interstage BPM, follow these steps:

1. Copy the `engine` directory from product media. Refer to the *Copy Interstage BPM engine directory from Product Media* on page 20.

2. Update the configuration file according to the instructions in section *Updating the Interstage BPM Configuration File* on page 20.

3. Run setup script according to the instructions in section *Running the Interstage BPM Setup Script* on page 21.

   If any error occurs in the script execution, check the configuration file updated in step 2 and then re-execute the setup script. However, if an error caused due to pre-exisitng components of Interstage BPM, then you need to un-setup the Interstage BPM and again execute this setup script. Refer to the *Un-setup Interstage BPM Server and Console* on page 54

5.3.1 Copy Interstage BPM engine directory from Product Media

To copy Interstage BPM engine directory, follow these steps:

1. Create a directory on your machine where you want to setup Interstage BPM and copy the `engine` directory from Interstage BPM product media to the directory created on your machine.

   In case of UNIX environment, you must grant execute permissions to the script `setup.sh` file.

> **Note:** Make sure that there are no space character or special characters (such as '~', '$', '@') in the path of directory where you are copying the `engine` directory.

5.3.2 Updating the Interstage BPM Configuration File

Before execution of setup script, you need to update the configuration file for the values of parameters required to setup the Interstage BPM.

Follow these steps:

1. Open the `setup.config` file located in the `<engine directory>/server` directory in a text editor.

> **Note:** To edit `setup.config` file, use the text editor that can edit LF characters.

2. Update the configuration parameters as described in the `setup.config` file. The parameters are classified under following categories:

> **Note:** For security reasons, it is recommended that passwords should be specified from command prompt as Command Line Parameters. For details, refer *Running the Interstage BPM Setup Script* on page 21. If passwords are specified in the configuration file, the file should be secured.

- **Interstage BPM Environment Parameters**: Specify the environment you have selected for setting up the Interstage BPM. For example, specify the selected application server, database.

  execution_mode_selection

  This parameter specifies the mode of setup execution. Specify the value of this parameter as `0` to setup the Interstage BPM Server and Console.

  database_creation_selection

  This parameter specifies whether the existing database is to be used or create a new database.

- **Application Server Parameters**: Specify the parameters only for the application server that you have selected for setting up the Interstage BPM.
- **Database Parameters**: Specify the parameters only for database that you have selected for setting up the Interstage BPM.
- **Interstage BPM System Administrator**: Specify the parameters for system administrator (Super User).
- **Interstage BPM Tenant**: Specify the parameters for Tenant Administrator.

> **Note:** If you want to use directory server to manage Interstage BPM users, refer to the section *Setting Up a Directory Service* on page 34 for more information on how to setup a directory service.

- **Interstage BPM Console**: Specify the parameters for Interstage BPM Console.

- **Interstage BPM Analytics**: Specify the parameters for Interstage BPM Analytics only at the time of setting up Analytics. This parameter is not used at the time of setting up Interstage BPM Server and Console.

Notes about Parameters of Configuration File

Read the following instructions before updating the parameters values in configuration file.

- **db_ibpm_password**:
  - For SQL Server: By default, Microsoft SQL Server enforces a password policy that prevents users from using simple passwords. Make sure that you enter a password that meets the password policy requirements. Otherwise, the setup will fail. For details on the password policy, refer to the *Microsoft SQL Server* documentation.

- **db_port**:
  - For SQL Server: Ensure that TCP/IP is selected under Network Operations while configuring Microsoft SQL Server. Please refer to the section *Configuring Microsoft® SQL Server* on page 14.
  - For Oracle: The port number is typically `1521`. You can check the actual port number in the `targets.xml` file located in the `<ORACLE_HOME>/<hostname>_<SID>/sysman/emd` directory.

- **db_instance_name**
  - For Oracle: The connection identifier usually corresponds to the database name unless the database name is longer than eight characters. In this case, a truncated version of the database name is used. You can verify the actual connection identifier in the `tnsnames.ora` file located in the `<ORACLE_HOME>/network/admin` directory.

- **LDAPAccessUserID**: If you have selected a Directory Service, by default, the user account defined on this screen is also used to log into the Directory Service. If you want to use a different user, you must change the `LDAPAccessUserID` and `LDAPAccessUserPassword` configuration parameters of the Interstage BPM Server. Refer to the *Server Administration Guide* for more information.

5.3.3 Running the Interstage BPM Setup Script

Before executing the setup script, do the following:

- Set the value of `JAVA_HOME` environment variable on your machine. Specify the JDK version that is mentioned in the *Interstage BPM Server Release Notes* . If this parameter is left blank or set to an incorrect value, it will cause the error.

Note:	The JDBC connection through Microsoft JDBC Driver to a Microsoft SQL server database can not be created using JDK 1.6.0_29. Therefore, use the JDK version that is supported by the Interstage BPM and your Application Server. For the version information, refer to the *Interstage BPM Server Release Notes*.

- Make sure that the configuration file is updated properly.

Note:	Make sure that there are no space character or special characters (such as '~', '$', '@') in the path of JDK.

Note:	JRE is not supported.

Execute Interstage BPM setup script:

Run the following setup script located in the `<engine directory>/server` directory as mentioned below.

- For Windows: `setup.bat`
- For UNIX: `setup.sh`

Execute the setup script using the following command:

- On Windows:

```
setup.bat [-<option>] [<parameter name>=<value>] [<parameter name>=<value>]...
```

- On UNIX:

```
setup.sh [-<option>] [<parameter name>=<value>] [<parameter name>=<value>]...
```

Options:

- `-configFilePath <Path of configuration file>`: This option is used to specify the path of configuration file located in a directory other than that of `setup.bat` / `setup.sh`.
- `-onlyValidation`: This option is used to execute the setup script in validation mode. If you specify this option, only the content of the configuration file is verified but the actual setup of Interstage BPM will not be performed.

Command Line Parameters:

All the parameters specified in the `setup.config` file can be specified as the command line parameters. The error occurs if you specify any parameter that is not supported. The format of specification is `<parameter name>=<value>`. You can specify multiple parameters delimited by space character.

If you want to use space character in the value of a parameter then you need to enclose entire <parameter name>=<value> in double quotes. For example: `"DATAFILE_PATH=C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA"`.

If you want to use special characters on your shell, you need to escape such a character at the command line option. If you want to use un-escape character, you need to write in the `setup.config` file.

In the following example, path of `setup.config` file is specified, and `password` is set to the parameter of `appserver_admin_password` and `db_admin_password`. Also the setup script is executed in Validation mode.

On Windows:

```
setup.bat -configFilePath C:\engine\server\setup.config -onlyValidation
appserver_admin_password=password db_admin_password=password
```

On UNIX:

```
setup.sh -configFilePath /opt/FJSVibpm/engine/server/setup.config
-onlyValidation
appserver_admin_password=password db_admin_password=password
```

How to Confirm Successful Setup

After executing the setup, if you receive the `Setup Successful` message, then the setup of Interstage BPM server and console is completed successfully and you can now proceed to the next step.

However, if you receive the `Setup Failed: <error message>` message, then it indicates that the setup is failed due to some reason. You can check the cause of any errors that occur during setup by viewing the `deployment.log` file, located at the following location:

- On Windows: `<engine directory>\server\deployment\logs`
- On UNIX: `<engine directory>/server/deployment/logs`

Note:	Each time you execute the setup script, the contents of `deployment.log` file will be overwritten. In some cases like specifying inappropriate options, the log file might not generated.

Note:	When setup execution fails, depending on the cause of failure you might require to execute un-setup script. For further information, refer to *Un-setup Interstage BPM Server and Console* on page 54.

5.4 Setup Database and Interstage BPM on the Different Computer

To setup Interstage BPM, follow these steps:

1. Copy the `engine` directory from Interstage BPM product media. Refer to the *Copy Interstage BPM engine directory from Product Media* on page 20.

2. Copy the database directory specific to database you are using. Refer to the *Copy database setup directory to database machine* on page 23

3. Update and run the database setup script on the machine where database is installed according to the instructions in section *Updating the database setup script on the database machine* on page 24

4. Update the configuration parameters as described in the `setup.config` file. Refer to the section *Update the configuration file on Interstage BPM Server machine* on page 25.

5. Run setup script according to the instructions in section *Running the Interstage BPM Setup Script* on page 21.

   If any error occurs in the script execution, check the configuration file updated in step 4 and then re-execute the setup script. However, if an error caused due to pre-existing components of Interstage BPM, then you need to un-setup the Interstage BPM and again execute this setup script. Refer to the *Un-setup Interstage BPM Server and Console* on page 54.

5.4.1 Copy database setup directory to database machine

To copy database setup directory, follow these steps:

1. Copy the directory specific to database you are using from the `<engine directory>/server/deployment/dbsetup` directory to the machine where database is installed.

   For Example:
   - For Oracle: `oracle`
   - For Microsoft SQL Server: `sqlserver`

In this directory, only shell scripts and sql scripts are included. To use these scripts, you do not need to install Java on the database machine.

> **Note:** In UNIX, you must grant following permissions for the directory you just copied (for example `<engine directory>/server/deployment/dbsetup/oracle`) to the user who executes the scripts.
> - Directory: 'Read', 'Write' and 'Execute' permissions.
> - All files: 'Read' permission.
> - All script (.sh) files: 'Execute' permission.

5.4.2 Updating the database setup script on the database machine

Prerequisite: You have prepared the database server as instructed in section *Database Server Preparation* on page 14.

To use the database creation script:

1. Login to the machine where the database is installed.
2. On the database machine, navigate to the directory where you copied the script files, and edit the following parameters in the configuration file. The name of the configuration file depends on Operating System of the database machine as mentioned below:
   - For Windows: `config.bat`
   - For UNIX: `config.sh`

> **Note:**
> - When editing parameters, **do not** include values in double-quotes. An example of the **correct way** to specify a value:
>   `DATAFILE_PATH=C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA.`
> - For security reasons, the password specified in the configuration file should be secured.

- **Parameters common to all databases:**
  - **USER**
    Database User Name
    Sample value: `ibpmuser`
  - **PASSWORD**
    Database User Password

- **For Oracle:**
  - **SID**
    Oracle System ID
    Sample value: `orcl`
  - **SYSTEM_PASSWORD**
    System User Password
  - **ORACLE_HOME**
    ORACLE home directory
    Sample value on Windows: `C:\app\oracle\product\11.2.0\dbhome_1`

Sample value on UNIX: `/opt/app/oracle/product/11.2.0/dbhome_1`

- **DATAFILE_PATH**

    Path to store data files

    Sample value on Windows: `C:\app\oracle\oradata\orc1`

    Sample value on UNIX: `/opt/app/oracle/oradata/orcl`

- **For SQL Server:**
    - **ADMIN_USER**

        Database Administrator User

        Sample value: `sa`

    - **ADMIN_PASSWORD**

        Database Administrator Password

    - **PORT**

        Database Port Number

        Sample value: `1433`

    - **SQLSERVER_HOME**

        SQLSERVER home directory

        Sample value on Windows: `C:\Program Files\Microsoft SQL Server`

    - **DATAFILE_PATH**

        Path to store data files

        Sample value on SQL Server 2008: `C:\Program Files\Microsoft SQL Server\MSSQL10.MSSQLSERVER\MSSQL\DATA.`

        Sample value on SQL Server 2012: `C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA.`

3. Run the setup script. The name of the setup script depends on Operating System of the database machine as mentioned below:
    - For Windows: `dbsetup.bat`
    - For UNIX: `dbsetup.sh`

Note:	Running these scripts causes the older database to be deleted. So, when you run these scripts for the first time and if database does not exist on the machine, you will receive an error message saying database deletion failed. This is correct behavior.

Note:	If you create database using the database creation script, validation is not performed by the Setup Script. Therefore you need to confirm all of the preparation requirements described in section *Database Server Preparation* on page 14.

5.4.3 Update the configuration file on Interstage BPM Server machine

Before executing the setup script, do the following:

To update the configuration file on Interstage BPM Server machine:

1. Open the `setup.config` file located in the `<engine directory>/server` directory in a text editor.

> **Note:** You can change the file name and location of these configuration files. The updated file name and location will need to be specified in the setup script in next step. For example, here we use `setup.config` as the configuration file name.

2. Update the configuration parameters as described in the `setup.config` file. The parameters are classified under following categories:

> **Note:** For security reasons, it is recommended that passwords should be specified from command prompt as Command Line Parameters. For details, refer *Running the Interstage BPM Setup Script* on page 21. If passwords are specified in the configuration file, the file should be secured.

- **Interstage BPM Environment Parameters**: Specify the environment you have selected for setting up the Interstage BPM. For example specify the selected application server, database.

  execution_mode_selection

  This parameter specify the mode of setup execution. Specify the value of this parameter as `0` to setup the Interstage BPM Server and Console.

  Database_creation_selection

  This parameter specify whether the existing database is to be used or create a new database. Specify the value of this parameter as `1` as the existing database is to be used.

- **Application Server Parameters**: Specify the parameters only for the application server that you have selected for setting up the Interstage BPM.
- **Database Parameters**: Specify the parameters only for database that you have selected for setting up the Interstage BPM.
- **Interstage BPM System Administrator**: Specify the parameters for system administrator (Super User).
- **Interstage BPM Tenant**: Specify the parameters for Tenant Administrator.

> **Note:** If you want to use directory server to manage Interstage BPM users, refer to the section *Setting Up a Directory Service* on page 34 for more information on how to setup a directory service.

- **Interstage BPM Console**: Specify the parameters for Interstage BPM Console.
- **Interstage BPM Analytics Parameter**: Specify the parameters for Interstage BPM Analytics only at the time of setting up Analytics. This parameter is not used at the time of setting up Interstage BPM Server and Console.

5.5   User Accounts and Groups

Every user that is to work with Interstage BPM needs a user account and must be assigned to one or more groups.

> **Note:** To create user accounts and groups that are valid for Interstage BPM, use only alphanumeric characters, hyphens, and underscore characters ("_"). User names and group names must not begin with an at character ("@") as this is used to identify Agents in Interstage BPM.

Interstage BPM administrator accounts must be members of a special group named by default `AdminRole.`

If you have configured the Interstage BPM Server to use a Directory Service, you need to configure the Directory Service before starting the Interstage BPM Server. For details, refer to chapter *Setting Up a Directory Service* on page 34.

If you have configured the Interstage BPM Server to use its local user store, the Interstage BPM Super User account has already been created in the user store. There is no need to perform further configuration steps before starting the Interstage BPM Server. For details on creating additional user accounts and groups, refer to the *Interstage Business Process Manager User's Guide*.

5.6 Switching on Java Security

Setup script setup the Interstage BPM in SaaS mode. In SaaS mode, it is critical to ensure that each tenant has access to only their own resources, and no other tenant's resources. To achieve this security, you need to manually switch on Java security as follows:

For JBoss:

1. When you setup Interstage BPM, a `policy.txt` file is created at `<engine directory>/server/instance/default/resources`. Confirm that the content of this `policy.txt` file is as given below:

```
grant {
        permission java.security.AllPermission;
      };
```

2. Append the following new Java VM option for the `JAVA_OPTS` variable in `run.conf` for a UNIX machine or `run.conf.bat` for Windows environment. These files are located in `<JBOSS HOME>/jboss-as/bin` directory.

```
-Djava.security.manager -Djava.security.policy=<Location of policy.txt>
```

If you configure the `JAVA_OPTS` variable at any other place, it might prevent the setting of certain Java VM options which are necessary for server startup.

3. To the `policy.xml` file, add the following permissions. Refer the *Interstage BPM Administration Guide* for details about its location and how to edit this file.

```
...
  <permission
   className="java.lang.RuntimePermission"
   target="accessDeclaredMembers"/>
  <permission
   className="java.lang.reflect.ReflectPermission"
   target="suppressAccessChecks"/>
 ...
```

Additional Settings for Custom Adaptors

In case you intend to use Custom Directory Adapters to connect to remote server, you need to add the following permission in the `policy.xml` file. Refer the *Interstage BPM Administration Guide* for details about its location and how to edit this file.

```
...
  <permission
```

```
className="java.net.SocketPermission"
target="*"
action="connect,resolve"/>
...
```

5.7 Starting Interstage BPM Server

Prerequisites: You have switched on Java security. For details, refer *Switching on Java Security* on page 27.

You start the Interstage BPM Server by starting the JBoss Application Server.

To start the server for JBoss run runIBPM.bat or runIBPM.sh:

> **Note:** This file is located in the `<JBoss Installation Directory>/jboss-as/bin` directory.

Example:

- On Windows, run `runIBPM.bat -b 0.0.0.0`.
- On UNIX, run `runIBPM.sh -b 0.0.0.0`.

> **Note:** The JBoss Enterprise Application Platform now binds its services to localhost (127.0.0.1) by default, instead of binding to all available interfaces (0.0.0.0). This was primarily done for security reasons because of concerns of users going to production without having secured their servers correctly. To enable remote access by binding JBoss services to a particular interface, simply run jboss with the -b option. To bind to all available interfaces and re-enable the legacy behaviour, use `./run.sh -b 0.0.0.0` on UNIX run `run.bat -b 0.0.0.0` on Windows. In any case, be aware you still need to secure your server properly.

> **Note:** During the Interstage BPM Server startup, an error message `Class path contains multiple SLF4J bindings` is displayed, you can ignore this message because this is just a warning level message.

To examine whether the Interstage BPM Server is running check the Trace.log log file located at `<engine directory>/server/instance/default/logs`. If the server starts successfully, you will see the following message at the end of the file:

```
<Date> … Interstage BPM Server … is ready.
```

> **Note:** If Interstage BPM Server does not start and you receive an error message notifying a conflict about the http port number (49950) already being in use, then you can change the http port in the `server.xml` file located in the `<JBoss installation directory>\jboss-as\server\ibpm\deploy\jbossweb.sar\` directory.
>
> If you change the port number, you also need to change the `ServerBaseURL` property using the Tenant Management Console. For details, refer the *Interstage BPM Server Administration Guide*.

To stop the server:

You can stop the Interstage BPM Server by stopping the JBoss Application Server. To stop the server, do one of the following:

- Run the shutdown script. To do this:
  1. Ensure that JMX authentication is configured - for details on how to do this refer *Configuring JBoss Application Server Secure Access* on page 83.

2. Run the shutdown script located in the `<JBoss Installation Directory>/jboss-as/bin` directory as follows:

Operating System	Script
Windows	`shutdownIBPM.bat -S -s <Server Name>:<port> -u <user id> -p <password>` **Example:** `shutdownIBPM.bat -S -s localhost:1099 -u admin -p admin`
UNIX	`shutdownIBPM.sh -S -s <Server Name>:<port> -u <user id> -p <password>` **Example:** `shutdownIBPM.sh -S -s localhost:1099 -u admin -p admin`

Note: Here, the `-u` and `-p` options are required if you have set up JMX Console Authentication.

• Display the Command Prompt window in which the JBoss Application Server is running. Press <Ctrl>-C and wait for the server to stop.

Note: Do not stop the JBoss Application Server by closing the Command Prompt window in which the server is running.

Some components may not stop properly and you may not be able to start the JBoss Application Server again.

5.8   Starting Interstage BPM Console and Tenant Management Console

Prerequisites:

The application server where you have setup Console is running.

When you setup Interstage BPM Console on JBoss, you start Console and Tenant Management Console by starting Interstage BPM Server. To start Interstage BPM Server, refer *Starting Interstage BPM Server* on page 28.

To access Interstage BPM Console and Tenant Management Console:

1. In a Web browser
    • To access the Interstage BPM Tenant Management Console, enter the URL
      `http://<hostname>:<port>/console/TenantManager.page`
    • To access the Interstage BPM Console, enter the URL
      `http://<hostname>:<port>/console/<tenant_name>/`
   Here:
    • `<hostname>` is the machine name of the computer upon which you have setup the Interstage BPM Console.
    • The default port is `49950`.
    • `<tenant_name>` is the name of the tenant; if you configure non-SaaS mode, this is `default`.
    • It is recommended to use the tenant name in the URL with the same case as it has been created with during setup. However, tenant name in the URL is not case sensitive.

The Login page appears.

2. Log on to Console or Tenant Management Console.

You can now begin using Interstage BPM Console and Tenant Management Console. Refer the *Interstage BPM Console Online Help* and *Interstage BPM Tenant Management Console Online Help* for details.

5.8.1 Starting Interstage BPM Mobile Application

To start Interstage BPM Mobile Application:

1. In your mobile device's Browser, open the Interstage BPM Mobile application at the following URL: `http://<hostname>:<port>/console/<tenant_name>/`

   The Login page appears.

2. Log on to Interstage BPM Mobile application.

You can now begin using Interstage BPM Mobile application. Refer the *Interstage BPM Console Online Help* for details.

5.9 Starting Interstage BPM OpenID Provider

Prerequisites: The application server where you have setup OpenID Provider is running.

When you setup Interstage BPM OpenID Provider on JBoss, you start OpenID Provider by starting Interstage BPM Server. To start Interstage BPM Server, refer *Starting Interstage BPM Server* on page 28.

6 Configuring Interstage BPM Console to work with Interstage Analytics

This section provides information about configuring Interstage BPM Console to work with Interstage Analytics.

To set up Interstage BPM for Interstage Analytics:

1. Update the configuration file according to the instructions in the *Update the Configuration File* on page 31.
2. Run setup script according to the instructions in section *Running the Interstage BPM Setup Script* on page 21. If any error occurs in the script execution, check the configuration file updated in step 1 and then re-execute the setup script.
3. Execute the remaining steps as described in the *Interstage Analytics Installation Guide*.
4. Configure the SSL for Interstage Analytics according to the instructions in the *Configuration for SSL* on page 32.

6.1 Prerequisites

To set up Interstage BPM for Interstage Analytics, use the setup script.

Using the Interstage Analytics Setup Script:

- Complete the setup of Interstage BPM Server and Console.
- Prepare JAR files of Interstage Analytics.

  The JAR file of Interstage BPM Analytics exists in the setup directory of Interstage BPM Analytics.

  The following example shows the directory of JAR files of Interstage BPM Analytics:

  - On JBoss
    - Windows: `<JBoss installation directory>\jboss-as\server\<Profile>\deploy\ibpmm.war\WEB-INF\lib`
    - UNIX: `<JBoss installation directory>/jboss-as/server/<Profile>/deploy/ibpmm.war/WEB-INF-lib`

  Here, `<Profile>` is the Interstage Analytics deployment directory. If you setup Interstage Analytics on `<JBoss Installation Directory>/jboss-as/server/default`, then `<Profile>` is `default`.

If you setup Interstage Analytics on a different machine than Interstage BPM, then copy these directories to the Interstage BPM machine.

> **Note:** Only the user registered in Interstage Analytics can access analytics information from Console. Ensure that your Interstage BPM Console username is also a registered Interstage Analytics username.

6.2 Update the Configuration File

To update the configuration file for Interstage Analytics Setup:

1. Open the `setup.config` file located in the `<engine directory>/server` directory in a text editor.

> **Note:** You can change the file name and location of these configuration files. The updated file name and location will need to be specified in the setup script in next step. For example, here we use `setup.config` as the configuration file name.

2. Update the configuration parameters as described in the `setup.config` file. The parameters are classified under following categories:

> **Note:** For security reasons, it is recommended that passwords should be specified from command prompt as Command Line Parameters. For details, refer *Running the Interstage BPM Setup Script* on page 21. If passwords are specified in the configuration file, the file should be secured.

- **Interstage BPM Environment Parameters**: Specify the environment you have selected for setting up the Interstage BPM. For example specify the selected application server, database, execution mode.

  execution_mode_selection

  This parameter specify the mode of setup execution. Specify the value of this parameter as `3` to setup the Interstage BPM Analytics.

- **Application Server Parameters**: Specify the parameters only for the application server that you have selected for setting up the Interstage BPM. This parameter is not used for Analytics.
- **Database Parameters**: Specify the parameters only for database that you have selected for setting up the Interstage BPM. It is mandatory to set the value for `db_ibpm_user_name` and `db_ibpm_password` parameters.
- **Interstage BPM System Administrator**: Specify the parameters for system administrator (Super User). This parameter is not used for Analytics.
- **Interstage BPM Tenant Owner**: Specify the parameters for Tenant Administrator. This parameter is not used for Analytics.
- **Interstage BPM Analytics Parameter**: Specify the parameters for Interstage BPM Analytics.

6.3 Configuration for SSL

Interstage Analytics configuration in secure mode:

- If you have implemented SSL for Interstage BPM Console, set the `InterstageAnalyticsProtocol` Console configuration parameter to `https` in the configuration file `console.conf` located at `<Console Shared Root>/console/conf` directory.

  Here, `<Console Shared Root>` is the value of `console_shared_root` parameter set in the configuration file during setup of Interstage BPM.

- If Interstage Analytics is setup on a remote machine, and both Interstage Analytics as well as Interstage BPM are in secure mode, import the CA-issued certificate of Interstage Analytics to the keystore of Interstage BPM. For details of how to import a certificate into Interstage BPM's keystore, refer the last step in *Configuring a Keystore and Obtaining a Signed Certificate* on page 79.

> **Note:** If both Interstage BPM Console and Interstage BPM Analytics are using different domains (for example, Interstage BPM Console using local domain and Interstage BPM Analytics using a remote domain), then Interstage BPM Console does not operate properly. To avoid this either of the following settings is required for Internet Explorer:
> - Add Interstage BPM Console and Interstage BPM Analytics address to local Intranet or to **Trusted sites** in **Tools >Internet Options > Security**.
> - Add Interstage BPM Console and Interstage BPM Analytics domain to **Per Site Privacy Actions** as **Allow** in **Tools >Internet Options > Privacy > Sites**.

7 Setting Up a Directory Service

This chapter provides instructions for setting up your Directory Service.

7.1 Setting Up Microsoft® Active Directory

This section provides instructions for setting up Microsoft® Active Directory. Active Directory uses a form of the Lightweight Directory Access Protocol (LDAP). Like all LDAP-type Directory Services, Active Directory organizes people into Groups, and maintains a user profile with the appropriate permissions for each user.

The Active Directory setup procedure must be performed on the domain controller for your network by an Administrator.

7.1.1 Configuring Users and Groups for Interstage BPM with GUI of Microsoft® Active Directory

This section explains how to configure users and groups for Interstage BPM with the GUI of Microsoft Active Directory.

1. Create an Organizational Unit (ou) named as `Groups`.

   This ou should also be specified in the setup.config file during Interstage BPM setup. (You can change this value to another value.)

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) In the Console tree, right-click the required domain, select **New**, and click **Organizational Unit**.

   c) Type the name of the organizational unit (`Groups`).

   The following are common rules for configuring users and groups for Interstage BPM:

   • To create Groups that are valid for Interstage BPM, use only alphanumeric characters, hyphens, and underscore characters ("_"). Group names must not begin with an 'at' character ("@") as this is used to identify Agents in Interstage BPM.

2. Create an Organizational Unit (ou) named as `People`.

   (You cannot change this value to another value.)

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) In the Console tree, right-click the required domain, select **New**, and click **Organizational Unit**.

   c) Type the name of the organizational unit (`People`).

At this point, the directory tree of LDAP root looks as follows:
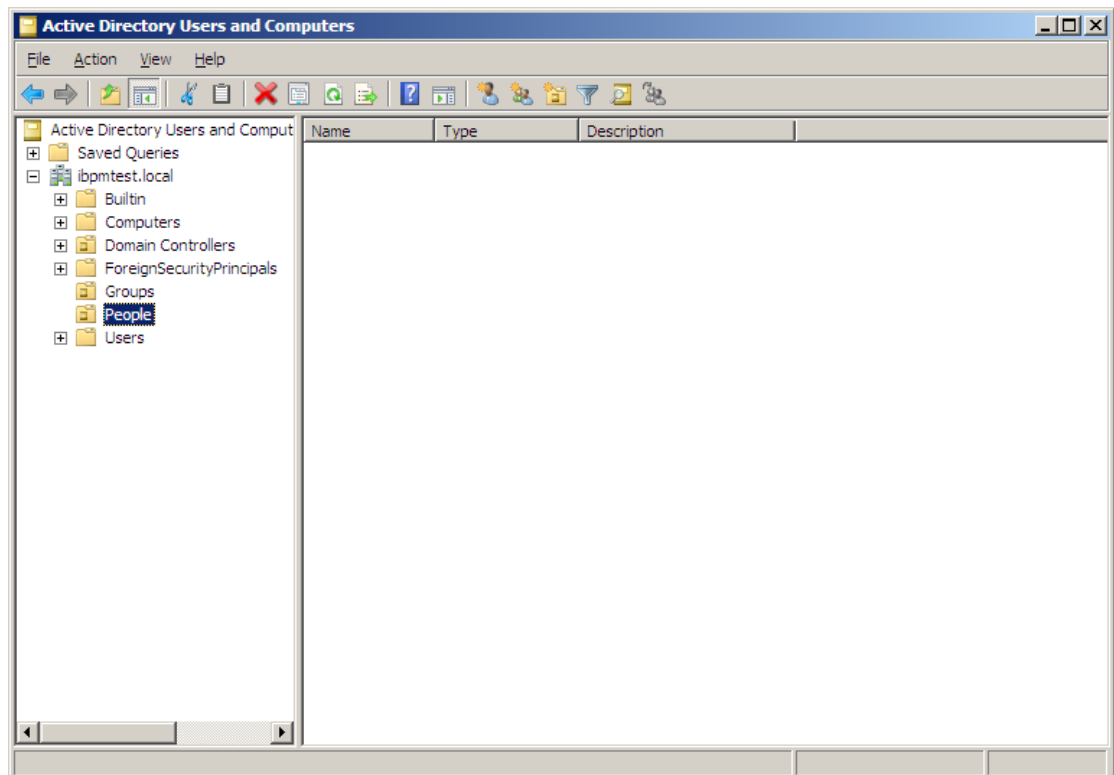
Figure 5: Creating Groups and People

3. Create LDAP-access user.

   This user is specified as SuperUser during the setup of Interstage BPM. For example, here we use `ibpm_server1` as LDAP-access user.

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) Right-click the **People** object, click **New**, and select **User**.

   c) Enter the new user's information for `ibpm_server1` and click **Next**.

      For the user, Active Directory requires you to provide a **First name**, **Last name**, **Full name**, and **User logon name**. Interstage BPM requires both a user login name and password to log in.

   Note: If you use Built-in SSO authentication, do not include any forwardslash "/" or backslash '\' characters in the user ID that you create.

   d) Enter the user's password, and click **Next**.

   e) Confirm the adding of the new user by clicking **Finish** in the confirmation dialog box.

   Note: Although entering a password and confirming it are optional for Active Directory, Interstage BPM requires a password to log in. The other fields such as E-Mail, Phone, and Fax are not used by Interstage BPM.

At this point, the directory tree of **People** looks like the following:
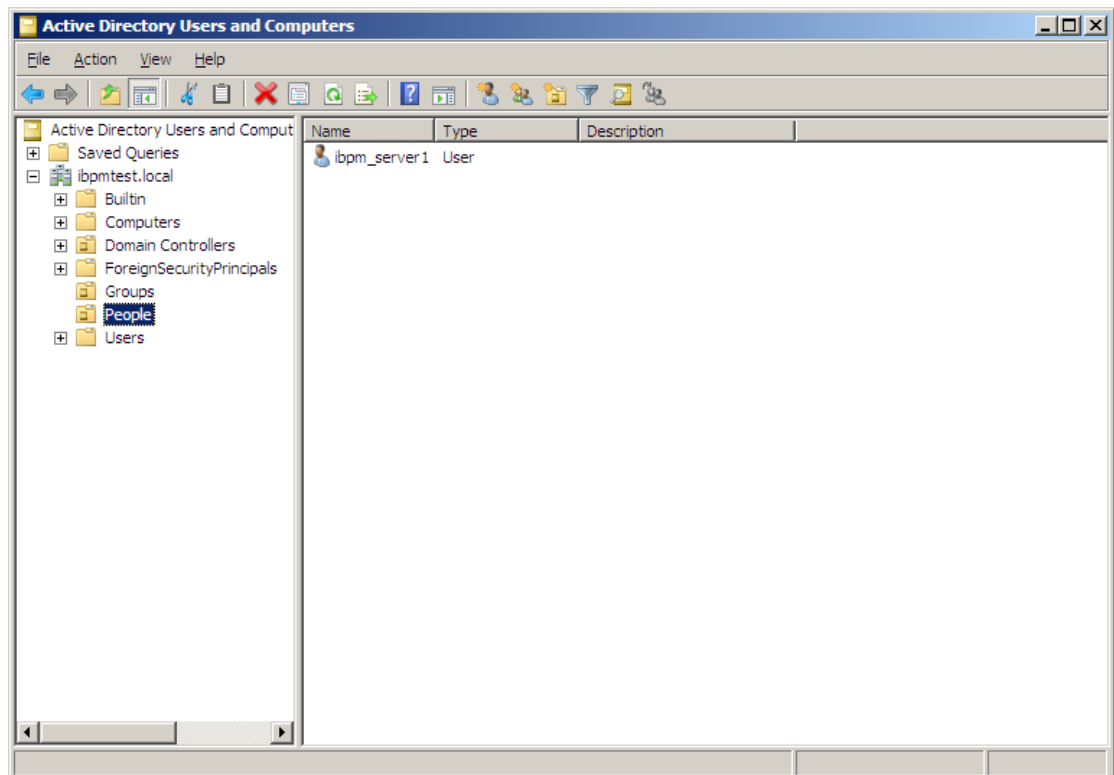
Figure 6: Directory Tree of People

4. Add the LDAP-access user (`ibpm_server1`) in the Administrators group.

   a) Select **Start** > **Settings** > **Control Panel** > **Administrative Tools** > **Active Directory Users and Computers**. Expand the host name and the domain name to find the **people** Organizational Unit.

   b) Right click the user (`ibpm_server1`) that you want to include in the Administrators group.

   c) From the popup menu that appears, select **Properties**, and then select the **Members Of** tab.

   d) In the user properties (for example, **ibpm_server1 Properties**) dialog, check if the `Administrators` group already exists in the list. If not, then follow these steps:

      1. Click **Add**.

         The **Select Groups** dialog appears.

      2. Type group name (`Administrators`), and then click **Check Names** to verify the group name.

      3. Click **OK**.

   e) Click **OK**.

5. Create the default Interstage BPM roles `Role` and `AdminRole` belonging to the Organizational Unit `Groups`.

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) Right-click the **Groups** object, click **New** and then select **Groups**.

   c) Create the group's information for **AdminRole**.

   d) Double-click the **AdminRole** object, and navigate to the **Member** tab.

   e) Click **Add**, and enter `ibpm_server1`. Now `ibpm_server1` is linked to `AdminRole` group.

   f) Repeat these steps to create the `Role` group, and add `ibpm_server1` to the `Role` group.

> **Note:** After normal setup using Active Directory, the default Administrator Role is assigned to a Group called `AdminRole`. You can change this default name by modifying the `AdminRole` parameter of the Interstage BPM Server.

6. Create the `IflowUsers` group belonging to the Organizational Unit `Groups`.

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) Right-click the **Groups** object, click **New** and then select **Groups**.

   c) Create the group's information for **IflowUsers**. Also, create this object as **Distribute**.

   d) Double-click the **IflowUsers** object, and navigate to the **Member** tab.

   e) Click **Add**, and enter `ibpm_server1`.

7. Create the `IflowGroups` group belonging to the Organizational Unit `Groups`.

   a) Open the Active Directory Management Console (Active Directory Users and Computers).

   b) Right-click the **Groups** object, click **New** and then select **Groups**.

   c) Create the group's information for **IflowGroups**. Also, create this object as **Distribute**.

   d) Double-click the **IflowGroups** object, and navigate to the **Member** tab.

   e) Click **Add**, and enter `AdminRole`.

   f) Similarly, add `Role` to `IflowGroups`.

At this point, the directory tree of `Groups` looks like the following:
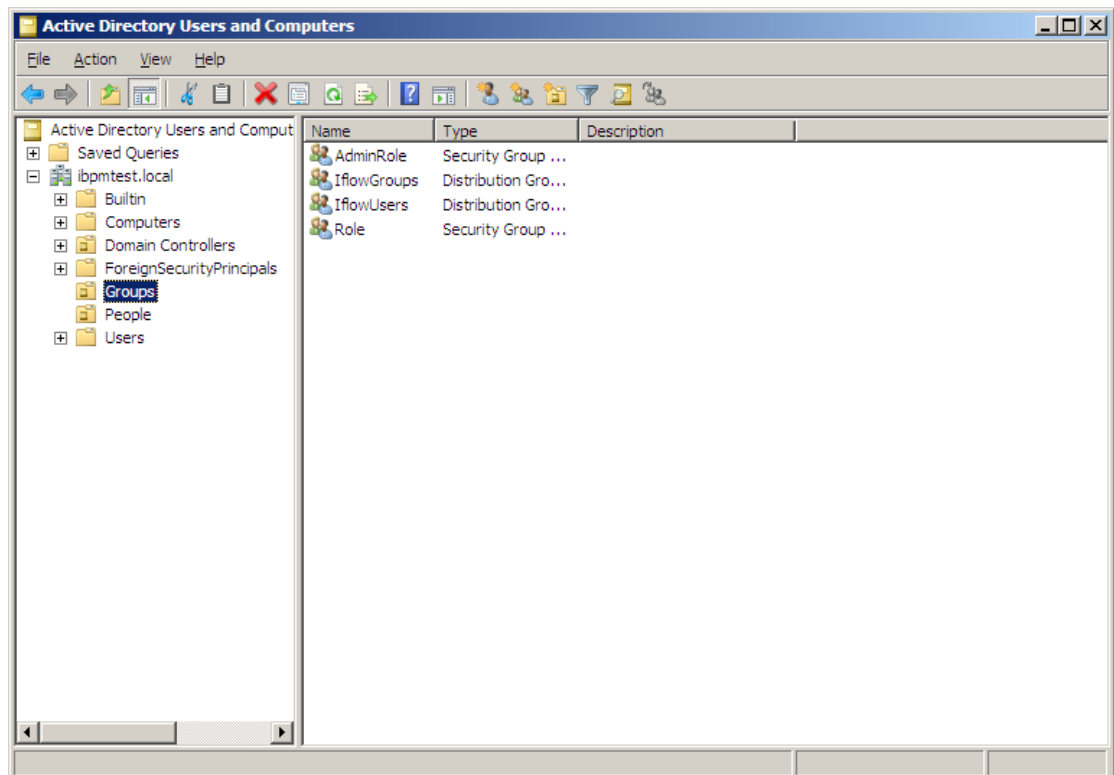
Figure 7: Directory Tree of Groups

You have now completed the configuration for Active Directory. You can now setup Interstage BPM with Microsoft Active Directory.

7.1.2 Using Existing Active Directory Users and Groups

If you are new to Interstage BPM and are already using Active Directory as the Directory Service to maintain your organization's Users and Groups, you can use your existing directory structure with Interstage BPM. You can do this by designating which of your LDAP Users and Groups you will be able to use in Interstage BPM. This involves the modification of two special LDAP Groups, `IflowUsers` and `IflowGroups`.
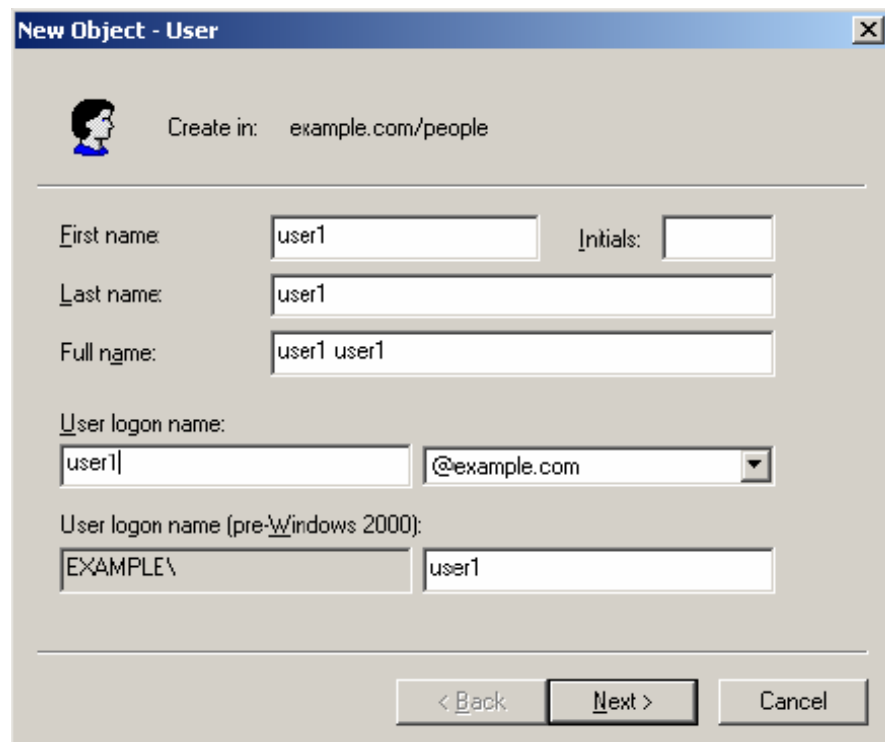
To give your LDAP Users access to Interstage BPM as Interstage BPM users, add them as members of the `IflowUsers` group. You can add each user individually or add a group that contains the users. Users in the group sub-levels will also have access permission. To use your LDAP Groups directly in Interstage BPM add them as members of the `IflowGroups` group.

7.1.3 Adding New Users Using the GUI

Note: To create users that are valid for Interstage BPM, use only alphanumeric characters, hyphens, and underscore characters ("_"). User names must not begin with an at character ("@") as this is used to identify Agents in Interstage BPM.

To add new users using the ActiveDirectory GUI:

1. Launch the Active Directory Console if you haven't already done so by selecting **Start** > **Settings** > **Control Panel** > **Administrative Tools** > **Active Directory Users and Computers**. Expand the host name and the domain name to find the **people** Organizational Unit.

2. Right click **people**.

3. From the popup menu, select **New**, and then select **User** to open the **New Object - User** dialog.
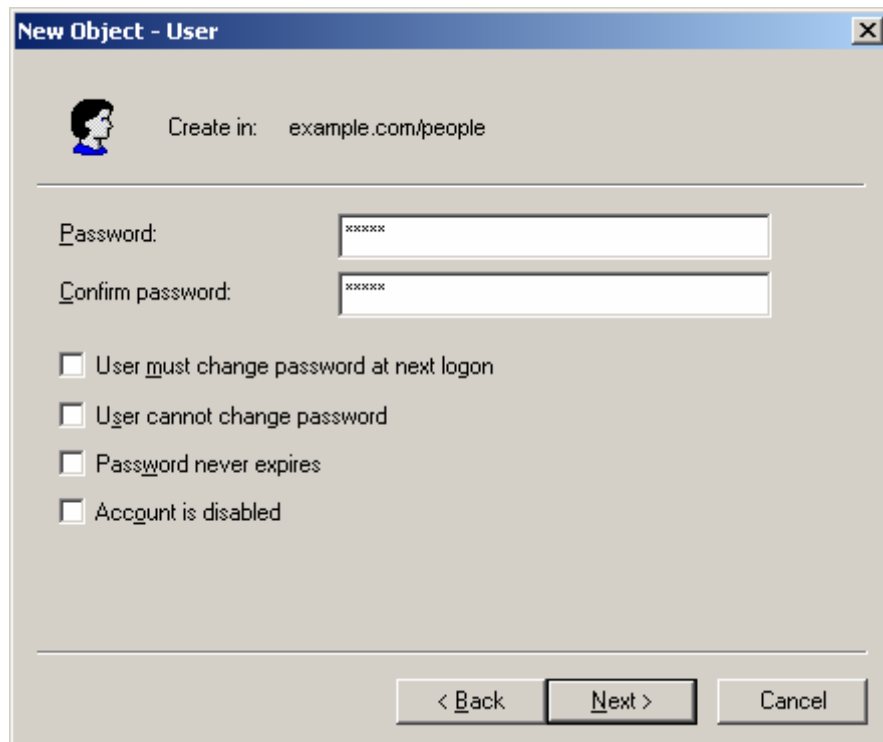
Figure 8: Adding a New User

4. Enter the new user's information and click **Next**.

   For each user, Active Directory requires you to provide a first name, last name, full name, and user login name.

   Interstage BPM requires both a user login name and password to log in.

5. Enter the user's password, and make sure that **User must change password at next logon** check box is not selected. Click **Next**.

Figure 9: Adding a New User

6. Confirm the adding of the new user by clicking **Finish** in the confirmation dialog.
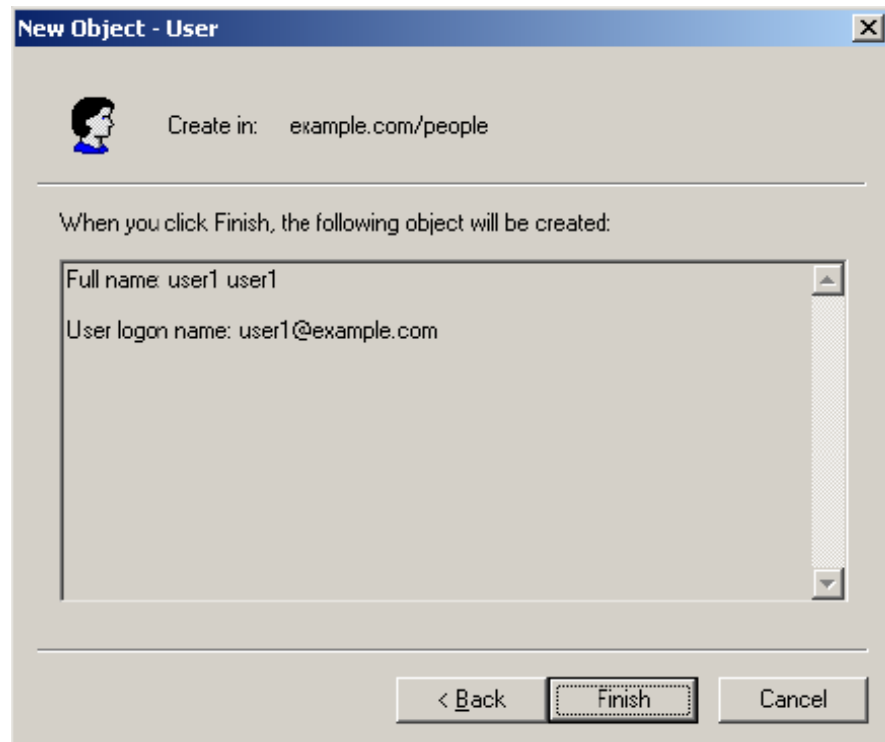
Figure 10: Adding a New User

Use the **New Object - User** dialog to create as many new user profiles as you want.

7. Add the new user to `IflowUsers` so that the new user is recognized by Interstage BPM. To do so:

    a) In the **Active Directory Users and Computers** window, expand the host name and the domain name to find the main Organizational Unit that you specified during Interstage BPM setup.

    b) Right click the `IflowUsers` Group and select **Properties** from the popup menu.

    c) Select the **Members** tab and click **Add**.

    The **Select Users, Contacts, Computers, or Groups** dialog appears.

    d) Enter the name of the new user that is to be added to `IflowUsers`. Click **Check Names** to verify the user name.

    e) Click **OK**.

7.1.4 Adding New Groups Using the GUI

Note: To create Groups that are valid for Interstage BPM, use only alphanumeric characters, hyphens, and underscore characters ("_"). Group names must not begin with an at character ("@") as this is used to identify Agents in Interstage BPM.

To add a new Group using the GUI:

1. Launch the Active Directory Console if you haven't already done so by selecting **Start** > **Settings** > **Control Panel** > **Administrative Tools** > **Active Directory Users and Computers**. Expand the host name and the domain name to find the **groups** Organizational Unit.

2. Right click **groups**.

3. From the popup menu, select **New**, and then select **Groups** to open the **New Object - Groups** dialog.

4. Add the new Group's information, and then click **OK** to add your new Group.

   In the example below, the Group `Role` is added.
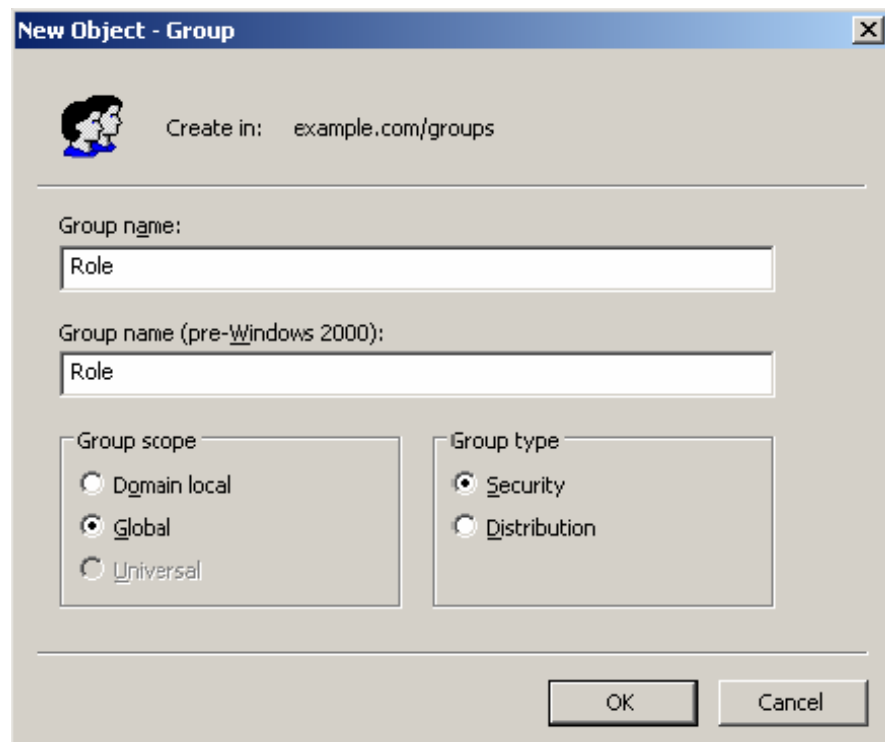
Figure 11: Adding New Groups

5. Confirm the adding of the new Group by clicking **Finish** in the confirmation dialog box.

   Use the **New Object - Groups** dialog to create as many new user profiles as you want.

   For each Group, Active Directory requires you to provide a unique name for your Group.

6. Add the new Group to `IflowGroups` so that the new Group is recognized by Interstage BPM. To do so:

   a) In the **Active Directory Users and Computers** window, expand the host name and the domain name to find the main Organizational Unit that you specified during Interstage BPM setup.

   b) Right click the `IflowGroups` Group and select **Properties** from the popup menu.

   c) Select the **Members** tab and click **Add**.

   The **Select Users, Contacts, Computers, or Groups** dialog appears.

d) Enter the name of the new Group that is to be added to `IflowGroups`. Click **Check Names** to verify the Group name.

e) Click **OK**.

7.1.5 Adding Members to a Group Using the GUI

To add members to a Group using the GUI:

1. Launch the Active Directory Console if you haven't already done so by selecting **Start** > **Settings** > **Control Panel** > **Administrative Tools** > **Active Directory Users and Computers**. Expand the hostname and the domain name to find the **groups** Organizational Unit.

2. Right click the group to which you want to add members.

3. From the popup menu that appears select **Properties**, and then select the **Members** tab to display the Group's properties dialog.

   The **Properties** dialog for the group named "`Role`" is used in the following example. `ibpm_example` is already a member of the group named "`Role`". It is highly recommended that you use a group with a more meaningful name than "Role" in your own programming practice, since this name tends to be very confusing to talk about.
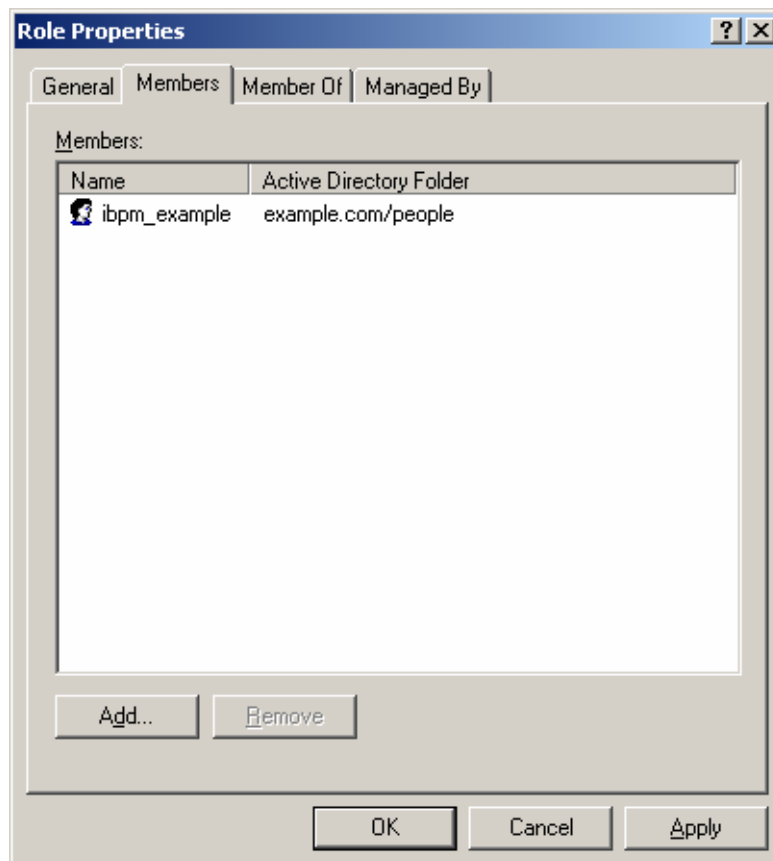
Figure 12: Adding Members

4. In the **Role Properties** dialog, click **Add**.

The **Select Users, Contacts, Computers, or Groups** dialog appears.

5. In Windows Server, search a user or Group that you want to add as a member of the Group. The user or Group appears in the bottom text area of the dialog.
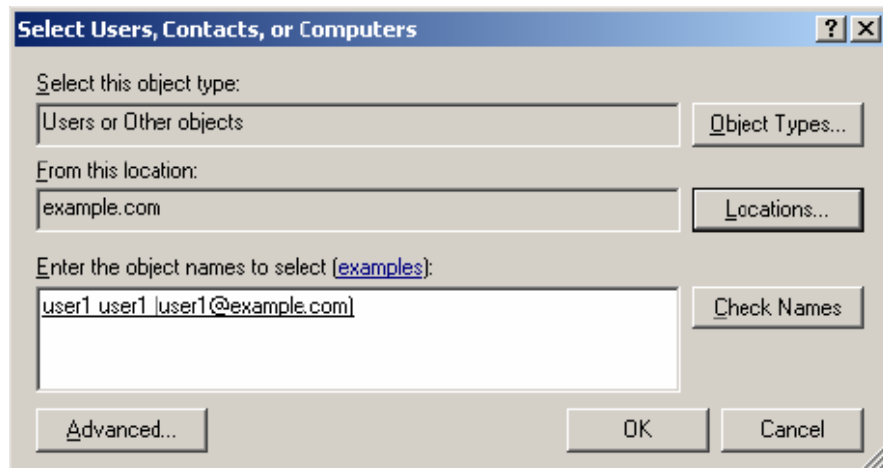
Figure 13: Selecting a User

6. Click **OK**.

The user appears with the existing users in the **Properties** dialog.
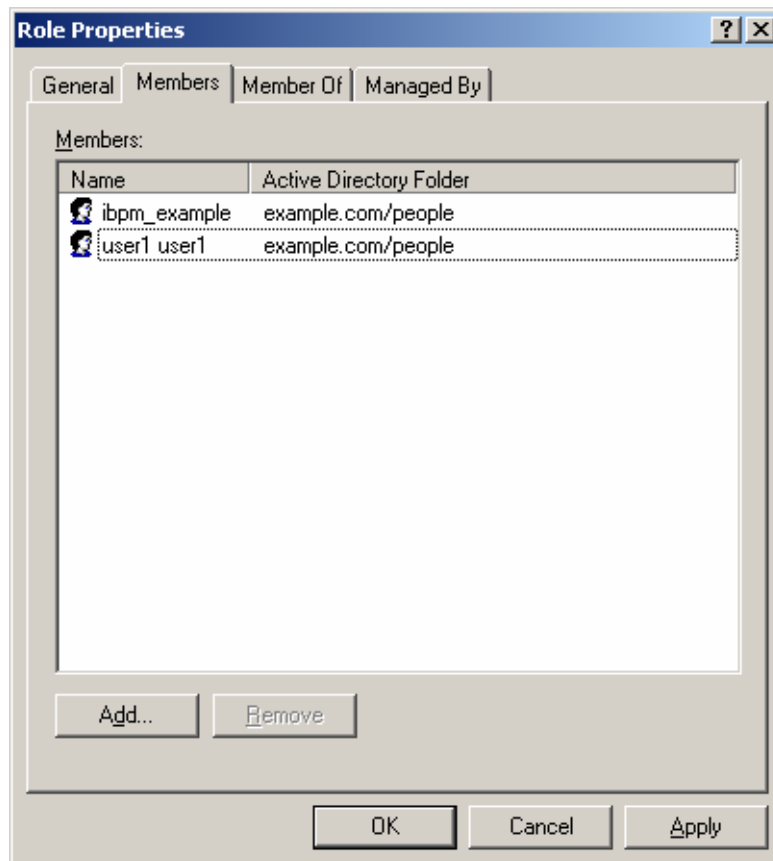
Figure 14: New Member Added

7. To the **AdminRole** Group, add the IDs of all Interstage BPM users who will create WFAdminSession objects through Java. This Group should at least include the Interstage BPM Administrator account that you defined during setup.

7.2 Setting Up Oracle Directory Server Enterprise Edition

Oracle Directory Server Enterprise Edition uses a form of the Lightweight Directory Access Protocol (LDAP). Like all LDAP-type Directory Services, it organizes people into Groups, and maintains a user profile with the appropriate permissions for each user.

Prerequisite:

• Install the Oracle Directory Server Enterprise Edition and start it.

• Create suffixes on Oracle Directory Server Enterprise Edition for Interstage BPM.

• Create a Directory Server Instance.

To use Interstage BPM with Oracle Directory Server Enterprise Edition:

You must customize your Oracle Directory Server Enterprise Edition installation as follows:

• Configure users and Groups to use Interstage BPM.

• Add general users and general Groups to the Directory Service.

7.2.1 Configuring Users and Groups for Interstage BPM with GUI of Oracle Directory Server Enterprise Edition

This section explains how to configure users and groups for Interstage BPM with the GUI of Oracle Directory Server Enterprise Edition.

1. Create an Organizational Unit (ou) named as `Groups`.

   This ou should also be specified in the setup.config file during Interstage BPM setup. (You can change this value to another value.)

   a) Open the Oracle Directory Service Control Center, and select the **Browse** tab of **Entry Management**.

   b) Specify the DN that you want to use in the **View DN** drop-down list.

   c) Click **New Entry** to start the **New Entry** wizard.

   d) In the **Choose Object Class** screen, for **Entry Type**, select **Organizational Unit-(organizationalUnit)**.

   e) In the **Configure Attribute** screen, enter `Groups` for the Organization Unit (ou).

   The following are common rules for configuring users and groups for Interstage BPM:

   • To create users that are valid for Interstage BPM, use only alphanumeric characters, hyphens, and underscore characters ("_"). User IDs must not begin with an 'at' character ("@") as this is used to identify Agents in Interstage BPM.

2. Create an Organizational Unit (ou) named as `People`.

   (You cannot change this value to another value.)

   a) In the Oracle Directory Service Control Center, select the **Browse** tab of **Entry Management**.

   b) Specify the DN that you want to use in the **View DN** drop-down list.

   c) Click **New Entry** to start the **New Entry** wizard.

   d) In the **Choose Object Class** screen, for **Entry Type**, select **Organizational Unit-(organizationalUnit)**.

   e) In the **Configure Attribute** screen, enter `People` for the Organization Unit (ou).

Note:	Although entering a password and confirming it are optional for Oracle Directory Server Enterprise Edition, Interstage BPM requires a password to log in. The other fields such as E-Mail, Phone, and Fax are not used by Interstage BPM.

At this point, the directory tree of LDAP root looks as follows:
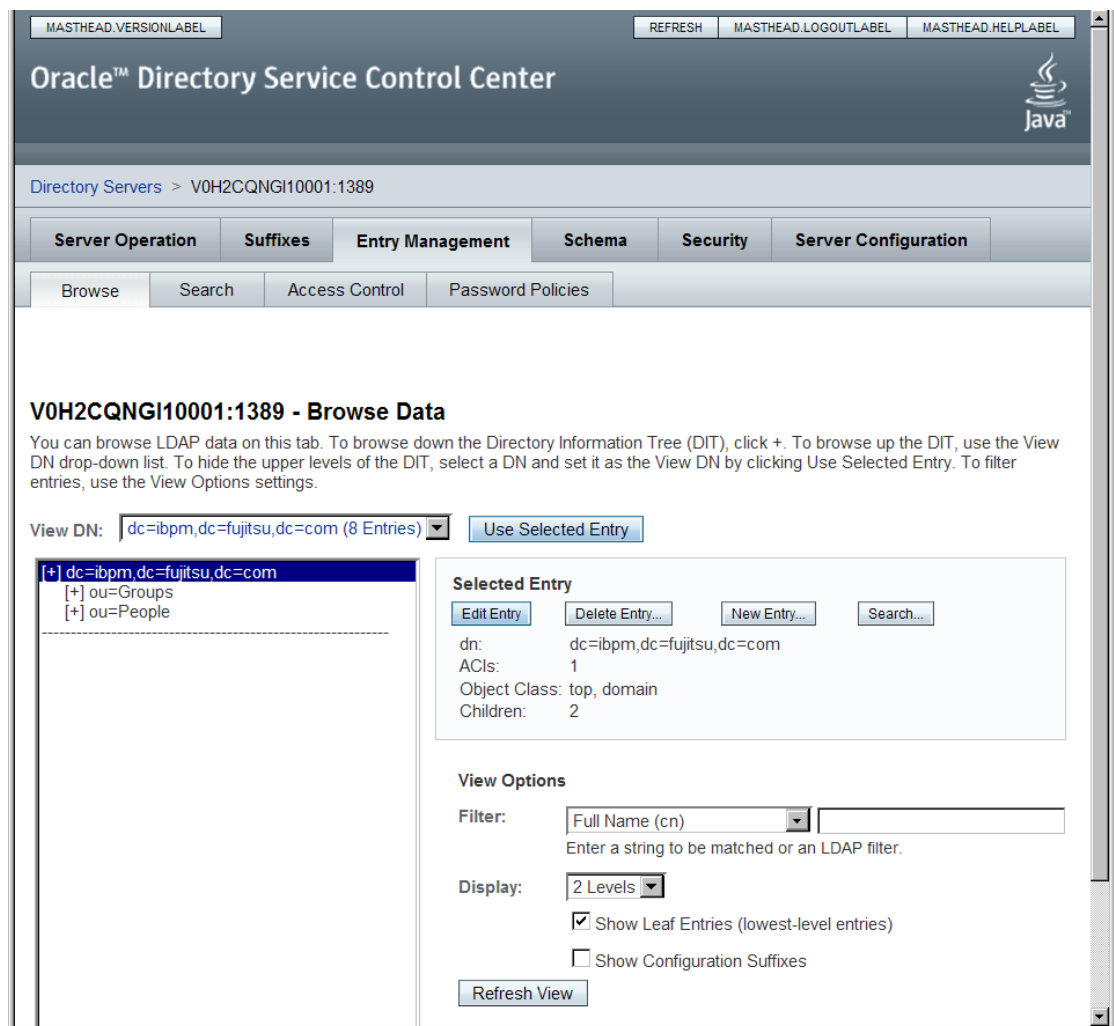
Figure 15: Creating Groups and People

3. Create LDAP-access user.

   This user is specified as SuperUser during the setup of Interstage BPM. For example, here we use `ibpm_server1` as LDAP-access user.

   a) In the Oracle Directory Service Control Center, select the **Browse** tab of **Entry Management**.

   b) Under the `People` group you created earlier, click **New Entry** and start the **New Entry** wizard.

   c) In the **Choose Object Class** screen, for **Entry Type**, select **User - (inetOrgPerson)**.

   d) In the **Configure Attribute** screen, enter `ibpm_server1` for **cn** and **sn** fields of **Required Attributes**.

   e) In the **Configure Attribute** screen, enter `ibpm_server1` for **User ID(uid)** field of **Allowed Attributes**. Also enter information for **Password** and **Confirm Password** fields.

Note: If you use Built-in SSO authentication, do not include any forwardslash "/" or backslash '\' characters in the user ID that you create.

At this point, the directory tree of **People** looks like the following:
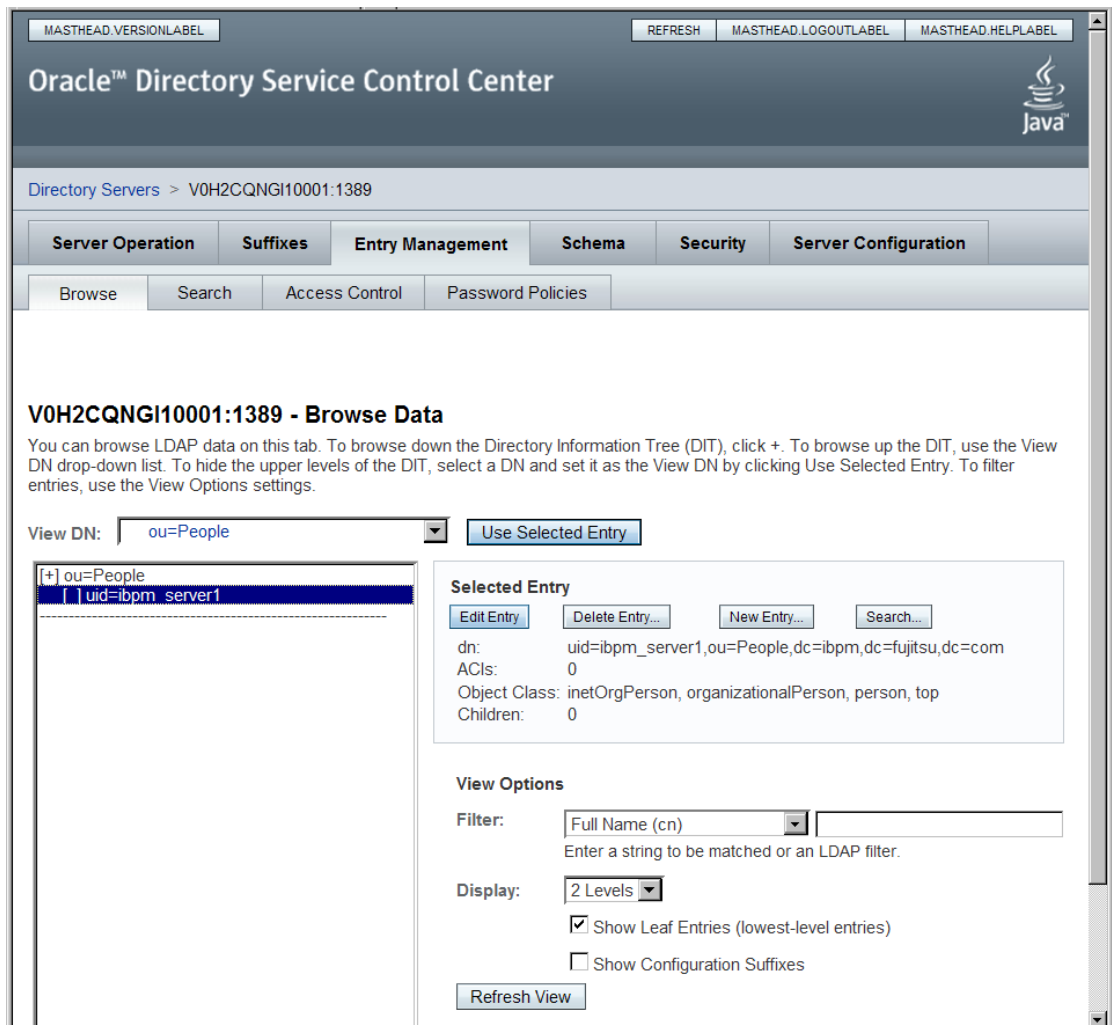
Figure 16: Directory Tree of People

4. Create the default Interstage BPM roles `Role` and `AdminRole` belonging to the Organizational Unit `Groups`.

   a) In the Oracle Directory Service Control Center, select the **Browse** tab of **Entry Management**.

   b) Under the `Groups` group you created earlier, click **New Entry** and start the **New Entry** wizard.

   c) In the **Choose Object Class** screen, for **Entry Type**, select **Static Group - (groupOfUniqueNames)**.

   d) In the **Configure Attribute** screen, enter `AdminRole` for **Full Name (cn)** field of **Required Attributes**.

   e) In the **Configure Attribute** screen, in **Allowed Attributes**, for both Groups select the default user you created in the previous step.

   f) Similar to the steps just performed for `AdminRole`, repeat these steps for `Role`.

> **Note:** After a normal installation using the Oracle Directory Server Enterprise Edition, the default Administrator Group is called `AdminRole`. You can change this default name by modifying the `AdminRole` parameter of the Interstage BPM Server. For the parameter description, refer the *Interstage BPM Server Administration Guide*. To this Group, add the IDs of all Interstage BPM users who will access administration functions in the Interstage BPM Console or create `WFAdminSession` objects through Java. This Group should at least include the Interstage BPM Administrator account that you defined during setup (typically `ibpm_server1`).

5. Create the `IflowUsers` group belonging to the Organizational Unit `Groups`.

   a) In the Oracle Directory Service Control Center, select the **Browse** tab of **Entry Management**.

   b) Under the `Groups` group you created earlier, click **New Entry** and start the **New Entry** wizard.

   c) In the **Choose Object Class** screen, for **Entry Type**, select **'Static Group - (groupOfUniqueNames)**.

   d) In the **Configure Attribute** screen, enter `IflowUsers` for **Full Name (cn)** field of **Required Attributes**.

   e) In the **Configure Attribute** screen, in **Allowed Attributes**, add `ibpm_server1` for **Group Member (uniqueMember)** field. By using the **Add** button, for both Groups select the default user you created in step 3.

6. Create the `IflowGroups` group belonging to the Organizational Unit `Groups`.

   a) In the Oracle Directory Service Control Center, select the **Browse** tab of **Entry Management**.

   b) Under the `Groups` group you created earlier, click **New Entry** and start the **New Entry** wizard.

   c) In the **Choose Object Class** screen, for **Entry Type**, select **'Static Group - (groupOfUniqueNames)**.

   d) In the **Configure Attribute** screen, enter `IflowGroups` for **Full Name (cn)** field of **Required Attributes**.

   e) In the **Configure Attribute** screen, in **Allowed Attributes**, add `AdminRole` and `Role` for **Group Member (uniqueMember)** field. By using the **Add** button, you can select `AdminRole` and `Role` you created in step 4.

At this point, the directory tree of `Groups` looks like the following:
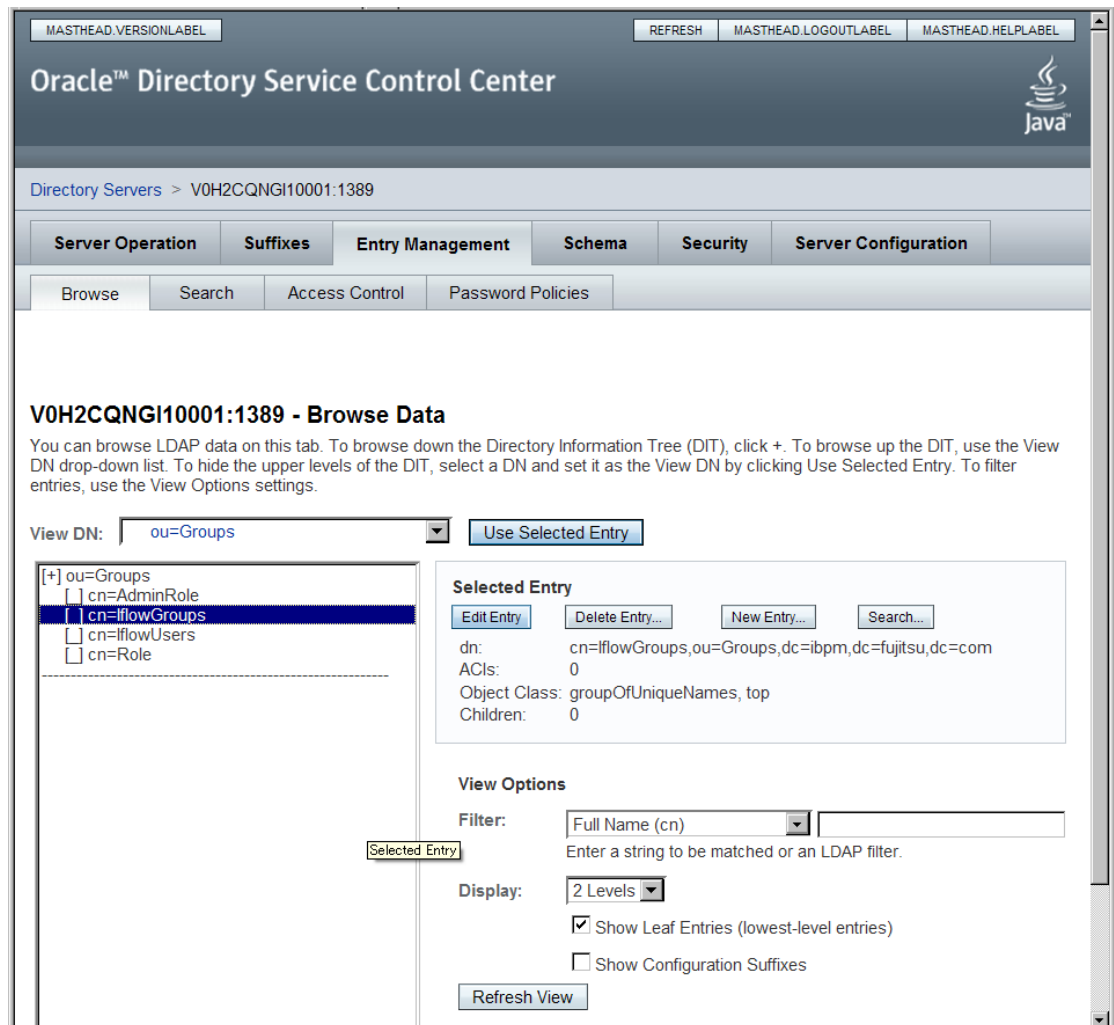
Figure 17: Directory Tree of Groups

7. Configure ACI.

   a) In the Oracle Directory Service Control Center, select the **Access Control** tab of **Entry Management**.

   b) Click **New ACI from Syntax** and start the **New ACI** wizard.

   c) Enter information for the **ACI Syntax** and **Entry where the ACI is located**.

   ACI Syntax: `(target = ldap:///'Suffix') (targetattr="*") (version 3.0; acl "'ACIName'"; allow (all) (userdn = "ldap:///uid='UserId',ou=People,'Suffix'");)`

   Example:

   ```
   (target = ldap:///dc=xxxx,dc=fujitsu,dc=com) (targetattr="*")
   (version 3.0; acl "Enable Full access for IBPM admin user"; allow
   (all)
   ```

```
(userdn =
"ldap:///uid=ibpm_server1,ou=People,dc=xxxx,dc=fujitsu,dc=com") ;)
```

Entry where the ACI is located: `Suffix`

Example:

```
dc=xxxx,dc=fujitsu,dc=jp
```

You have now completed the configuration for Oracle Directory Server. You can now setup Interstage BPM with Oracle Directory Server Enterprise Edition.

7.2.2 Using Existing Oracle Directory Server Enterprise Edition Users and Groups

If you are new to Interstage BPM and are already using Oracle Directory Server Enterprise Edition as the Directory Service to maintain your organization's users and Groups, you can use your existing directory structure with Interstage BPM. You can do this by designating which LDAP Users and Groups can be used directly within Interstage BPM. This involves the modification of two special LDAP Groups, `IflowUsers` and `IflowGroups`.

To give your LDAP Users access to Interstage BPM add them as members of the `IflowUsers` Group. You can add each user individually or add a Group that contains the users. Users in the Group sub-levels are also given access. To use your LDAP Groups within Interstage BPM add them as members of the `IflowGroups` Group.

7.2.3 Adding New Oracle Directory Server Enterprise Edition Users

When you want to add a new user as a general Interstage BPM user, you need to create a user that belongs to `ou=People`.

To add a new user:

1. Open the Oracle Directory Service Control Center, and select the **Browse** tab of **Entry Management**.
2. Under the `People` group, click **New Entry** and start the **New Entry** wizard.
3. In the **Choose Object Class** screen, for **Entry Type**, select **User - (inetOrgPerson)**.
4. In the **Configure Attribute** screen, enter the username of the new user in the **cn** and **sn** fields of **Required Attributes**.
5. In the **Configure Attribute** screen, enter the LDAP User ID for **User ID(uid)** field of **Allowed Attributes**. Also enter information for **Password** and **Confirm Password** fields.

7.2.4 Adding New Groups

When you want to add new groups as general Interstage BPM group, you need to create a group and add it to `Role` group.

1. Open the Oracle Directory Service Control Center, and select the **Browse** tab of **Entry Management**.
2. Under the `Groups` group, click **Edit Entry** to start the **Edit Entry** wizard for the group named "`Role`".
3. In the **Allowed Attributes** screen, add the group you want by using the **Add** button.

7.3 Group Caching

When the Interstage BPM Server starts up, Interstage BPM connects to the Directory Service and copies all of the user and Group information defined in `LDAPUsersDN` and `LDAPGroupsDN` to a cache on the Interstage BPM Server. This increases Interstage BPM performance because user and Group information no longer has to be retrieved from the Directory Service, which might be running on a separate network computer. It retrieves it from the LDAP Cache that is on the local computer in memory.

If the cache is not updated, users added since the start of the Interstage BPM Server would not be able to login to or use Interstage BPM. To avoid this, the cache has to be updated periodically.

The `LDAPGroupCacheAgeSec` parameter of the Interstage BPM Server specifies how often the LDAP Cache is updated. Groups that have been in service for longer than the period of time specified in the `LDAPGroupCacheAgeSec` parameter are checked, and new user and Group information is retrieved from the Directory Service. The default value for this parameter is 3600 seconds; that is, the LDAP Cache will be checked every hour. If this parameter is set to -1, new user and Group information is retrieved from the Directory Service every time it is needed. Refer to the *Interstage Business Process Manger Server Administration Guide* for more information about the configuration parameters of the Interstage BPM Server.

Each entry in the cache has a timestamp that is set to the last time that group was read from the Directory Service. Whenever someone calls the Directory Adapter to fetch a Group, the Directory Adapter checks if that Group is in the cache:

- If the Group requested is not in the cache, it is read in and timestamped with the current time.
- If the Group requested is already in the cache, the timestamp is checked. If the Group was timestamped before the previous cache check (it is at a time before `LDAPGroupCacheAgeSec` seconds ago), then just that Group is deleted from the LDAP Cache and read back in from the Directory Service. All other Groups in the cache are unaffected.

7.4 User Attribute Caching

The generic structure of an Interstage BPM user's profile is stored using multiple user attributes. These attribute values include the user's ID, email, manager or subordinate's ID, and so on. Inclusion of manager or subordinate information in the Interstage BPM user profile allows mapping of your company's organization and people structure so that Interstage BPM can further use this information. The `RequiredUserAttribute` property of Interstage BPM stores names of user attributes that are necessary to be defined for a user profile.

All attributes specified for `RequiredUserAttribute` are not cached. Only attributes for which the `cache` option is specified are cached. Storing attributes in the local database cache allows Interstage BPM to quickly search and retrieve these attribute values for any user, from the cache. Retrieved attribute values can further be used for different purposes (for example, directly allocating a task to a particular user's manager or subordinate, or viewing what tasks a user's subordinates are allocated to).

Interstage BPM server refreshes the user attribute values in the cache in the following scenarios:

- When you modify the value of the `RequiredUserAttribute` Interstage BPM property
- When you call the Model API `WFAdminSession.refreshAllUserProfileCache()` method

7.5 Changing Username and Password of Tenant Owner

When a tenant is created, the Tenant Owner name and password specified while creation of the tenant are stored in Interstage BPM Server tenant properties of `ServerUserName`, `ServerPassword` and in `LDAPAccessUserID`, `LDAPAccessUserPassword` for LDAP-related directory services.

If you change Tenant Owner name or password then please do not forget to change these Interstage BPM Server tenant properties as well and also re-activate the tenant.

But, if you use Local User Management (LUM) as a directory service and change the Tenant Owner password then `ServerPassword` will be changed automatically at the same time. In this scenario, you need not re-activate the tenant.

8   Un-setup Interstage BPM Server and Console

This chapter explains how to un-setup Interstage BPM Server and Console from an application server.

8.1   Un-setup Interstage BPM Server and Console from the Application Server

You can un-setup the Interstage BPM Server and Console from the application server using the setup script.

> **Note:**   When you un-setup the Interstage BPM Server and Console , the Interstage BPM database will not be removed.

To un-setup an Interstage BPM Server and Console instance:

Log out of all Interstage BPM Clients and close all Browser windows.

Follow the steps described below:

1. Confirm the configuration parameters according to the section *Confirm the Un-setup Configuration File* on page 54.
2. Run the unsetup script according to the instructions in section *Running the Un-setup Script* on page 55
3. Backup your data according to the instructions in section *Backup Resources* on page 56
4. Remove the `engine` directory according to the section *Remove engine Directory* on page 56.

8.1.1   Confirm the Un-setup Configuration File

Make sure the configuration parameters are properly set in the `unsetup.config` file located at `<engine directory>/server` directory. You can specify the value of parameters which are not set, either in the `unsetup.config` file or using the command line parameters while executing the unsetup script, as the value is not specified for parameter of password.

> **Note:**   If you have set the password parameters in the configuration file, secure the file for security reasons.

> **Note:**   Basically, when `unsetup.config` file does not exist, executing un-setup is not neccessary. However, under certain conditions (for example - when directory from previous setup is deleted without executing un-setup), the `unsetup.config` file needs to be created manually using the following steps:
>
> 1. Use the following template located in the `<engine directory>/server/deployment/configFile/` directory to create the un-setup configuration file.
>   - For Windows: `unsetup-template-Win.config`
>   - For UNIX: `unsetup-template-Unix.config`
>
> 2. Rename the template file you used in step 1 to `unsetup.config`.
> 3. Copy `unsetup.config` to `<engine directory>/server` directory.

8.1.2 Running the Un-setup Script

Stop the Interstage BPM Server by stopping the JBoss Application Server before executing the unsetup script. For further information refer to *To stop the server* section of *Starting Interstage BPM Server* on page 28.

To un-setup an Interstage BPM Server and Console instance:

Run the following unsetup script located in the `<engine directory>/server` directory as mentioned below.

For Windows: `unsetup.bat`

For UNIX: `unsetup.sh`

Execute the setup script using the following command:

- On Windows:

```
unsetup.bat <parameter name>=<value> <parameter name>=<value>...
```

- On UNIX:

```
unsetup.sh <parameter name>=<value> <parameter name>=<value>...
```

All the parameters specified in the `unsetup.config` file can be specified as the command line parameters. The error occurs if you specify any parameter that is not supported. The format of specification is `<parameter name>=<value>`. You can specify multiple parameters delimited by space character.

If you want to use space character in the value of a parameter then you need to enclose entire <parameter name>=<value> in double quotes. For example: `"DATAFILE_PATH=C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA"`.

If you want to use special characters on your shell, you need to escape such a character at the command line option. If you want to use un-escape character, you need to write in the `unsetup.config` file.

In the following example, `password` is set to the parameter of `appserver_admin_password` and `as_message_broker_password`:

On Windows:

```
unsetup.bat appserver_admin_password=password db_admin_password=password
```

On UNIX:

```
unsetup.sh appserver_admin_password=password db_admin_password=password
```

Note: If the administrative security mode is enabled and you run the unsetup script, a dialog box appears with prompts for username and password. Specify the username and password that you have configured for global security.

How to Confirm Successful Un-setup

After executing the un-setup, if you receive the `Un-setup Successful` message, then the un-setup of Interstage BPM server and console is completed successfully and you can now proceed to the next step.

However, if you receive the `Un-setup Failed: <error message>` message, then it indicates that un-setup is failed due to some reason. You can check the cause of any errors that occur during un-setup by viewing the `deployment.log` file, located at the following location:

- On Windows: `<engine directory>\server\deployment\logs`
- On UNIX: `<engine directory>/server/deployment/logs`

> **Note:** Each time you execute the un-setup script, the contents of `deployment.log` file will be overwritten. In some cases like specifying inappropriate options, the log file might not generated.

> **Note:** If the un-setup also fails, you need to manually delete the resources. Refer to the section *Errors during Setup of the Interstage BPM Server* on page 115

8.1.3 Backup Resources

Before you go to next step, you need to back up your resources. For detail information, refer *Server Administration Guide* .

8.1.4 Remove engine Directory

You can remove the `engine` directory that you have copied during the setup of Interstage BPM.

9 Upgrading Interstage BPM from Previous Versions

9.1 Outline

The basic steps for upgrading from previous version of Interstage BPM are described below:

To upgrade from previous versions of Interstage BPM:

1. Backup the complete Interstage BPM materials.

2. Uninstall the previous version of Interstage BPM.

3. Create a directory on your machine where you want to setup Interstage BPM and copy the `engine` directory from Interstage BPM engine directory on product media to the directory created on your machine

4. Upgrade your database according to the instructions in section *Upgrade Database* on page 57.

5. Upgrade the Interstage BPM Server and migrate application resources as described in *Migrating Application Resources from Previous Versions to this Version of Interstage BPM* on page 64.

Following sections explain the instructions for each of these steps.

9.1.1 Back up the Interstage BPM materials

To upgrade from previous versions of Interstage BPM:

1. Before uninstalling the previous version of Interstage BPM:

   - Back up the Interstage BPM database - This is the only way to ensure the retention of your current Interstage BPM data. The upgrade process automatically migrates (and therefore overwrites) process definitions to the current release's formats. Use the default functionalities of your database software for backing up your database.

   - Export out the Interstage BPM Server properties using the Interstage BPM export script. (For details, refer *Using the Configuration Export and Import Scripts* on page 75.) This preserves your previous server configurations. (If upgrading from Interstage BPM v7.x or v8.x, the uninstallation program automatically saves your configuration files with the suffix `previous` appended to their file names. For example, the `ibpm.properties` file is saved as `ibpmprevious.properties`.) After setting up the new version of Interstage BPM, you can use the saved properties file to manually configure your new server setup. For information on how to change the server configuration, refer to the *Interstage Business Process Manager Server Administration Guide*.

   - Back up all files from the previous `agents/` folder

   - Back up all files from the previous `calendar/` folder

   - Back up the `resources/DataSourceDefinition.xml` file

   - Back up the `resources/fileListenerConf.xml` file

   - Back up the `DmsCollections.xml` file and the directories specified in it - these directories contain data that users have previously uploaded.

9.1.2 Upgrade Database

The database upgrade procedure consists of the following 3 main steps:

1. **Schema migration**: This upgrade script does not require Java execution environment. This script must be executed with admin credentials on the machine where database is installed. In case of upgrading remote database, you need to copy the database upgrade script to remote database

machine and then configure the database parameters and execute the script, which will perform the database migration.

2. **Data migration**: This step executes data conversion and initialization for new schema. This step requires Java execution environment and can be executed from a remote machine that has Interstage BPM setup. Hence you do not need to execute this step on the remote database machine. This step fails if schema migration is not completed successfully.

> **Note:** If the Java execution environment is available on the database machine, you can execute this step on the database machine also.

3. **Post upgrade operations**: This is the final step to complete the database upgrade. This script does not require Java execution environments and must be executed on the database machine. In case of upgrading remote database, you need to copy the database upgrade script to the remote database machine and then configure the database parameters and execute the script, which will perform the post upgrade operations. This step fails if data migration is not completed successfully.

Before starting the execution of database upgrade script, you need to configure the parameters in the configuration file. These parameters indicates which step to execute. You can either execute all the scripts at one go or you can manually inspect and sequentially execute these three steps of database upgrade procedure if your database resides on a machine other than the Interstage BPM Server setup. For information regarding the configuration parameters, refer to the *Parameters for the database upgrade configuration file* on page 58

Parameters for the database upgrade configuration file

Before you execute database upgrade script, you need to configure parameters in the database upgrade configuration file `config.bat / config.sh` located at `<engine directory>/server/deployment/dbupgrade/bin` directory.

You can edit `config.bat / config.sh` file using the text editor.

> **Note:** If special characters are included in the parameter value, you need to escape the character followed by your shell.

Configuration Parameters for Database Upgrade:

Configuration Parameter	Description
MIGRATE_SCHEMA	This parameter specifies whether the schema migration has to be performed or not. The valid values are y or n. • If set to y, this parameter enables the schema migration. • If set to n, this parameter disables the schema migration. Please refer to *Upgrading Database* on page 62 for the usage example.
MIGRATE_DATA	This parameter specifies whether the data migration has to be performed or not. The valid values are y or n. • If set to y, this parameter enables the data migration. • If set to n, this parameter disables the data migration. Please refer to *Upgrading Database* on page 62 for the usage example.

Configuration Parameter	Description
POST_UPGRADE	This parameter specifies whether the post upgrade operations has to be performed or not. The valid values are y or n. • If set to y, this parameter enables the post upgrade operations. • If set to n, this parameter disables the post upgrade operations. Please refer to *Upgrading Database* on page 62 for the usage example.
AE_TO_EE	This parameter specifies the edition you are upgrading from. The valid values are y or n. • If set to y, this parameter indicates that you are upgrading from AE(Advanced Edition) to EE(Enterprise Edition) • If set to n, this parameter indicates that you are upgrading from EE to EE
DB_HOME	This parameter specifies the absolute path to the top-level directory of your database installation. Sample Value • For Oracle: 　• On Windows: C:\app\oracle\product\11.2.0\dbhome_1 　• On UNIX: /opt/app/oracle/product/11.2.0/dbhome_1 • For Microsoft SQL Server: C:\Program Files\Microsoft SQL Server
DATAFILE_PATH	This parameter specifies the absolute path to the directory where your data files resides. Sample Value • For Oracle: 　• On Windows: C:\app\oracle\oradata\orcl 　• On UNIX: /opt/app/oracle/oradata/orcl • For Microsoft SQL Server: C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA

Configuration Parameter	Description

JDBC_DRIVER_PATH	This parameter specifies the absolute path of the JDBC driver.
	
	This parameter is mandatory to specify if you have set MIGRATE_SCHEMA=y while upgrading from pre-10.1 version of Interstage BPM or if you have set MIGRATE_DATA=y.
	
	Sample Value
	• For Oracle:
	    • On Windows:
	      `C:\app\oracle\product\11.2.0\dbhome_1\jdbc\lib\ojdbc6.jar`
	    • On UNIX:
	      `/home/oracle/app/oracle/product/11.2.0/dbhome_1/jdbc/lib/ojdbc6.jar`
	• For Microsoft SQL Server:
	    On Windows: `C:\MicrosoftSQLServer2012JDBCDriver\sqljdbc_4.0\enu\sqljdbc4.jar`

JAVA_HOME	This parameter specifies the absolute path to the top-level directory of the JDK installation. Sample Value: `D:\java\jdk1.6.0_22` This parameter is mandatory to specify if you have set MIGRATE_SCHEMA=y while upgrading from pre-10.1 version of Interstage BPM or if you have set MIGRATE_DATA=y.
DB_TYPE	This parameter specifies the type of database used. The valid values are: • oracle • mssql
DB_HOST	This parameter specifies the IP address or host name of the machine where database is installed. If you do not specify the value of this parameter localhost will be used.
DB_PORT	This parameter specifies the port on which your database is running. It is used for creating database connection. Sample Value: • For Oracle: 1521 • For Microsoft SQL Server: 1433
ORCL_SID	This parameter is specific to oracle database and indicates the connection identifier used for creating database connection and executing Oracle SQL scripts.
DBUSER	This parameter specifies the name of the database user. Sample Value: ibpmuser

Configuration Parameter	Description
DBPWD	This parameter specifies the database user password. Sample Value: `ibpmuserpassword`
DBADMINUSER	This parameter specifies the name of database admin user. Sample Value: `ibpmadminuser`
DBADMINPWD	This parameter specifies the database admin password. Sample Value: `ibpmadminuserpassword`

Copy the upgrade scripts

You need to copy the database upgrade scripts only if the Interstage BPM Server and the database are setup on different machines. This is for remote database configuration. When the Interstage BPM Server and database exist on the same machine, you do not need to copy the script.

1. Create a directory with a name (for example `dbupgrade_local`) on the machine where database is installed.

2. From following directory, copy the directories in the `dbupgrade_local` directory that you have just created:

   • On Windows: `<engine directory>\server\deployment\dbupgrade`

   • On UNIX: `<engine directory>/server/deployment/dbupgrade`

   Directories to be copied to the database machine:

   • If you are upgrading from pre-10.1 versions of Interstage BPM, copy the following folders:

      1. `bin`
      2. `lib`
      3. For Oracle: `oracle`
      4. For Microsoft SQL Server database: `sqlserver`

   Note: The `lib` directory includes Java code. Hence in this case, you need to make sure that the Java execution environment is available on the database machine.

   • If you are upgrading from V10.1 or above versions of Interstage BPM, copy the following folders:

      1. `bin`
      2. For Oracle: `oracle`
      3. For Microsoft SQL Server database: `sqlserver`

   Note: In this case, Java execution environment is not required on the database machine.

> **Note:** In UNIX, you must grant following permissions for the `dbupgrade_local` directory to the user who executes the scripts.
> - The `dbupgrade_local` directory and sub-directories: 'Read', 'Write' and 'Execute' permissions.
> - All files: 'Read' permission.
> - All script (.sh) files: 'Execute' permission.

Upgrading Database

Pre-requisites: You have uninstalled the previous version of Interstage BPM.

> **Note:** In case of Oracle database in UNIX environment, make sure that you have set the following environment variables as mentioned below:
> - `ORACLE_HOME=<Database Installation directory>`
>   For example:
>   `ORACLE_HOME=/opt/app/oracle/product/11.2.0/dbhome_1; export ORACLE_HOME`
> - `ORACLE_SID=<Database identifier>`
>   For example:
>   `ORACLE_SID=orcl; export ORACLE_SID`

If you want to execute the database upgrade script in the Java execution environment and the Interstage BPM Server and database are exist on the same machine, follow these steps:

1. Configure the parameters in the `config.bat / config.sh` file located at:

   - On Windows: `dbupgrade\bin`
   - On UNIX: `dbupgrade/bin`

   Configure the parameters as below:

   ```
   MIGRATE_SCHEMA=y
   MIGRATE_DATA=y
   POST_UPGRADE=y
   ```

   For more information, refer to the *Parameters for the database upgrade configuration file* on page 58

2. Run the upgrade script `dbupgrade.bat / dbupgrade.sh` as shown below. The script file located at the:

   - On Windows: `dbupgrade\bin`
   - On UNIX: `dbupgrade/bin`

   If you want to overwrite values of any of the database configuration parameters that you have specified in the configuration file `config.bat / config.sh`, at runtime you can provide the parameters and its value from the command line while executing the upgrade script.

Use the following command to execute this script:

```
dbupgrde.bat dbuser=<dbuser> dbpwd=<db password> dbadminuser=<db
administrator> dbadminpwd=<db administrator password> JDBC_DRIVER_PATH
="C:\Microsoft SQL Server\sqljdbc_2.0\enu\sqljdbc4.jar"
JAVA_HOME=C:\Java\jdk6
```

> **Note:**
> - If any space used in parameter values then values must be enclosed in double quotes.
>   For example: `DATAFILE_PATH="C:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL\DATA"`
> - On the command line, you can specify only the parameters supported in the configuration file. If you specify any unsupported parameters, it may cause an error. Refer to the *Configuration Parameters* table described above.
> - If you have set the password parameters in the configuration file, secure the file for security reasons.

If the Java execution environment is not available on database machine. In this case, the Interstage BPM Server usually exists on different machine then you need to execute the scripts for each step of database upgrade, as described below:

1. **Migrating Database Schema**: This procedure must be executed on the machine where database is installed.

   a) Copy the directories on the database machine according to the instructions in the *Copy the upgrade scripts* on page 61

   b) Configure the following parameters in the `config.bat / config.sh` file located in the `dbupgrade_local\bin` folder that you have copied in previous step.

   For more information, refer to the *Parameters for the database upgrade configuration file* on page 58.

   ```
   MIGRATE_SCHEMA=y
   MIGRATE_DATA=n
   POST_UPGRADE=n
   ```

   c) Run the upgrade script `dbupgrade.bat / dbupgrade.sh` file located in the `dbupgrade_local\bin` folder that you have copied, as described above.

2. **Migrating Data**: This procedure can be executed from a non-database (remote) machine.

> **Note:** This procedure can be executed only if the database schema migration is completed successfully.

   a) Configure the migration parameters in the `config.bat / config.sh` file located at `<engine directory>\server\deployment\dbupgrade\bin` as shown below.

   For more information, refer to the *Parameters for the database upgrade configuration file* on page 58.

   ```
   MIGRATE_SCHEMA=n
   MIGRATE_DATA=y
   POST_UPGRADE=n
   ```

   b) Run the upgrade script `dbupgrade.bat / dbupgrade.sh` located at `<engine directory>\server\deployment\dbupgrade\bin` folder, as described above.

3. **Executing Post Migration operations**

> **Note:** This procedure can be executed only if the data migration is completed successfully.

   a) On the machine where database is installed, navigate to the `dbupgrade_local\bin` directory and configure the migration parameters in the `config.bat / config.sh` file as shown below.

For more information, refer to the *Parameters for the database upgrade configuration file* on page 58.

```
MIGRATE_SCHEMA=n
MIGRATE_DATA=n
POST_UPGRADE=y
```

b) Run the upgrade script `dbupgrade.bat / dbupgrade.sh` located in the `dbupgrade_local\bin` directory, as described above.

9.1.3 Upgrade Interstage BPM and Migrate Application Resources

To upgrade Interstage BPM and migrate application resources:

1. Setup the Interstage BPM Server and/or Console according to the instructions in section *Setting-up Interstage BPM Server and Console* on page 18.

> **Note:** Specify `1` to `database_creation_selection` in `setup.config`. Otherwise, the old database will be overwritten and you will lose all of the previous work that is stored in the database.

> **Note:** Once upgrade is completed, the `ApplicationSecurityMode` server configuration parameter is set to `Secure` (SaaS mode) by default as the setup is always in SaaS mode. Therefore if you want to keep using Interstage BPM with non-SaaS mode, you should change the property value from `Secure` to `Relax`. How to change server parameters is described in the *Interstage BPM Server Administration Guide*.

2. Migrate application resources as described in *Migrating Application Resources from Previous Versions to this Version of Interstage BPM* on page 64.

3. Start the Interstage BPM Server and Console. Refer the following sections:
   - *Starting Interstage BPM Server*
   - *Starting Interstage BPM Console and Tenant Management Console*

4. If needed, migrate the application owners as described in *Migrating Application Owners from Previous Versions to this Version of Interstage BPM* on page 66

Interstage BPM is now upgraded to the latest version.

9.2 Migrating Application Resources from Previous Versions to this Version of Interstage BPM

Pre-requisites: You have completed the previous steps as described in *Outline* on page 57.

- If you are upgrading from a version of Interstage BPM that do not support SaaS mode or if you were using Interstage BPM with non SaaS mode, you have to setup an instance of Interstage BPM Server, and after setup, you have to change the `ApplicationSecurityMode` server configuration parameter to `relax`.

To migrate application resources from previous versions to this version of Interstage BPM:

1. Copy the `DmsCollections.xml` file of the previous version to the `<engine directory>/server/instance/default/tenants/Default/resources/` folder. (Replace the `DmsCollections.xml` present at this location.)

Essentially, to be able to use attachments from the previous Interstage BPM version, you need to continue to use the same DMSRoot you used in the previous version.

2. Copy the `apps` folder from `<engine directory>/server/instance/default/tenants/Default/attachments/` to the DMSRoot `<Path>` specified in `DmsCollections.xml`.

> **Note:** For UNIX environments, while specifying the DMSRoot, ensure you use the correct case in the file path.

3. Create a new directory named `engine_classes` in the `<DMSRoot>/apps/<app_ID>/` and copy all the class files for generic Java Actions in this `engine_classes` directory.

4. For each application, do one of the following:

   a) If an application already contains the `agentsConfig.xml` file (located in `<DMSRoot>/apps/<application id>/`), add the following code to that file:

   ```
   <ActionAgent>
       <Name>@FTP</Name>
       <Description>FTP Agent</Description>
       <RetryInterval>20</RetryInterval>
       <EscalationInterval>1</EscalationInterval>
       <ClassName>com.fujitsu.iflow.serveree.impl.actionagent.ServiceAgent
    </ClassName>
       <ConfigFile>ftp.xml</ConfigFile>
   </ActionAgent>
   <ActionAgent>
       <Name>@HTTPAgent</Name>
       <Description>HTTP Agent</Description>
       <RetryInterval>20</RetryInterval>
       <EscalationInterval>1</EscalationInterval>
       <ClassName>com.fujitsu.iflow.serveree.impl.actionagent.httpservice.
    HTTPServiceAgent</ClassName>
       <ConfigFile>HTTPAgent.xml</ConfigFile>
   </ActionAgent>
   ```

   b) If an application does not contain the `agentsConfig.xml` file (located in `<DMSRoot>/apps/<application id>/`)

   - Copy the `agentsConfig.xml` file of the previous version to the `<DMSRoot>/apps/System` folder.
   - Edit the copied `agentsConfig.xml` to remove 'agents/' from the text within the `<ConfigFile>` tag.

5. Copy the `fileListenerConf.xml` file of the previous version to the `<DMSRoot>/apps/System` directory.

6. Copy the previous versions of each of the following to each application folder in the `<DMSRoot>/apps/<application id>/` directory.

   - `HTTPAgent.xml` file
   - `ftp.xml` file
   - Business Calendar (`.cal`) files
   - `DataSourceDefinition.xml` file

> **Note:** Do not migrate Decision Table Management (DTM) configuration files from previous versions of Interstage BPM; this version of Interstage BPM does not support DTM configuration files of pre-v11.0 versions.

7. Synchronize the Interstage BPM Console with your DMSRoot using the following steps:

   a) Login to Interstage BPM Console as an administrator.

   b) After choosing an application, in the **System Administration tab**, click **Application Settings**.

   c) In the **Application Settings** page, click **Synchronize with DMS**, and then click **Synchronize** in the pop-up that appears.

   Note: Repeat the above steps for all the tenants.

> **Note:** From this version of Interstage BPM:
> - Parent process definitions can only call sub process definitions if they exist in the same application. To continue using parent process definition from previous versions in Interstage BPM V11.0, ensure their sub process definitions exist in the same application as the parent process definition.
> - You cannot migrate process instances from one application to another.
> - You cannot copy process definitions from one application to another.

9.3 Migrating Application Owners from Previous Versions to this Version of Interstage BPM

When you migrate applications prior to this version to this version of Interstage BPM, the user group having the role of AdminRole is automatically set as the owner of the application. After application migration, if you want to assign application ownership to a group other than the AdminRole, you can do so by using Interstage BPM Console. For information about changing application owners in Interstage BPM Console, refer the *Managing Applications* section of the *Interstage BPM Console Online Help*.

9.4 Migrating WebDAV Repository and UDDI Registry from Previous Versions to this Version of Interstage BPM

If you had configured Interstage BPM of the version prior to this version to use WebDAV repository and UDDI registry (such as Centrasite), you need to configure for WebDAV and UDDI repositories. This configuration is possible by using Interstage BPM Tenant Management Console or the ImportProperties command.

After this configuration is complete, you need to synchronize the Interstage BPM Server with your WebDAV and UDDI repositories before you can use already published information or publish new process definitions. Use the following steps to achieve this:

1. After upgrade and configuration of Interstage BPM Server and Console, start the Interstage BPM Server and Console.

2. Login to Interstage BPM Console as an administrator.

3. After choosing an application, in the **System Administration tab**, click **Application Settings**.

4. In the **Application Settings** page, click **Synchronize with Repository**, and then click **Synchronize** in the pop-up that appears.

   Once synchronization is successful, an appropriate message is displayed.

Now this version of Interstage BPM is ready to be used with WebDAV and UDDI repositories

9.5 Additional Steps for Handling Pre-11.0 Console URLs

From version 11.0 of Interstage BPM Console, the Interstage BPM Console URL has been changed, making older versions of URLs such as those of Remote SubProcesses, Service Registry, and so on incompatible when called from previous versions of Interstage BPM.

To overcome this problem, deploy the Compatibility Proxy WAR provided in this release using the steps listed in this section.

> **Note:** 1. For a remote subprocess, perform the steps listed here only in the following cases:
> - When both the Parent and child process instances are running, and you upgrade Interstage BPM on the parent server to v11.0
> - When the parent process is running but the child process instance has not yet started, and you upgrade Interstage BPM on the child server to v11.0

In order to use the Compatibility Proxy for supporting pre-V11.0 URLs, the following requirements must be met:

- You should setup an instance of Interstage BPM Server, and after setup, you should change the `ApplicationSecurityMode` server configuration parameter to `relax`.
- The Compatibility Proxy should be deployed at the original pre-V11 context root, and the V11 Console should be deployed at a different context root. For example, if the pre-v11.0 Console was deployed at the context root `ibpmconsole`, then you should install the compatibility proxy at `ibpmconsole` and the V11 Console at any other context root, for example, `console`. The default context root for V11 Console is `console`, which is different from the default context root for any previous version. So if you have followed the defaults, this requirement rule will be automatically satisfied.
- V10.x had the restriction that two applications cannot have process definitions with the same name. This restriction has been removed in V11.0. But to use the Compatibility Proxy, the same restriction needs to be followed, that is, two applications should not have process definitions with the same name.

9.5.1 Steps to Overcome the URL-incompatibility Problem

Pre-requisites: You have completed the previous steps as described in *Outline* on page 57:

- You have setup an instance of Interstage BPM Server and Console, and after setup you have changed the `ApplicationSecurityMode` server configuration parameter to `relax`.

To overcome the URL-incompatibility problem caused by pre-11.0 URLs:

1. Create a folder whose name corresponds to your pre-v11.0 context root (for example `ibpmconsole`) at any location on your machine.
2. Copy the `webserviceproxy.war` file from the `console` directory on the product media to the folder created in step 1.
3. Extract `webserviceproxy.war` to the `ibpmconsole` directory using the following java command:

   ```
   jar -xvf webserviceproxy.war
   ```

4. After extracting the jar, edit the `proxy.conf` file located under `<Extraction Directory>\WEB-INF\config` and update the `ServerBaseURL` parameter in this file to the **v11 port number and context root**.

5. Copy the `jbossall-client.jar` file available in the `<JBoss Installation Directory>/client/` folder to the `WEB-INF/lib/` folder of the extracted WAR.

6. Start the JBoss Application server.

7. Start the Interstage BPM Server and Console. Refer the following topics:
   - *Starting Interstage BPM Server* on page 28
   - *Starting Interstage BPM Console and Tenant Management Console* on page 29

9.6 Migrating to another Database Connection

If you are migrating from the Interstage BPM database to another database, you need to update the values of existing database username and password parameters.

To update database username and password:

1. Set the values of `<user-name>` and `<password>` parameters in the following file located in `<JBoss Installation Directory>/server/ibpm/deploy`.

Interstage BPM Database	File Name
Microsoft® SQL Server	`iflow-mssql-ds.xml`
Oracle	`iflow-oracle-ds.xml`

For example:

```
<user-name>ibpmuser</user-name>
<password>ibpmuserpassword</password>
```

2. Set the following parameters in the `login-config.xml` file located in `<JBoss Installation Directory>/server/ibpm/conf`.

```
<module-option name="principal">ibpmuser</module-option>
<module-option name="userName">ibpmuser</module-option>
<module-option name="password">ibpmuserpassword</module-option>
```

These parameters have to be set for two application policies:
- For Microsoft® SQL Server:
  - `MSSQLRealm`
  - `JmsXARealm`
- For Oracle:
  - `OracleRealm`
  - `JmsXARealm`

Example for Microsoft® SQL Server:

```
<application-policy name="MSSQLRealm">
    <authentication>
      <login-module
code="org.jboss.resource.security.ConfiguredIdentityLoginModule"
flag="required">
```

```
<module-option name="principal">ibpmuser</module-option>
<module-option name="userName">ibpmuser</module-option>
<module-option name="password">ibpmuserpassword</module-option>
        <module-option
name="managedConnectionFactoryName">jboss.jca:service=LocalTxCM,name=iflow.iFlowDS
 </module-option>
        </login-module>
      </authentication>
   </application-policy>

   <application-policy name="JmsXARealm">
      <authentication>
        <login-module
code="org.jboss.resource.security.ConfiguredIdentityLoginModule"
flag="required">

<module-option name="principal">ibpmuser</module-option>
<module-option name="userName">ibpmuser</module-option>
<module-option name="password">ibpmuserpassword</module-option>
        <module-option
name="managedConnectionFactoryName">jboss.jca:service=TxCM,name=JmsXA
</module-option>
        </login-module>
      </authentication>
   </application-policy>
```

Example for Oracle:

```
<application-policy name="OracleRealm">
     <authentication>
       <login-module
code="org.jboss.resource.security.ConfiguredIdentityLoginModule"
flag="required">

<module-option name="principal">ibpmuser</module-option>
<module-option name="userName">ibpmuser</module-option>
<module-option name="password">ibpmuserpassword</module-option>
       <module-option
name="managedConnectionFactoryName">jboss.jca:service=LocalTxCM,name=iflow.iFlowDS
 </module-option>
       </login-module>
     </authentication>
   </application-policy>

   <application-policy name="JmsXARealm">
     <authentication>
       <login-module
code="org.jboss.resource.security.ConfiguredIdentityLoginModule"
flag="required">

<module-option name="principal">ibpmuser</module-option>
<module-option name="userName">ibpmuser</module-option>
<module-option name="password">ibpmuserpassword</module-option>
       <module-option
name="managedConnectionFactoryName">jboss.jca:service=TxCM,name=JmsXA</module-option>

       </login-module>
     </authentication>
   </application-policy>
```

9.7 Additional Steps for Form Styles while Migrating from Interstage BPM Console 11.1

Versions of Interstage BPM Console **later than v11.1** allow changing the look and feel of Interstage BPM Console forms using Interstage BPM Console itself. If you are migrating from Interstage BPM Console 11.1, and you were using custom stylesheets for either:

- tenants (stylesheet placed under `//<console WAR>/tenant/<tenantName>/web/styles/custom.css` or `//<console WAR>/web/styles/custom.css`), OR

- applications (stylesheet placed under `//<console WAR>/tenant/<tenantName>/apps/<appName>/web/styles/customTheme.css`)

after migration, ensure you define form-specific style classes in the custom CSS files.

9.8 Additional Steps for Interstage BPM Console

9.8.1 Deleting Interstage BPM Console

In version 11.2.1 of Interstage BPM, Interstage BPM Console is always setup with Interstage BPM Server. Therefore if you do not want to work with Interstage BPM Console you can un-setup it from your application server.

On JBoss: Delete `console.war` from the following directory:

- On Windows: `<JBoss Installation Directory>\jboss-as\server\ibpm\deploy\console.war`
- On UNIX: `<JBoss Installation Directory>/jboss-as/server/ibpm/deploy/console.war`

9.8.2 Updating System Properties for Web Server Port

If you changed your WebServer port from default value, you need to change the following System properties.

- ServerBaseURL
- ServerEmailBaseURL

You can update these values via the Interstage BPM Tenant Management Console or Import/Export property commands. How to change properties using Tenant Management Console is explained in the *Interstage BPM Tenant Management Console Online Help*. Details of using import/export commands are described in the *Interstage BPM Server Administration Guide*.

9.9 Additional Steps for JBoss Application Server Configuration

In the former version of Interstage BPM (v11.2), Partition Name and Multicast IP were configurable during deployment. In Interstage BPM v11.2.1, these parameters are not configurable during deployment. Therefore, after completing deployment of Interstage BPM on JBoss application server, you need to configure these parameters.

Configure the `IBPM_CLUSTER_PARTITION_NAME` and `IBPM_MULTICAST_IP` parameters in the following files (using a text editor):

- On Windows: `<JBoss Installation Directory>\jboss-as\bin\setEnv.cmd`
- On UNIX: `<JBoss Installation Directory/jboss-as/bin/setEnv.cmd`

Appendix A: Security

Interstage BPM can be set to two security levels: Demo Mode and Security Mode. Demo Mode is useful while key members of your work team learn the features of the software. Later, Security Mode provides a stable and controlled environment for implementing Interstage BPM across your company.

A.1 Interstage BPM Operation Model

It is assumed that Interstage BPM is used in an organizational Intranet. VPN is used when connecting from Internet to Intranet. In most situations, end-users will work with Interstage BPM applications via a firewall, administrators, however, will be using the server segment.

End-users do not need to run applets or other clients requiring the Interstage BPM model. This means that the only port that needs to be opened in the firewall is the standard HTTPS port (443) and the Web Server in the server segment.

The following diagram depicts a setup situation where Interstage BPM applications are used via a firewall. It also shows possible security threats – these are described in more detail in the subsequent table.
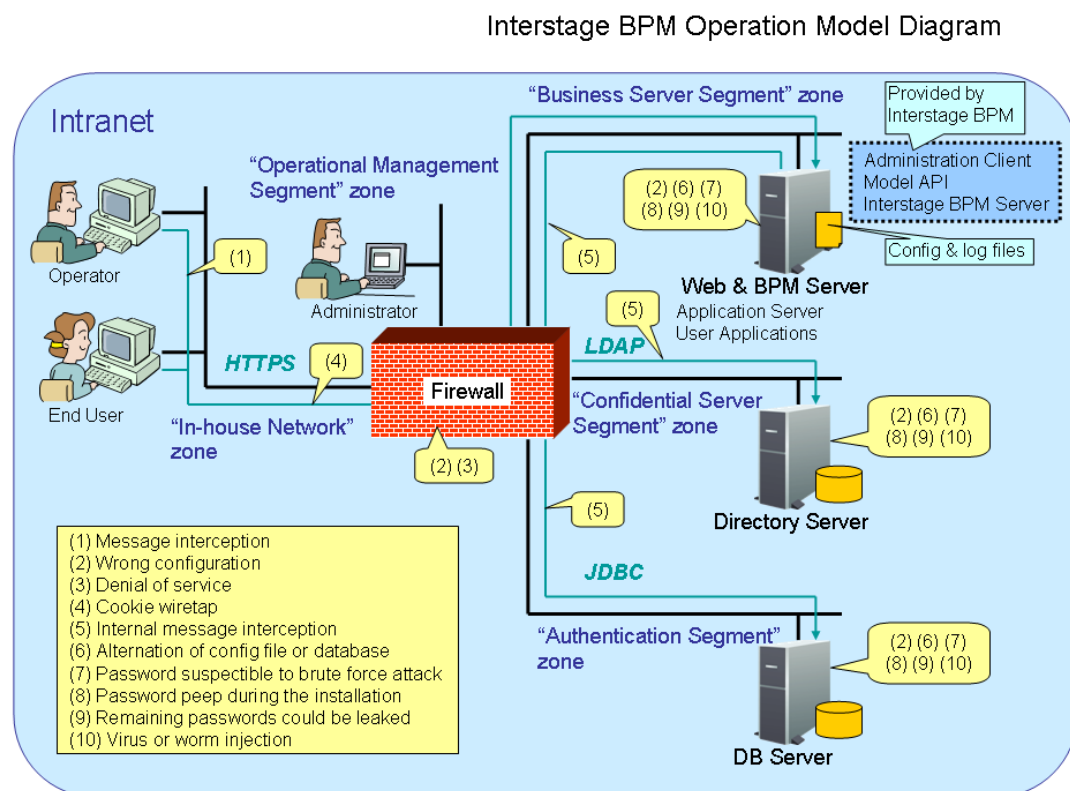
Interstage BPM Operation Model Diagram

Figure 18: Interstage BPM Operation Model

The following table lists the possible security threats as well as possible solutions:

#	Threat	Solution
(1)	Message interception	Use SSL.
(2)	Wrong configuration	Make sure that your administrators are properly trained and certified, and that the firewall, the Web Server, the Interstage BPM Server, the Database Server and the Directory Server are configured correctly.
(3)	Denial of service	Use firewall configuration to block illegitimate requests.
(4)	Cookie wiretap	Use secure cookies if you are using cookies for session management.
(5)	Internal message interception	Keep the Web Server, Interstage BPM Server, the Directory Server and the Database Server machines in a secure location.
(6)	Alternation of config file or database	Keep the Web Server, Interstage BPM Server, Directory Server and Database Server machines in a secure location. Set the operating system/database permissions such that file/database access is possible only by authorized people. Take special care for the directories/database of Interstage BPM, Interstage Application Server, Active Directory and Oracle.
(7)	Password susceptible to brute force attack	All guessed passwords should be changed to something that is less vulnerable. Passwords should not be proper nouns (e.g., a person's name), a word found in a dictionary or the same string as the user name. Ideally, a password should contain a minimum of 6 characters in a mixture of upper case, lower case, numeric digits and other characters. In addition, it should not contain more than two identical consecutive characters and more than two ascending or descending consecutive characters.
(8)	Password peep during the installation	Install under the condition that no one is around you.
(9)	Remaining passwords could be leaked	Secure the configuration files after setup.
(10)	Virus or worm injection	As a rule, always use anti-virus software.

A.2 Password Encryption

The Interstage BPM setup script encrypts the passwords entered during setup and writes the encrypted passwords into the database.

The Interstage BPM Server decrypts all passwords at startup. If decryption fails, a warning message is printed in the `Trace.log` file.

If you need to change the user/passwords after completion of setup, an Encryption Utility is provided so that you can encrypt the passwords and overwrite them in the server's configuration. The Encryption Utility does not provide for decryption of passwords. It can only be used for encryption.

Initially, a default key is used to encrypt and decrypt the passwords. If you want to use a different key for security reasons, you must add this key to the server's configuration. The default key is not published; it is hardcoded in the server code.

The Encryption Utility provided is:

`com.fujitsu.iflow.utilities.TextEncrypter.class`

To call the Encryption Utility, use the encryption script located in `<engine directory>/client/samples/configuration`:

- On Windows: `EncryptPassword.bat`
- On UNIX: `EncryptPassword.sh`

Encrypting a Password With the Default Key

To encrypt a password with the default key, run the script with the following option:

On Windows: `EncryptPassword.bat -e "<TextPassword>"`

On UNIX: `EncryptPassword.sh -e "<TextPassword>"`

> **Note:** Make sure to enclose the password and the encryption key in double quotes. Otherwise, the encryption process might fail. As double quotes are delimiters, do not use double quotes in the encryption key.

Encrypting Passwords With a New Key

You are recommended to encrypt your passwords with your own key.

To encrypt a single password with a new key, run the script with the following options:

On Windows: `EncryptPassword.bat -e "<TextPassword>" "<Key>"`

On UNIX: `EncryptPassword.sh -e "<TextPassword>" "<Key>"`

> **Note:** If a key other than the default key is used, it should contain more than 23 characters.
>
> Make sure to enclose the password and the encryption key in double quotes. Otherwise, the encryption process might fail. As double quotes are delimiters, do not use double quotes in the encryption key.

During startup of the Interstage BPM Server, the key needs to be present in the server's configuration. Therefore, before starting the server, use the configuration export and import scripts to add the following parameter to the server's configuration:

`EncryptionKey=<Key>`

For details on the procedure, refer to section *Using the Configuration Export and Import Scripts* on page 75. For security reasons, the key can be removed again from the configuration file that you imported into the database.

Alternatively, you can encrypt all passwords in the configuration file at the same time before importing it into the database. To do this, substitute all passwords in the configuration file with actual text passwords and encrypt the configuration file by running the script with the following options:

On Windows: `EncryptPassword.bat -f "<Path of Configuration File>" "<Key>"`

On UNIX: `EncryptPassword.sh -f "<Path of Configuration File>" "<Key>"`

> **Note:** Make sure to enclose the file path and the encryption key in double quotes. Otherwise, the encryption process might fail. As double quotes are delimiters, do not use double quotes in the encryption key.

The following parameters in the configuration file are encrypted using this method:

- `DBALoginpassword`
- `LDAPAccessUserPassword`
- `MetadataRepositoryPassword`
- `ServerPassword`
- `SMTPPassword`
- `SWAPLinkagePassword`
- `UDDIPublisherPassword`

Example

Use the following command to encrypt all passwords in the configuration file at the same time.

On Windows: `EncryptPassword.bat -f "C:\SomeDirectory\MyServerConfiguration.properties" "EWAERJQ23FIQ0J22"`

On UNIX: `EncryptPassword.sh -f "/SomeDirectory/MyServerConfiguration.properties" "EWAERJQ23FIQ0J22"`

A.3 Using Demo Mode and Security Mode

Interstage BPM can be set to two security levels: Demo Mode and Security Mode. Demo Mode is useful while key members of your work team learn the features of the software. Later, Security Mode provides a stable and controlled environment for implementing Interstage BPM across your company.

Demo Mode restricts access to Interstage BPM in two ways:

- Only the person who is assigned a work item may make choices about it, thus advancing the process to the next work item - or completing it.
- Only members of the `AdminRole` can access administration functions in the Interstage BPM Console.

All Interstage BPM users can experiment with all of Interstage BPM functions, including creating and editing process definitions and process instances.

In **Security Mode**, access to process definitions, process instances, and work items are restricted to the specific people who need to use them. The following are examples of people who need to use them:

- Only members of the Role specified in the `TemplatePublishers` parameter of the Interstage BPM Server can create new process definitions.
- Only the process instance owners, current assignees, and Interstage BPM Administrators can view any specific process instances. (Current assignees are those who have active task assignments. This does not include people who will have task assignments later in the process.)
- Only the process instance owners, current assignees, and Interstage BPM Administrative Users can edit their specific process instances. This means they can change User Defined Attributes and add or delete attachments. However, they are not allowed to edit the process structure.

To set up Security Mode:

- Add the following parameters to the server configuration:

  `SecuritySwitch=true`

  This setting enables Security Mode.

  `TemplatePublishers =<Registered Role>`

This Role must be registered in Interstage BPM's local group store or in your Directory Service. For example, if you have defined a Role of `pubRole`, you would type `TemplatePublishers=pubRole`. Be aware that this key takes effect only if the Security Mode is switched on.

For information on how to add parameters, refer to section *Using the Configuration Export and Import Scripts* on page 75.

A.4 Configuring SMTP Authentication for Use with Interstage BPM

Note: Only a System Administrator should perform these instructions.

If you required SMTP Authentication for logging in to Interstage BPM, use the following instructions:

1. Set up an email server and enable SMTP Authentication.

2. Add the following parameters to the server configuration:

   ```
   SMTPServerHost=<Email Server Host Name>

   SMTPUserName=<User Name for SMTP Authentication>

   SMTPPassword=<Password for SMTP authentication>
   ```

   For details on the procedure, refer to section *Using the Configuration Export and Import Scripts* on page 75.

3. Design a process definition to test the email feature.

   Refer to the *Interstage Business Process Manager Studio User's Guide* for information on how to design process definitions.

If the `SMTPUserName` or `SMTPPassword` are set correctly, the email will be accepted by the email server. If neither the `SMTPUserName` nor `SMTPPassword` values are blank, Interstage BPM will use the SMTP authentication feature.

A.5 Using the Configuration Export and Import Scripts

Prerequisite: The database server is running.

Interstage BPM comes with configuration export and import scripts that allow you to change the server configuration. You can use these scripts to add parameters that are not present in the configuration or remove parameters from the configuration. If the server fails to start or denies login due to configuration errors, you can use the scripts to import a working configuration into the database.

You can add or edit both System as well as Tenant properties using the export and import scripts. For more information about System and Tenant properties, refer the *Interstage BPM Server Administration Guide.*

The Interstage BPM Server is not required to be running for the configuration export and import scripts to be used.

To use the configuration export and import scripts:

1. Export the server configuration by running the export script located in `<engine directory>/server/deployment/bin`:

Operating System	Configuration Export Script

Windows	• For System Properties:
	
	`exportProperties.bat <File Name> <Database User Name> <Password>`
	
	Example:
	
	`exportProperties.bat MyServerConfiguration.properties SomeUserName SomePassword`
	
	• For Tenant Properties:
	
	`exportProperties.bat <File Name> <Database User Name> <Password> <TenantName>`
	
	Note that `<TenantName>` is case-sensitive.
	
	Example:
	
	`exportProperties.bat MyServerConfiguration.properties SomeUserName SomePassword Default`

UNIX	• For System Properties:
	
	`exportProperties.sh <File Name> <Database User Name> <Password>`
	
	Example:
	
	`exportProperties.sh MyServerConfiguration.properties SomeUserName SomePassword`
	
	• For Tenant Properties:
	
	`exportProperties.sh <File Name> <Database User Name> <Password> <TenantName>`
	
	Note that `<TenantName>` is case-sensitive.
	
	Example:
	
	`exportProperties.sh MyServerConfiguration.properties SomeUserName SomePassword Default`

For `<File Name>`, specify the file name and, optionally, the path of the configuration file to be generated. If you do not specify a path, the configuration file is written to the current directory.

For `<Database User Name>` and `<Password>`, specify the database user account that you defined during setup of the Interstage BPM Server.

> **Note:** Before you make any changes to the configuration file, create a copy of the configuration file you exported as a back-up. In case you make errors while editing parameters and import the file, Interstage BPM Server may not be able to start or errors may occur at runtime. In such a case you can use the back-up file which contains a working configuration.

2. Make the required changes in the generated configuration file.

   If you want to add parameters, use the following syntax:

   `<Parameter Name>=<Parameter Value>`

> **Note:**
> - Parameter names and values are case sensitive.
> - Any backslashes "\" or colons ":" used in parameter values must be escaped by backslashes. For example, a server address is specified like this:
>   ```
>   ibpmhost\:49950
>   ```
> - Some configuration parameters have a `<Hostname>` or `<Hostname>.<Servername>` suffix appended to their names. These suffixes are automatically removed during the export and are automatically appended during the import. Do not add these suffixes to the parameter names.

Passwords in the generated configuration file are encrypted for security reasons. If you change a password, you are recommended to encrypt it before importing the configuration file. Passwords are not automatically encrypted during the import. For details on how to encrypt passwords, refer to section *Password Encryption* on page 72.

3. Import the updated configuration file into the database by running the import script located in `<engine directory>/server/deployment/bin`:

Operating System	Configuration Import Script

Windows	• For System Properties:
	
	`importProperties.bat <File Name> <Database User Name> <Password>`
	
	Example:
	
	`importProperties.bat MyServerConfiguration.properties SomeUserName SomePassword`
	
	• For Tenant Properties:
	
	`importProperties.bat <File Name> <Database User Name> <Password> <TenantName>`
	
	Note that `<TenantName>` is case-sensitive.
	
	Example:
	
	`importProperties.bat MyServerConfiguration.properties SomeUserName SomePassword Default`

UNIX	• For System Properties:
	
	`importProperties.sh <File Name> <Database User Name> <Password>`
	
	Example:
	
	`importProperties.sh MyServerConfiguration.properties SomeUserName SomePassword`
	
	• For Tenant Properties:
	
	`importProperties.sh <File Name> <Database User Name> <Password> <TenantName>`
	
	Note that `<TenantName>` is case-sensitive.
	
	Example:
	
	`importProperties.sh MyServerConfiguration.properties SomeUserName SomePassword Default`

For `<File Name>`, specify the file name and, if required, the path of the updated configuration file. You need to specify the path if the configuration file is not located in the current directory.

For `<Database User Name>` and `<Password>`, specify the database user account that you defined during setup of the Interstage BPM Server.

4. In a cluster setup, each server node must be configured individually. Therefore, repeat steps 1-3 for the other server nodes.

5. Restart the Interstage BPM Server for the changes to take effect.

A.6 Configuring JBoss Application Server for Secure Access of Interstage BPM Console

The Interstage BPM Console setup on Interstage Application Server can be configured for secure access using HTTPS protocol. To enable this, Interstage BPM Console setup on JBoss application server should be configured to run on Secure Socket Layer (SSL) port.

Broadly, configuring JBoss for secure access of Interstage BPM Console consists of the following steps:

1. Configuring a keystore and obtaining a signed certificate - refer *Configuring a Keystore and Obtaining a Signed Certificate* on page 79

2. Configuring Interstage BPM Console for HTTPS connection - refer *Configuring Interstage BPM Console on JBoss Application Server for HTTPS connection* on page 81

3. Updating Interstage BPM Server parameters - refer *Updating Interstage BPM Server Parameters* on page 81

Additionally, if Interstage BPM Server and Console need to access secure URLs, further steps are needed. For details, refer *Configuring Truststore for Interstage BPM Server and Console to access Secure URLs* on page 81

Note: Please refer JDK documentation for usage of various commands described in this section.

A.6.1 Configuring a Keystore and Obtaining a Signed Certificate

Overview

Broadly, the following steps are used to create a keystore and obtain a signed certificate from a Certifying Authority (CA):

1. Create a private/public key pair, self-signed certificate

2. Generate a Certificate Signing Request (CSR) for a CA

3. If the CA's own certificate is not already present in your list of trusted certificates in the keystore, import the CA's certificate

4. Import the CA-signed certificate reply to the keystore

Details

1. To create a private/public key pair, self-signed certificate, use `keytool.exe`, which is a Key and Certificate Management Tool supplied with any version of the Java SDK.

   a) Find the keytool located in `<JAVA_HOME>\bin\keytool.exe`.

   b) The keystore can be created in a directory of your choice. This directory is also referenced as `<KEYSTORE_HOME>`.

   Create a self-signed certificate (a public/private key) using the following command at a Command Prompt: `keytool -genkey -v -alias <keyname> -keypass <keypassword> -keyalg RSA -keystore <keyStoreFile> -storepass <KeystorePassword> -dname <dname>`.

   Here, `<keyStoreFile>` is the full path including the name of the keystore file to be created, `<dname>` is the 'X.500 Distinguished Name' to be associated with this key. While specifying `<dname>`, it is mandatory to keep the 'first and last name' (denoted by 'CN') as the hostname of the machine on which the secure Interstage BPM Console is to be setup. This is to avoid SSL certificate name mismatch error.

   For example, `keytool -genkey -alias jbosskey -keypass changeit -keyalg RSA -keystore C:\server.keystore -storepass changeit -dname "CN=MyMachine, OU=MyOrg, O=MyCompany, L=MyCity, ST=MyState, C=US"`.

   The generated keystore contains a certificate (containing the public key) and its associated private key.

2. Create a new certificate signing request (CSR) with the following command:

```
keytool -certreq -v -alias <keyname> -keystore <KEYSTORE_HOME> -keypass
<keypassword> -storepass <KeystorePassword>
```

A request of the following format is generated:

```
-----BEGIN NEW CERTIFICATE REQUEST-----
...
...
-----END NEW CERTIFICATE REQUEST-----
```

3. Send the signing request (generated in the step above) to a trusted Certificate Authority (CA) for issuing a signed certificate. The Certifying Authority will return a signed certificate reply.

4. The signed certificate reply issued by the CA authenticates the self-signed public key certificate generated in step 1. A typical signed certificate reply issued by the CA will have the following format:

```
-----BEGIN CERTIFICATE-----
...
...
-----END CERTIFICATE-----
```

Save this certificate into a file.

> **Note:** Make sure that the format in which the certificate reply is provided by the CA is supported for import using the keytool. Typically, keytool can import X.509 certificates and PKCS#7 formatted certificate chains. And the certificate must be either in binary encoding format or in printable encoding format.

5. Verify the certificate reply by executing the following command to view its fingerprints:

```
keytool -printcert -file <certificate-reply-file>
```

`<certificate-reply-file>` is the complete path of the file containing the certificate reply that you received from the CA. Compare the displayed fingerprints with the ones received from CA. Only when the fingerprints match is it guaranteed that the certificate has not been tampered in transit by someone.

6. If the CA's own certificate is not already present in your list of trusted certificates in the keystore, import the CA's certificate.

7. Import the certificate reply file to the keystore file so that it can be used for configuring HTTPS on JBoss application server. Use the following command to import/store the certificate reply as a trusted certificate:

```
keytool -v -import -trustcacerts -keystore <keystore-location> -file
<certificate-reply-file> -alias <keyname> -keypass <keypassword> -storepass
<KeystorePassword>
```

Here, `<keyname>` is the name of the key, `<keystore-location>` is the complete path of the keystore file which contains the generated key, `<keypassword>` is the password of the key, `<KeystorePassword>` is the password of the keystore and `<certificate-reply-file>` is the complete path of the file containing the certificate reply that you received from the CA.

Once the certificate is imported to a keystore, it can be used for configuring secure connections in Interstage BPM on JBoss application server.

A.6.2 Configuring Interstage BPM Console on JBoss Application Server for HTTPS connection

Prerequisite: Ensure that Interstage BPM Console is already setup on JBoss application server.

Steps

1. Open the `server.xml` file located in the `<JBoss Installation directory>\\jboss-as\server\ibpm\deploy\jbossweb.sar` folder.

2. Disable the existing HTTP support by commenting out the contents inside the `<Connector>` tag for HTTP connection. This tag can be identified by the comment above the tag as *'A HTTP/1.1 Connector on port 49950'*.

3. Enable HTTPS support by removing comments for the `<Connector>` tag for HTTPS connection. This tag can be identified by the comment above the tag as *'SSL/TLS Connector configuration using the admin devl guide keystore"*.

4. Inside the `<Connector>` tag for HTTPS, add/update the following attributes:

   - `keystoreFile`: specify location of keystore file containing the signed certificates. For example, `keystoreFile="C:/server.keystore"`

   - `keystorePass`: specify password for keystore file. For example, `keystorePass="changeit"`

   - `keystoreType`: If the keystore type is different from the default keystore type, namely `JKS`, add this attribute specifying the keystore type as it value.

   - `useBodyEncodingForURI="true"`

   - `port`: change to a desired value if required

   A sample configuration in the `<Connector>` tag for HTTPS connection should look like the following:

```
<!--SSL/TLS Connector configuration using the admin devl guide
keystore-->
<Connector port="49950" address="${jboss.bind.address}"
maxThreads="100" strategy="ms" maxHttpHeaderSize="8192"
emptySessionPath="true" useBodyEncodingForURI="true"
scheme="https" secure="true" clientAuth="false"
keystoreFile="C:/server.keystore"
keystorePass="changeit" sslProtocol = "TLS" />
```

Now Interstage BPM Console is configured to use the CA certificate as its site certificate.

A.6.3 Updating Interstage BPM Server Parameters

Change `http` to `https` in the values of the following Interstage BPM Server parameters:

- ServerBaseURL
- ServerEmailBaseURL

Refer the *Interstage BPM Server Administration Guide* for details on how to update server parameters.

A.6.4 Configuring Truststore for Interstage BPM Server and Console to access Secure URLs

The Interstage BPM Server and Console would need to access 'secure URLs' in following scenarios:

- When accessing remote subprocess using ASAP/SWAP URLs which is setup either on a local or a remote Interstage BPM Console

- For Web services – for example, both Interstage BPM web services and other external web services can be accessed from a web service javaaction
- When XSD is used for trigger validation

> **Note:** For information about how Interstage BPM Server can be configured to access secure WebDAV, refer *Configuring Interstage BPM Server for secure WebDAV DMS access* on page 82.

For accessing a particular secure URL from Interstage BPM, it is essential that:

- This URL is hosted on a website which has a CA certified certificate.
- The Java Runtime Environment (JRE) used for starting Interstage BPM should be able to identify the self-signed certificate of the root CA of this website as a trusted certificate. The trusted certificates for a JRE are those which are included as trusted entries either in the `cacerts` file (the `cacerts` file represents a system-wide keystore with CA certificates, located at `<jrehome>/lib/security`) or in the truststore file (this file needs to be explicitly specified using the `-Djavax.net.ssl.trustStore` JVM option).

To configure truststore for Interstage BPM Server and Console to access secure URLs:

1. Configure the truststore for Interstage BPM by adding the truststore's path to the `run.conf` file on a UNIX machine or the `run.conf.bat` file in Windows environment, as follows. These files are located at `<JBoss Installation Directory>/jboss-as/bin/` directory.

   `set JAVA_OPTS= -Djavax.net.ssl.trustStore="<path to truststore file>" %JAVA_OPTS%`

   Example: `set JAVA_OPTS= -Djavax.net.ssl.trustStore="C:\ibpmtruststore" %JAVA_OPTS%`

   If you configure the `JAVA_OPTS` variable at any other place, it might prevent the setting of certain Java VM options which are necessary for server startup.

A.7 Configuring Interstage BPM Server for secure WebDAV DMS access

WebDAV compliant directory can be configured as DMS root for the IBPM Server. This WebDAV directory may be configured for secure access using HTTPS url. In such a case additional configuration should be done on IBPM.

To configure Interstage BPM server for secure WebDAV DMS access:

1. Export the IBPM configuration from the database into a configuration file.

   For information on exporting the configuration file, refer *Using the Configuration Export and Import Scripts* on page 75.

2. Copy the root CA certificate used by WebDAV directory to the machine where IBPM is setup. This is further referenced as `<CERTIFICATE_PATH>`

3. Import the root CA certificate copied in the step above to a keystore (which gets created) using the following command: `keytool -import -trustcacerts -alias <key name> -file <CERTIFICATE_PATH>\<certificate name> -keystore <keyStoreFile>`.

   Here, `<keyStoreFile>` is the full path including the name of the keystore file to be created.

   Example on Windows: `keytool -import -trustcacerts -alias mykey -file C:\example.cer -keystore C:\java\jdk1.6.0_22\jre\lib\security\mystore.keystore`

   Example on UNIX: `keytool -import -trustcacerts -alias mykey -file /tmp/example.cer -keystore /usr/java/jdk1.6.0_22/jre/lib/security/mystore.keystore`

> **Note:** Ensure that all security certificates related to IBPM are added to the same keystore file.

4. Add the following property in the configuration file exported in step 1: `WebDAVKeyStore=<keystore path>`.

   Example on Windows:
   `WebDAVKeyStore=C:\java\jdk1.6.0_22\jre\lib\security\mystore.keystore`
   Example on UNIX:
   `WebDAVKeyStore=/usr/java/jdk1.6.0_22/jre/lib/security/mystore.keystore`

5. In order for your changes to take effect, import the updated configuration file into the database. For information on importing the configuration file, refer *Using the Configuration Export and Import Scripts* on page 75. After import is complete, for security reasons, delete the configuration file.

6. Restart the Interstage BPM Server.

7. Configure the truststore for Interstage BPM by adding the truststore's path to the `run.conf` file on a UNIX machine or the `run.conf.bat` file in Windows environment, as follows. These files are located at `<JBoss Installation Directory>/jboss-as/bin/` directory.

   `set JAVA_OPTS= -Djavax.net.ssl.trustStore="<path to truststore file>" %JAVA_OPTS%`

   Example on Windows: `set JAVA_OPTS=`
   `-Djavax.net.ssl.trustStore="C:\java\jdk1.6.0_22\jre\lib\security\mystore.keystore" %JAVA_OPTS%`

   Example on UNIX: `set JAVA_OPTS=`
   `-Djavax.net.ssl.trustStore="/usr/java/jdk1.6.0_22/jre/lib/security/mystore.keystore" %JAVA_OPTS%`

   If you configure the `JAVA_OPTS` variable at any other place, it might prevent the setting of certain Java VM options which are necessary for server startup.

A.8 Configuring JBoss Application Server Secure Access

If Jboss services need to listen on external IPs that may be visible to unauthorized users, it is recommended that authentication is enabled on services like rmi-http, jmx-console, and web-console. Failure to do so could result in exposing administrative services on the JBoss installation to malicious users and this could result in Denial of Service (DoS) attacks.

JBoss Console can be accessed by using the following:

- `http://<hostname>:<port>/`
- Default configuration by Interstage BPM setup script (using `-b 0.0.0.0` option)
- `http://<hostname>:49950/`

To enable authentication for JMX and web console:

1. Edit the following `web.xml` files to comment out the security-constraint sections:
   - server/ibpm/deploy/jmx-console.war/WEB-INF/web.xml
   - server/ibpm/deploy/management/console-mgr.sar/web-console.war/WEB-INF/web.xml
   Commented out the following fragments:

   ```
   <security-constraint>
               ....
   </security-constraint>
   ```

2. Ensure the following `jboss-web.xml` files use a security domain:

   • `server/ibpm/deploy/jmx-console.war/WEB-INF/jboss-web.xml`

   • `server/ibpm/deploy/management/console-mgr.sar/web-console.war/WEB-INF/jboss-web.xml`

   The above file should have something like the following XML fragment:

```
<jboss-web>
     .....
     <security-domain>java:/jaas/jmx-console</security-domain>
/jboss-web>
```

3. Set up users and roles.

   a) Set up users. The default username/password combination of admin/admin is now active.

   b) Change or update the usernames and/or passwords for the configured security domain by editing the corresponding credential files.

      • `server/ibpm/conf/props/jmx-console-users.properties`

        `Default : admin=admin`

   c) Confirm the following settings to make this property effective. The following examples are the settings that use the same password as jms-console.

```
-server/ibpm/conf/login-config.xml
<application-policy name="jmx-console">
...
<module-option
name="usersProperties">props/jmx-console-users.properties</module-option>
<module-option
name="rolesProperties">props/jmx-console-roles.properties</module-option>
...
</application-policy>
....
<application-policy name="web-console">
...
<module-option
name="usersProperties">props/jmx-console-users.properties</module-option>
<module-option
name="rolesProperties">props/jmx-console-roles.properties</module-option>
...
</application-policy>
...
<application-policy name="JBossWS">
...
<module-option
name="usersProperties">props/jmx-console-users.properties</module-option>
<module-option
name="rolesProperties">props/jmx-console-roles.properties</module-option>
...
</application-policy>
```

   If you need more details, refer to the JBoss Application Server documents.

Note: After finishing to use JBoss consoles, all web browsers must be closed.

Appendix B: Clustering, Load Balancing, and Failover

This appendix provides you with an effective means of increasing the scalability and reliability of your Interstage Business Process Manager system. Configuring your system for load balancing can increase scalability. Configuring your system for failover can increase reliability.

This appendix provides guidelines for setting up a cluster of Interstage BPM Servers. It also provides guidelines for configuring that cluster for load balancing and failover.

In an Interstage BPM Cluster, multiple Interstage BPM Servers are setup to work in concert with each other. In other words, they work together as a unit. The default Interstage BPM Cluster is configured for load balancing in a round-robin configuration and for failover. For Interstage BPM Clusters in a round-robin configuration, requests sent to the cluster are distributed evenly among the servers in the cluster. If the cluster is configured for failover, a working server in the cluster automatically "takes over for" a server in the cluster that has just failed for some reason.

This appendix also provides the procedure for setting up a cluster of Interstage BPM Consoles on JBoss.

> **Note:** Ensure that all machines that you plan to include in a cluster are in the same Time Zone, and the difference between their system times is not more than 5 minutes.

B.1 Setting Up an Interstage BPM Cluster on JBoss

This section provides instructions for setting up a cluster of Interstage BPM Servers on JBoss. Setting up the cluster consists of the following steps:

1. Prepare the cluster. This involves preparing the database, installing the application server and setting up Interstage BPM Server on all cluster nodes.
2. Configuring the Shared Resource Root
3. Updating the Interstage BPM Server configuration files
4. Configuring environment variables
5. Importing the Interstage BPM Server configuration files
6. Configuring additional settings for JBoss
7. Configuring JMS messaging
8. Starting the cluster
9. Implementing failover if you require this feature

The sample cluster used to illustrate the clustering instructions is setup on two computers referred to as "cluster nodes". A file server is used for storing files that need to be accessed by all cluster

nodes, for example Workflow Applications and attachments to process instances. The following figure shows the sample system.
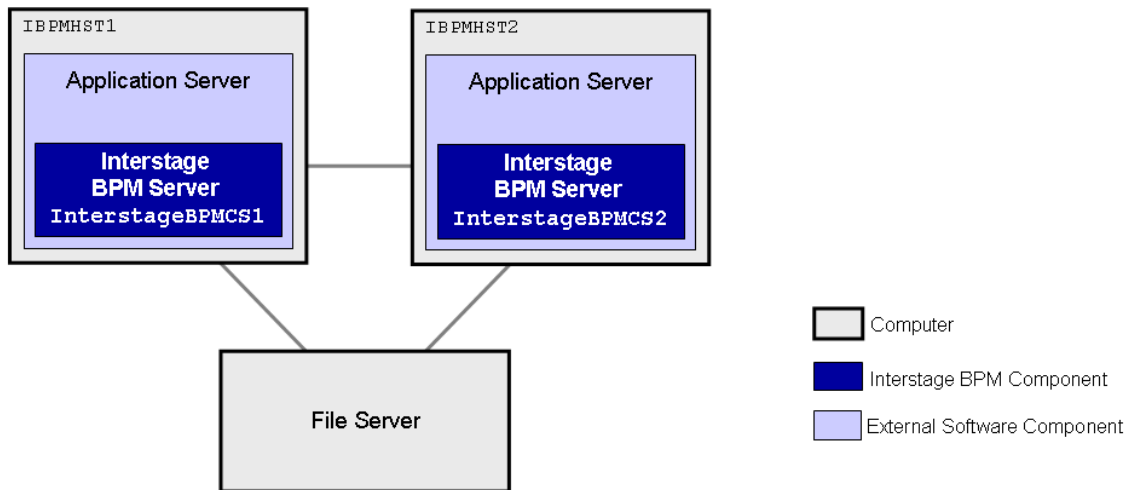

Figure 19: Sample Cluster

The following sections provide step-by-step instructions on how to set up the cluster.

B.1.1 Preparing the Cluster

Prerequisites:

Check the default settings for the multicast group. A multicast group is used to distribute information among the Interstage BPM Servers in a cluster. These are the default settings used by the Interstage BPM Servers:

- Multicast port number: 5000
- Multicast group address: 225.4.5.6

  A multicast group address is an IP address in the range 224.0.0.0 to 239.255.255.255, inclusive. It is used to identify the members of a multicast group. Each member of the group uses the same multicast group address. The address 224.0.0.0 is reserved and must not be used.

1. Create a directory on your machines that you want to include as nodes in your cluster setup and copy the `engine` directory from Interstage BPM product media to the directory created on your machines.

2. On each node, check and if require update the value for `JAVA_HOME` parameter in the `setIBPMJava` script located at `<engine directory>/server/deployment/bin/`.

3. Run the `startMulticastReceiver` script on each server node as follows.

```
<startMulticastReceiver script> <address> <port>
```

For example:

On Windows:

```
startMulticastReceiver.bat 225.4.5.6 5000
```

On UNIX:

```
startMulticastReceiver.sh 225.4.5.6 5000
```

4. Run the `startMulticastSender` script on one of the server nodes and check whether all server nodes are receiving the multicasts. Use the following format:

```
<startMulticastSender script> <address> <port>
```

Note: With the `startMulticastSender` script, use the same address-port pair as used with the `startMulticastReceiver` script in step 3.

For example:
On Windows:

```
startMulticastSender.bat 225.4.5.6 5000
```

On UNIX:

```
startMulticastSender.sh 225.4.5.6 5000
```

5. Stop the execution of the multicast sender script. If there are any remaining nodes that were not tested, repeat step 4 for them.

6. If you find that nodes are not receiving multicasts, repeat the multicast tests (step 3, 4, 5) with other ports and/or addresses. In case of any problems, contact your network administrator to make sure that the network is IP multicast enabled.

7. Once you know for which port and address (default or otherwise) the nodes are able to reach each other via IP multicast, note these values to update the parameters in the configuration file later.

To prepare the cluster:

The JBoss Application Server can be installed in different ways using different server configurations. To make sure that your JBoss installation is configured properly for Interstage BPM, you are recommended to perform the following steps:

1. Prepare the database system as explained in section *Database Server Preparation* on page 14

2. Install the JBoss Application Server on all computers that you want to include in your cluster. Refer *Installing and Configuring JBoss EAP for Interstage BPM Server and Console* on page 16 for steps to install the JBoss Application Server.

3. Setup Interstage BPM for JBoss on all computers in the cluster. All computers will use the same Interstage BPM database for setup. Use the instructions in chapter *Setting-up Interstage BPM Server and Console* on page 18.

Note: Make sure that you specify the value for `console_shared_root` parameter in configuration file during setup. Please ensure that the path specified in the value for this parameter is accessible from all cluster member nodes.

4. Start the Interstage BPM Server on **one** of the cluster nodes. Use the instructions in section *Starting Interstage BPM Server* on page 28. Make sure that Interstage BPM is operating correctly.

5. Stop the Interstage BPM Server. For instructions, refer to section *Starting Interstage BPM Server* on page 28.

B.1.2 Configuring the Shared Resource Root

The ResourceRoot is a directory on a central server containing resources (such as workflow applications, file listeners, shared classes, and so on).

In a load-balancing system, the ResourceRoot directory must be located on a central server that can be accessed by all server nodes; all server nodes must use the same ResourceRoot directory.

Each server node must be configured to access the ResourceRoot directory on that central server. The server nodes are allowed to map those directories to different physical paths as long as they use the same symbolic name for the directory.

> **Note:** If anonymous user access is not available to shared resource root, then make sure that user who is starting the Server (each cluster server) have the following permissions to access the configured shared resource root.
> - For Windows:
>   - Directory, Sub-directories, and All files: Full control.
> - For UNIX:
>   - Directory and Sub-directories: 'Read', 'Write' and 'Execute' permissions.
>   - All files: 'Read' and 'Write' permissions.

To configure your ResourceRoot:

1. On a central server, create a ResourceRoot directory.

   Example: In the sample system, a file server is used to host the ResourceRoot directory. You could create a directory named `InterstageBPMShared`.

2. Create the `tenants/Default/` folders under the ResourceRoot directory.

   For example, `//MyFileServer/InterstageBPMShared/tenants/Default/`

3. Do the following:

   a) From **any one** of the server nodes, from `<engine directory>/server/instance/default/tenants/Default/`**move** the following folders to the `tenants/Default/` folder under the ResourceRoot directory.
   - `apps`
   - `attachments`
   - `classes`
   - `dmsroot`
   - `lib`

   b) From **any one** of the server nodes, from `<engine directory>/server/instance/default/`, **move** the `search` folder to the ResourceRoot directory (for example, `//MyFileServer/InterstageBPMShared/`).

   c) Also delete the folders listed above from the other server nodes.

4. On Windows, **on each server node**, update the `<Path>` tag of `DmsCollections.xml` file located in `<engine directory>/server/instance/default/tenants/Default/resources` to specify the `attachments` directory on the file server.

Specify the path for the DMS root directory to be a folder different from the default IBPM copy directory and add share permissions to that folder.

Use one of the following formats to specify the directory's path:

```
//<Remote Computer Name>/<Absolute Path of DMS Folder>/
\\<Remote Computer Name>\<Absolute Path of DMS Folder>\
```

Example:

```
<DmsCollections>
<Dms>

<Path>//MyFileServer/InterstageBPMShared/tenants/Default/attachments</Path>


<ImplementationClass>com.fujitsu.iflow.dmsadapter.impl.FileSystemDmsSessionImpl

  </ImplementationClass>
  <Name>Attachments</Name>
 </Dms>
</DmsCollections>
```

Note:	• Do not use a network drive in the path specification. (For example, like in `<Path>P:/InterstageBPMShared/tenants/Default/attachments</Path>`). Network drives cannot be accessed by the Interstage BPM Server.
	• In the path specification, if using the machine name does not work use the machine IP.

Note:	To use WebDAV directory as DMS, ensure that at least one File DMS directory (local path folder) is present as the first DMS path in `DmsCollections.xml`.

5. Perform the subsequent steps if you are copying on the following operating system:
   - UNIX
   a) On each server node, create a directory (for example, `/home/InterstageBPMShared`) and mount the ResourceRoot directory (for example, `//MyFileServer/InterstageBPMShared`) that exists on the central server to this newly created directory.

Note:	• The path of the directory (for example, `/home/InterstageBPMShared`) to which you mount the ResourceRoot directory, must be the same on all server nodes in your cluster.

   b) On each server node, mount the `attachments` directory that you copied on the file server.
   c) On each server node, update the `DmsCollections.xml` file located in `<engine directory>/server/instance/default/tenants/Default/resources` to specify the `attachments` directory on the file server.

Example: If you mount the shared directory at `mp1`, you would update the `DmsCollections.xml` file to look like the following:

```
<DmsCollections>
<Dms>
  <Path>/mp1/attachments</Path>

<ImplementationClass>com.fujitsu.iflow.dmsadapter.impl.FileSystemDmsSessionImpl

  </ImplementationClass>
  <Name>Attachments</Name>
```

```
</Dms>
</DmsCollections>
```

Note: To use WebDAV directory as DMS, ensure that at least one File DMS directory (local path folder) is present as the first DMS path in `DmsCollections.xml`.

The DMS root directory's mount point may be different on the individual server nodes. However, the directory's symbolic name, which is specified in the `<Name>` element, must be the same on all server nodes. The following figure shows this configuration:
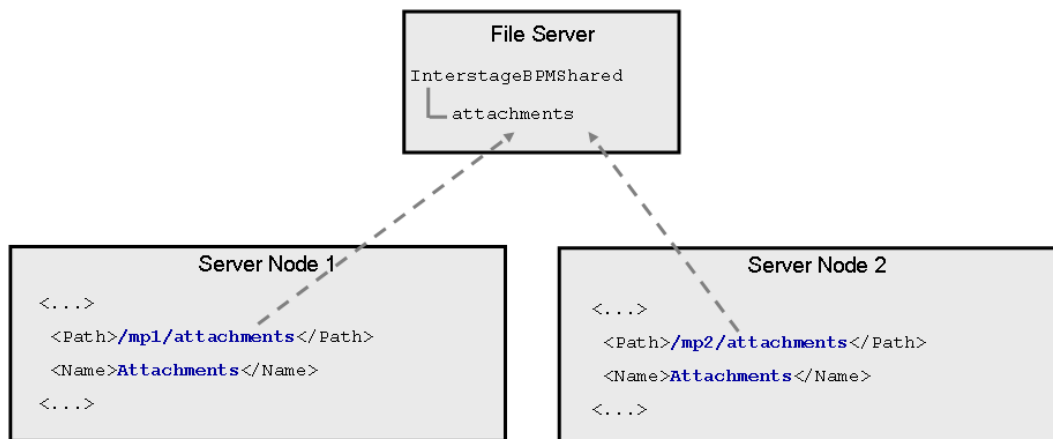

Figure 20: Sample DMS Configuration

B.1.3 Updating the Interstage BPM Server Configuration Files

When you are running Interstage BPM Servers in a cluster, you must change some server configuration settings.

To update the Interstage BPM Server configuration files:

1. **On each of the cluster nodes**, from the database, export system level server configuration parameters into a configuration file (<filename>.`properties`).

Operating System	Configuration Export Script
Windows	`exportProperties.bat <filePath> <Database User Name> <Password>`
UNIX	`exportProperties.sh <filePath> <Database User Name> <Password>`

Note: Before you make any changes to the configuration file, create a copy of the configuration file you exported as a back-up. In case you make errors while editing parameters and import the file, Interstage BPM Server may not be able to start or errors may occur at runtime. In such a case you can use the back-up file which contains a working configuration.

2. On **each cluster node**, add the following entries to the configuration file:

```
ServerName=<Name of the Cluster Server>
ServerSharedRoot=<Path of shared ResourceRoot in file server>
```

For the server name, specify a name of your choice. You can set the server name to the hostname, but you can also use any other name. Make sure that each server name is unique in the cluster.

Note down the server names because you will need to specify them in other configuration files later.

Note: Always specify the server name in uppercase letters.

Example:

On `IBPMHST1`, you could specify:

```
ServerName=INTERSTAGEBPMCS1
ServerSharedRoot=//MyFileServer/InterstageBPMShared/
```

On `IBPMHST2`, you could specify:

```
ServerName=INTERSTAGEBPMCS2
ServerSharedRoot=//MyFileServer/InterstageBPMShared/
```

3. On **any one** of the cluster nodes, add the following entry to the configuration file:

```
ServerInCluster=true
```

4. In the configuration file of **any one node** update (default or custom) values for the following multicast group properties. You must have checked the default settings and noted the port and address (default or otherwise) the nodes are able to reach each other via IP multicast. Refer to the section *Preparing the Cluster* on page 86 for details.

```
ClusterMulticastPort=<Multicast Port Number>
ClusterMulticastTopic=<Multicast Group Address>
```

Note: The IP address must be different from the JBoss start up environment. Please confirm the `IBPM_MULTICAST_IP` parameter's value in the following file.
- **Windows:** `<JBoss Installation directory>/jboss-as/bin/setEnv.cmd`
- **UNIX:** `<JBoss Installation Directory>/jboss-as/bin/setEnv.sh`

Note: Ensure these multicast group properties are not empty. Also, since these properties are identical for all cluster servers, you only need to add them to the configuration file on one of the cluster nodes.

5. **On each cluster node**, ensure the values of the following node-specific properties are correct:
- `JMSNamingProviderURL`
- `KPIListenerConfigFile`
- `ServerBaseURL`
- `ServerEmailBaseURL`
- `ServerHost`
- `ServerName`

- `ServerRoot`

In order for your changes to take effect, you will later import the updated configuration files into the database.

B.1.4 Configuring Environment Variables

To configure the required environment variables:

1. On each cluster node, update the following environment variable script as follows:

Operating System	Environment Variable Script
Windows	`setEnv.cmd`
UNIX	`setEnv.sh`

This script file is located in `<JBoss Installation Directory>/bin`.

Configure the following variables:

a) Set the `SERVERNAME` entry to the same value that you set for the `ServerName` parameter as explained in section *Updating the Interstage BPM Server Configuration Files* on page 90.

   Example: If you are following the example, set the `SERVERNAME` entry to `INTERSTAGEBPMCS1` on `IBPMHST1`. On `IBPMHST2`, set the `SERVERNAME` entry to `INTERSTAGEBPMCS2`.

b) Set the `IBPM_CLUSTER_PARTITION_NAME` and `IBPM_MULTICAST_IP` parameters to the same values on all cluster nodes. For example:

```
IBPM_CLUSTER_PARTITION_NAME = IBPMPartition
IBPM_MULTICAST_IP = 234.0.0.88
```

2. On each cluster node, configure the `SERVERNAME` entry in the following script, as explained above in step 1(a):

Operating System	Environment Variable Script
Windows	`setIBPMEnv.cmd`
UNIX	`setIBPMEnv.sh`

This script file is located in `<engine directory>/server/deployment/bin`.

Note: While editing the `setIBPMenv` script, ensure you use only forward slashes (`/`) with any paths in the script.

B.1.5 Importing the Interstage BPM Server Configuration Files

Prerequisites:

- On each cluster node, you have updated the server configuration file as instructed in section *Updating the Interstage BPM Server Configuration Files* on page 90.
- On each cluster node, you have updated the required environment variables as explained in section *Configuring Environment Variables* on page 92.
- The database server is running.

To import the configuration files into the database:

- Before importing the configuration file to the database, delete the older system properties from the database (from the `IBPMProperties` table) using the following SQL command:

```
DELETE FROM IBPMProperties WHERE tenantId = -1 AND modifier = 0
```

- On each cluster node, run the configuration import script located in `<engine directory>/server/deployment/bin`:

> **Note:** If you update `ClusterMulticastPort` and `ClusterMulticastTopic` parameters, run the configuration import script at the last on the cluster node where these properties are configured. Otherwise these updated properties may get overwritten.

Operating System	Configuration Import Script

Windows	`importProperties.bat`
	`<ConfigurationFilePath>/<ConfigurationFileName>.properties`
	`<Database User Name> <Password>`

UNIX	`importProperties.sh`
	`<ConfigurationFilePath>/<ConfigurationFileName>.properties`
	`<Database User Name> <Password>`

For `<Database User Name>` and `<Password>`, specify the database user account that you defined during setup of the Interstage BPM Server.

The script imports the specified configuration file into the database. During import, the string `<Hostname>.<Server Name>` is appended to some of the parameter names in order to make those names unique in a cluster environment.

For example, when importing the configuration file on `IBPMHST1`, the entry `ServerName=INTERSTAGEBPMCS1` is transformed into `ServerName.IBPMHST1.INTERSTAGEBPMCS1=INTERSTAGEBPMCS1`. Likewise, when importing the configuration file on `IBPMHST2`, the entry `ServerName=INTERSTAGEBPMCS2` is transformed into `ServerName.IBPMHST2.INTERSTAGEBPMCS2=INTERSTAGEBPMCS2`.

After importing the configuration files, for security reasons, delete the configuration file on each node.

B.1.6 Additional Configuration for JBoss

The following additional configuration is needed if setting up the cluster on **any version** of JBoss.

1. **On each node**, add the following attribute to the `iiop-service.xml` file located in the `<JBoss HOME>\server\ibpm\deploy\` directory.

```
<attribute name="SunJDK14IsLocalBugFix">false</attribute>
```

For example:

```
..
<mbean code="org.jboss.iiop.CorbaORBService"
name="jboss:service=CorbaORB">
 <attribute name="ORBPropertiesFileName">jacorb.properties</attribute>
 <attribute name="SunJDK14IsLocalBugFix">false</attribute>
 ..
</mbean>
```

2. If using Oracle as database, from the Oracle website (`http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/htdocs/jdbc_111060.html`) download and use the latest Oracle 11g JDBC drivers. For the exact version of drivers, refer the *Interstage BPM Server Release Notes*.

The following additional configuration is also needed:

1. **On each node**, in `iFlowClient.properties` (located at `<engine directory>/client`) update the `NamingProviderURL` and `JMSNamingProviderURL` properties with values of **all nodes**. For example, on node 1, update as follows:

```
NamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
JMSNamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
```

For node 2, also update as follows:

```
NamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
JMSNamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
```

2. Add/Update the `NamingProviderURL` and `JMSNamingProviderURL` properties with values in `console.conf` file (located at `<Console Shared Root>/console/conf`).

Here, `<Console Shared Root>` is the value of `console_shared_root` parameter set in the configuration file during setup of Interstage BPM Server and Console.

For example:

```
NamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
JMSNamingProviderURL=jnp://<host1>:<BOOTSTRAP_ADDRESS>,jnp://<host2>:<BOOTSTRAP_ADDRESS>
```

3. **On each node**, update the following in *<database>*-`persistance-service.xml` (located in `<JBoss Installation Directory>/jboss-as/server/ibpm/deploy/messaging`)

- Set the `Clustered` attribute to `true`.

```
<attribute name="Clustered">true</attribute>
```

For example:

```
<mbean code="org.jboss.messaging.core.jmx.MessagingPostOfficeService"

name="jboss.messaging:service=PostOffice"
xmbean-dd="xmdesc/MessagingPostOffice-xmbean.xml">
  <depends
optional-attribute-name="ServerPeer">jboss.messaging:service=ServerPeer</depends>

<depends>jboss.jca:service=DataSourceBinding,name=iflow.iFlowDS</depends>

  <depends
optional-attribute-name="TransactionManager">jboss:service=TransactionManager</depends>
...
<attribute name="Clustered">true</attribute>
...
</mbean>
```

- Add the following attribute:

```
<attribute
name="ChannelFactoryName">jboss.jgroups:service=ChannelFactory</attribute>
```

For example:

```
<mbean code="org.jboss.messaging.core.jmx.MessagingPostOfficeService"

name="jboss.messaging:service=PostOffice"
xmbean-dd="xmdesc/MessagingPostOffice-xmbean.xml">
  <depends
optional-attribute-name="ServerPeer">jboss.messaging:service=ServerPeer</depends>


<depends>jboss.jca:service=DataSourceBinding,name=iflow.iFlowDS</depends>

  <depends
optional-attribute-name="TransactionManager">jboss:service=TransactionManager</depends>
...
<attribute
name="ChannelFactoryName">jboss.jgroups:service=ChannelFactory</attribute>
...
</mbean>
```

4. **On each node**, in `messaging-service.xml` (located in `<JBoss Installation Directory>/jboss-as/server/ibpm/deploy/messaging`), comment out the `ClusterPullConnectionFactoryName` attribute.

```
<!-- <attribute
name="ClusterPullConnectionFactoryName">jboss.messaging.connectionfactory:
service=ClusterPullConnectionFactory</attribute> -->
```

5. **On each node**, in `iflow-destinations-service.xml` (located in `<JBoss Installation Directory>/jboss-as/server/ibpm/deploy/messaging`), for `iflow.TriggerTopic`, set the `Clustered` attribute to `false`.

```
<attribute name="Clustered">false</attribute>
```

For example:

```
<mbean code="org.jboss.jms.server.destination.TopicService"
name="jboss.messaging.destination:service=Topic,name=iflow.TriggerTopic"
xmbean-dd="xmdesc/Topic-xmbean.xml">
<depends
optional-attribute-name="ServerPeer">jboss.messaging:service=ServerPeer</depends>
<depends>jboss.messaging:service=PostOffice</depends>
...
<attribute name="Clustered">false</attribute>
...
</mbean>
```

B.1.7 Configuring JMS Messaging

As a default, the JBoss Application Server sends all JMS messages to all cluster nodes. However, some JMS messages are relevant to the local Interstage BPM Server only. You need to change the

default configuration to make sure that these messages are sent to the local Interstage BPM Server only. Make the configuration changes on each cluster node.

To configure JMS messaging:

1. On one of the cluster nodes, back up the original `<JBoss Installation Directory>/server/ibpm/deploy/fujitsu-ibpm-engine.ear` Enterprise Archive as follows:
   - On Windows: `copy fujitsu-ibpm-engine.ear fujitsu-ibpm-engine.ear.org`
   - On UNIX: `cp fujitsu-ibpm-engine.ear fujitsu-ibpm-engine.ear.org`

2. From the `<JBoss Installation Directory>/server/ibpm/deploy/ fujitsu-ibpm-engine.ear` Enterprise Archive, extract the `fujitsu-ibpm-engine-ejb.jar` Java Archive in the same folder, using the following command:

   `jar -xf fujitsu-ibpm-engine.ear fujitsu-ibpm-engine-ejb.jar`

3. Extract the `ejb-jar.xml` file from the `fujitsu-ibpm-engine-ejb.jar` archive using the following command:

   `jar -xf fujitsu-ibpm-engine-ejb.jar META-INF/ejb-jar.xml`

4. Open `ejb-jar.xml` in a text editor or in an XML editor.

5. Add the following entry to all Message Driven Bean sections:

   ```
   <message-selector>SERVER_ID='SERVERNAME'</message-selector>
   ```

   For `SERVERNAME`, specify the value of the `ServerName` parameter that you configured for the Interstage BPM Server as instructed in section *Updating the Interstage BPM Server Configuration Files* on page 90.

> **Note:** In the `ejb-jar.xml` file, specify the server name in uppercase letters that is used in the Interstage BPM Server's configuration.

This is an example of a Message Driven Bean section before the change:

```
<message-driven>
  <display-name>EmailDispatcher</display-name>
  <ejb-name>EmailDispatcher</ejb-name>
  <ejb-class>com.fujitsu.iflow.serveree.impl.globalnotification.
      EmailDispatcherMB</ejb-class>
  <transaction-type>Bean</transaction-type>
  <message-driven-destination>
    <destination-type>javax.jms.Topic</destination-type>
  </message-driven-destination>
</message-driven>
```

Add the `<message-selector>` entry immediately after the `<transaction-type>Bean</transaction-type>` tag within the `<message-driven>` tags, as shown in the example below.

Example: If you are following the example, you configured `InterstageBPMCS1` as the server name on `IBPMHST1`. Specify this value as `INTERSTAGEBPMCS1` in the `ejb-jar.xml` file. The following extract shows all the Message Driven Bean sections where you need to add the `<message-selector>` entry:

```
<message-driven>
  <display-name>EmailDispatcher</display-name>
  <ejb-name>EmailDispatcher</ejb-name>
  <ejb-class>com.fujitsu.iflow.serveree.impl.globalnotification.
```

```
        EmailDispatcherMB</ejb-class>
  <transaction-type>Bean</transaction-type>
  <message-selector>SERVER_ID='INTERSTAGEBPMCS1'</message-selector>
    <message-driven-destination>
    <destination-type>javax.jms.Topic</destination-type>
  </message-driven-destination>
</message-driven>

<message-driven>
  <display-name>Enactment</display-name>
  ...
   <message-selector>SERVER_ID='INTERSTAGEBPMCS1'</message-selector>
  ...
</message-driven>

<message-driven>
  <display-name>JmsEnactor</display-name>
  ...
   <message-selector>SERVER_ID='INTERSTAGEBPMCS1'</message-selector>
  ...
</message-driven>

<message-driven>
  <display-name>ActionAgent</display-name>
  ...
   <message-selector>SERVER_ID='INTERSTAGEBPMCS1'</message-selector>
  ...
</message-driven>

<message-driven>
  <display-name>TimerTaskMB</display-name>
  ...
   <message-selector>SERVER_ID='INTERSTAGEBPMCS1'</message-selector>
  ...
</message-driven>
```

6. Add the modified `ejb-jar.xml` file to the `fujitsu-ibpm-engine-ejb.jar` archive using the following command:

   ```
   jar -uf fujitsu-ibpm-engine-ejb.jar META-INF/ejb-jar.xml
   ```

7. Add the modified `fujitsu-ibpm-engine-ejb.jar` archive to the `<JBoss Installation Directory>/server/ibpm/deploy/fujitsu-ibpm-engine.ear` archive using the following command:

   ```
   jar -uf fujitsu-ibpm-engine.ear fujitsu-ibpm-engine-ejb.jar
   ```

8. Remove `ejb-jar.xml` file from the `<JBoss Installation Directory>/server/ibpm/deploy` directory. Otherwise, the Interstage BPM Server will not be able to start. Use the following commands to delete the temporary files:

   • On Windows:

   ```
   del fujitsu-ibpm-engine-ejb.jar
   rmdir /S /Q META-INF
   ```

   • On UNIX:

   ```
   rm fujitsu-ibpm-engine-ejb.jar
   rm -r META-INF
   ```

9. Repeat steps 1-8 for the other cluster nodes.

   If you are following the example, repeat the steps for `IBPMHST2` configuring `InterstageBPMCS2` as the server name.

B.1.8 Starting the Cluster

Start the JBoss Application Server on each cluster node. You can start the server instances in any order.

For starting each server instance in a cluster, use the following command:

```
runIBPM.bat -b 0.0.0.0 -u <MulitcastGroupAddress>
-Djboss.messaging.ServerPeerID=<n>
```

Here, `<n>` is node number, and should be `1` for the master node, and `2`, `3`, etc. for the other nodes.

For example:

```
runIBPM.bat -b 0.0.0.0 -u 225.4.5.6 -Djboss.messaging.ServerPeerID=1
```

Note: The first server instance that you start becomes the master node. If your cluster is composed of computers that differ in terms of CPU power and main memory capacity, you are recommended to start the most powerful computer first.

B.1.9 Automated Failover Settings

During operation, events are created and written to the database by each server node. Events are tied to the server node that created them and will be processed by this server node. If a server node goes down, and no failover is used, remaining events tied to this node will not be processed, and the processing of such events will resume only when the server node is available again.

Automated failover (which is enabled by default) ensures that events that cannot be processed are automatically transferred to other server nodes in the load-balancing system. Automated failover settings are controlled using the following server properties:

- The `ClusterAutomateFailoverEnabled` server property. By default, this is true, which enables automated failover.
- The `ClusterHeartbeatInterval` property (which specifies how often the status of all nodes will be checked) and the `ClusterInterceptEvents` property (which specifies, in case a node fails, how many of unhandled events will be handled by the active nodes at a time).

For details about these properties and how to change them, refer the *Interstage BPM Server Administration Guide*.

Note: If the `ClusterAutomateFailoverEnabled` server property is set to 'true' before you start all nodes in a cluster, the following behavior may occur (depending on the value of the `ClusterHeartbeatInterval` property, and how long start-up of each node takes):

As you start nodes, each started node may begin handling any unhandled events of the remaining, to-be-started nodes; this 'failover' will continue until all nodes have been started. This is normal and expected behavior.

Note: During failover, the order of transfer of unhandled events is as follows: first history events, then timer events, and then events of process scheduler.

Example

This example demonstrates the processing of events in case one of two server nodes fails.

A sample load-balancing system with two server nodes has been set up. While all of the server nodes are up and running, events are created and written to the database by each server node.
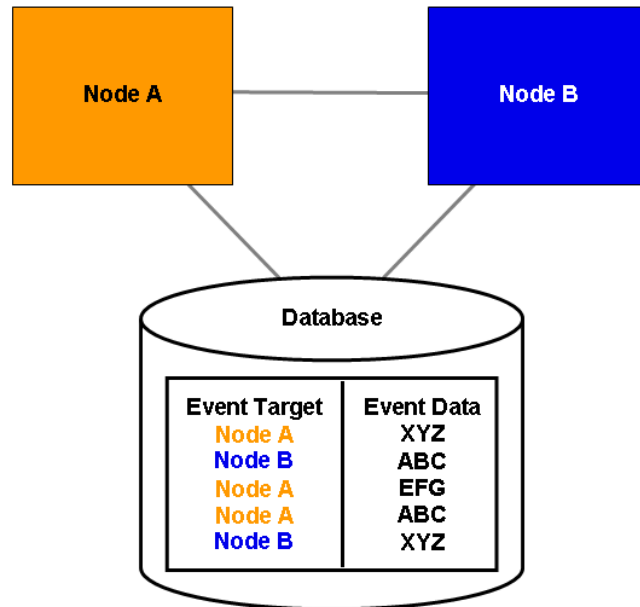

Figure 21: All Server Nodes are Up and Running

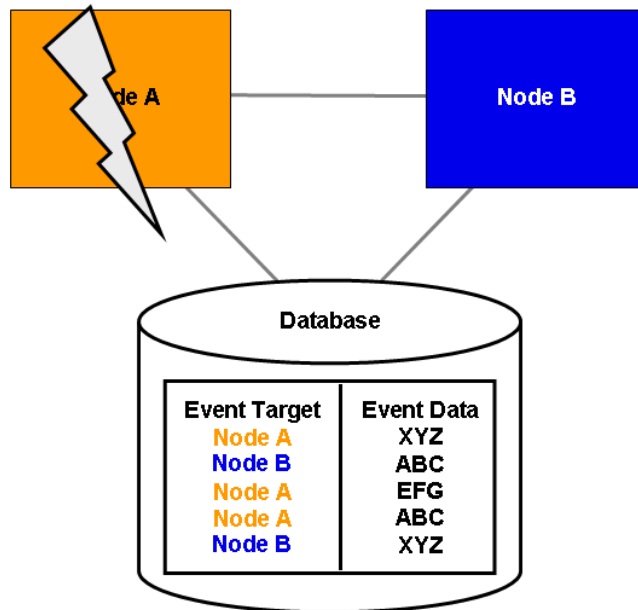If Node A goes down, events remain assigned to that node and are waiting to be processed.

Figure 22: Server Node Goes Down

If Node A goes down when automated failover is enabled:

- A pre-defined number (defined by the `ClusterInterceptEvents` server property) of node A's unhandled events are transferred to Node B, and then processed by Node B.
- Then, depending on the value of `ClusterHeartbeatInterval` property, the next node status check will be carried out.
- If node A is still found to be down, the next set from Node A's remaining events are transferred to and processed by Node B.

If node A continues to be down, the process described above continues until all of Node A's unhandled events (one set at a time) have been transferred to and processed by Node B.
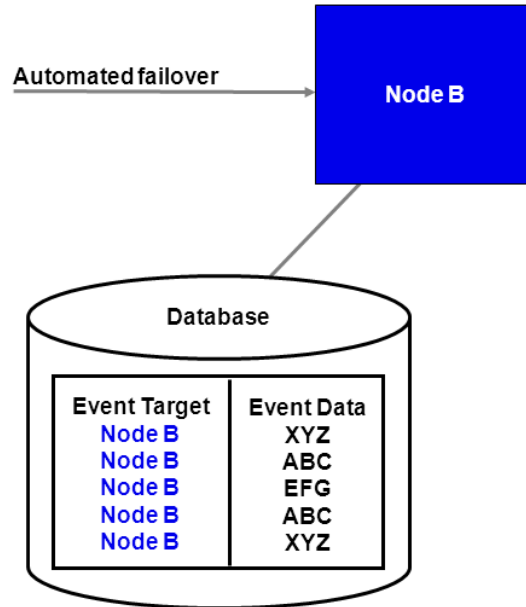
Figure 23: Events are Transferred to Another Node

Appendix C: Overview of NTLM Authentication Protocol

What is NTLM Authentication Protocol?

It is one of the security protocols used to authenticate users present in Windows AD network. The users can login into the AD network via local or remote Windows workstations present within the AD network. For more details regarding this protocol refer to Microsoft® documentation on NTLM.

Enabling NTLM Authentication Protocol for Interstage BPM Console

If you are accessing Interstage BPM Console on Windows, you can enable NTLM (NT LAN Manager) Version1 authentication protocol for Interstage BPM Console.

Enabling this protocol allows Integrated Windows Authentication for Interstage BPM Console users in a Microsoft AD network. For instance, if NTLM has been enabled for a tenant of Interstage BPM and any user within that tenant successfully logs on to Windows desktop, then on accessing any Interstage BPM Console URL of that tenant, user will be automatically logged in to Interstage BPM Console without having to login to it explicitly; the Interstage BPM Console login screen will not appear. However, login screen will always be displayed for Interstage BPM tenants who are not configured for NTLM Authentication.

Limitations:

- NTLM cannot be enabled for super users accessing the Interstage BPM Tenant Management Console.
- NTLM authentication will only work if the machine on which Interstage BPM is being accessed is on Microsoft AD network.
- Only NTLM Version1 is supported. NTLM Version 2 is not supported.

Prerequisites:

- **Network**: Machines being used for Interstage BPM Server and Console setup, and machines being used to access the Interstage Console URL are present within the AD network.
- **For all machines (Domain Controller, AD Clients, and Interstage BPM Server and Console machine)**: Set Local Security Policy as described below:

  Note: You must log on to Windows desktop using the Administrator's user ID.

  1. Navigate to **Start > Run**, type `gpedit.msc`, click **OK**.
  2. In the **Local Group Policy Editor** screen, go to **Local Computer Policy > Computer Configuration > Windows Settings > Security Settings > Local Policies > Security Options**
  3. Update policies as mentioned below and click **OK**.
     - Set policy **Network security: LAN Manager authentication Level** to **Send NTLM Response Only**.

     Also, it is recommended to update following policies (if present) as mentioned below:
     - Set policy **Network security: Restrict NTLM: Incoming NTLM traffic** to **Allow all**.
     - Set policy **Network security: Restrict NTLM: NTLM authentication in this domain** to **Disable**.
     - Set policy **Network security: Restrict NTLM: Outgoing NTLM traffic to remote servers** to **Allow all**.
  4. To apply these settings, navigate to **Start > Run**, type `gpupdate`, click **OK**.

- **Setup**: Interstage BPM Server and Console have been setup.

- **AD Client Browser Setting**: Enable Automatic logon in the Browser on Interstage BPM client machine, as described below:

    1. In the Web browser, navigate to **Tools > Internet Options > Security > Internet > Custom Level > User Authentication**.

    2. Select the **Automatic Logon with current user name and password** radio button to enable this option.

    3. Click **OK**.

> **Note:** If this option is not enabled, user will be prompted to enter the username and password. To avoid this issue, in the browser, add the Interstage BPM Console address to local intranet zone in **Tools > Internet Option > Security > Local Intranet Zone > Sites**.

C.1 Setup NTLM Authentication Protocol for Interstage BPM Console

You have prepared the system environment as instructed in section *Overview of NTLM Authentication Protocol* on page 102.

To setup NTLM Authentication Protocol, follow these steps:

1. Navigate to `<Console Shared Root>/console/conf` and add the following parameters (and their values) to `console.conf`:

    Here, `<Console Shared Root>` is the value of `console_shared_root` parameter set in the configuration file during setup.

    - `SSONTLMTenants=<value1,value2>`- this is a comma separated list of tenants for which you want to enable NTLM.

        Note: If you are specifying value in the `SSONTLMTenants` parameter, following parameters (except `SSOUserPassKey`) are mandatory and should not be left blank. If you leave any of these parameters blank, Interstage BPM Console will not start and an error will be logged in the Application Server log file.

    - `SSOToken=<value>` - the value is used to authenticate the logged in user. This is a mandatory parameter and should not be left blank.

    - `SSOIP=<value>` -the value is IP address of the domain controller (AD Server). This is a mandatory parameter and should not be left blank.

    - `SSOPreAuthDomain=<value>` -the value is the Domain Name (NETBIOS Name). This is a mandatory parameter and should not be left blank.

    - `SSOPreAuthUser=<value>` -the value is the Username of the Domain defined in `SSOPreAuthDomain` parameter. This is a mandatory parameter and should not be left blank.

    - `SSOPreAuthPass=<value>` -the value is the encrypted Password of the Domain user. This is a mandatory parameter and should not be left blank.

> **Note:** To encrypt the password, use the `EncryptPassword.bat` located in `<engine directory>/client/samples/configuration` with the encryption key defined in the `SSOUserPassKey` parameter. If no key is defined, then this script will use a default key to encrypt the password.
>
> For detailed information about encrypting passwords, please refer the section *Password Encryption* on page 72.

- `SSOUserPassKey=<value>` -the value is the key to encrypt the password of the Domain user. This is an optional parameter. If you do not specify, a default key will be used to encrypt the password. This key should be 24 characters long.

> **Note:** The `SSONTLMTenants` and `SSOToken` parameters are dynamically reloadable, so if you add/modify/remove these parameters, then you must log out and again login to the Interstage BPM Console for these changes to take effect. You do not need to restart the Interstage BPM Console.
>
> However, if you add/modify/remove other parameters (i.e. `SSOIP`, `SSOPreAuthDomain`, `SSOPreAuthUser`, `SSOPreAuthPass`, and `SSOUserPassKey`), then you must restart the Interstage BPM Console.

For details about the Interstage BPM Console configuration file (console.conf) refer the *Interstage BPM Console Online Help*.

2. Update the following Interstage BPM Server configuration parameters:

   - For system-level, update `SSOToken=<value>`. Its value will be used to the verify connection between Console and Server using SSO. Ensure that the value is the same as that updated in `console.conf` in the step above.
   - For each tenant for which you want to enable NTLM, update `IASSSOLoginConfFileEntryName=com.fujitsu.iflow.sso`. Its value specifies that Interstage BPM will use Windows authentication for that tenant.

> **Note:** Activate or reactivate the Interstage BPM tenant for the configuration property changes to take effect.

For details of how to update Interstage BPM Server system and tenant parameters, refer the *Interstage BPM Server Administration Guide*.

> **Note:** When a machine's local user has logged-in into the AD Client machine and is trying to access an NTLM Authentication enabled tenant, then the login screen will be displayed. While providing credentials, if this user has clicked the **Remember my password** option, the user name and password are stored in the **Stored Username and Password** utility of the Windows. If any new user logs into the system and access the same URL, it will automatically login with the previously stored user credentials. To solve this problem, you need to remove the entry from the Windows utility as follows:
>
> - For **Windows XP**, remove the entry from:
>   Control Panel > User Accounts > Users> Advanced > Manage Passwords > Stored User Names and Passwords.
>
> - For **Windows Server 2008 and Windows Vista**, remove the entry from:
>   Control Panel > User Accounts > Manage your network passwords > Stored User Names and Passwords
>
> - For **Windows 7, Windows 8, Windows Server 2012**, remove the entry from:
>   Control Panel > User Accounts > Manage Windows Credentials
>   Click on IP/Hostname used in accessing Interstage BPM Console URL.
>
> - For **Windows Server 2008 R2**, remove the entry from:
>   Control Panel > All Control Panel Items > Credential Manager > Windows Vault
>
> **Note**: You must login as the Administrator user to complete this procedure.

Appendix D: Overview of SSO Authentication

The SSO authentication process allows the user to log in once and gain access to multiple (SSO enabled) applications without having to login again in each application during that session.

In this SSO authentication process, the authentication is performed by a single module referred to as **OpenID Provider** application. Any application can leverage this SSO authentication process by integrating with OpenID Provider. As a result, usage of a single authentication module removes the overhead of authentication from each application & provides a centralized authentication mechanism into which any number of applications can be integrated.

The **OpenID Provider application** makes use of the OpenID Authentication 2.0 protocol to authenticate the users present in Microsoft Active Directory servers and Oracle Directory Server Enterprise Edition. It is the central system where user authentication will be done for all web based applications. You can configure this application for authentication of users in a particular directory server.

The setup of OpenID Provider application is done automatically along with the setup of Interstage BPM Server and Console for `default` tenant, if this tenant uses any directory server. If this tenant uses `Local User Management` then OpenID Provider application will only be deployed but not configured with any directory server, because OpenID Provider application does not support `Local User Management`.

Enabling SSO Authentication for Interstage BPM Console

If SSO authentication is enabled by the system administrator and you access the Console URL:

- If you are accessing the URL in a new session, the SSO login screen appears.
- If you are already logged into an application that is pre-authenticated by SSO authentication process, you will be automatically logged in to the Interstage BPM Console application in the same session. The SSO Login screen will not appear. The **Log Out** link displayed in the header of the Interstage BPM Console web page will also not appear. To log out, please close all the browser windows.

Refer to the section *Setup SSO Authentication for Interstage BPM Console* on page 106

D.1 Setup SSO Authentication for Interstage BPM Console

Pre-requisites: Setup of Interstage BPM Server and Console is completed.

> **Note:**
> - For SSO authentication, if the machine, on which OpenID Provider application is setup, has multiple IP addresses then you should use hostname in the values of `SSOFI.ProviderURL.<tenantName>` and `SSOFI.OpenIDPattern.<tenantName>` parameters, otherwise error page might be displayed while accessing such a tenant.
> - If you are using hostname to access the OpenID Provider application, then you must make sure that machines having applications and machines of end-users using such applications can resolve the hostname; otherwise error page might be displayed.
> - If you use Built-in SSO authentication, do not include any forwardslash "/" or backslash '\' characters in the user ID that you create.

To setup SSO Authentication, follow these mandatory steps:

1. Navigate to `<Console Shared Root>/console/conf` and add / update the following parameters (and their values) to `console.conf`:

   Here, `<Console Shared Root>` is the value of `console_shared_root` parameter set in the configuration file during setup.

Parameter	Mandatory?	Description
SSOToken	Yes	The value is used to authenticate the logged in user.

SSOFI.ProviderURL.<tenantName>	Yes	Used to specify the URL for OpenID provider. If you do not add this property, or add it but set it to blank, the SSO authentication will not be enabled.
		
		Specify the URL that will be passed to OpenID Provider application for a particular tenant. Its value will be in the following format:
		
		`SSOFI.ProviderURL.<tenantName>=[http|https]://<hostname>:<port>/<Provider context-root name>/id/`
		
		Here, you will replace:
		
		• `<tenantName>` by the name of the tenant for which you wish to set this property.
		• `<hostname>` by the machine name\IP address on which OpenID Provider application is setup.
		
		Note: In secure mode, ensure that the machine name\IP address you are specifying here exists as the value of `Common Name` in the security certificate. Otherwise, create a new certificate.
		
		• `<port>` by the port number configured for OpenID Provider application.
		• `<Provider context-root name>` by the context-root name of the OpenID Provider application.
		
		Note: If you use the OpenID provider application that is setup by the Interstage BPM setup script, use the following values:
		
		• `<hostname>`: This value should be same as host name of Interstage BPM.
		• `<port>`: This value should be same as port number of Interstage BPM.
		• `<Provider context-root name>`: This value should be `openid`.
		
		Example:
		
		`SSOFI.ProviderURL.tenant1=http://<hostname>:<port>/openid/id/`

Parameter	Mandatory?	Description
SSOFI.OpenIDPattern. <tenantName> (Default Value: `<SSOFI.ProviderURL>/{id}`)	No	The value is the openID pattern, which defines the location of `user id` in the HTTP-URL passed to the OpenID Provider application for a particular tenant. This value should be the value that specifies the host name, port and Provider Context root to the `OpenIDPattern` in `config.properties` file of OpenID provider application. This is an optional parameter. If you do not specify then the default value will be used. This parameter value should be updated only when you update the value of `openIDPattern` in `config.properties` file of OpenID Provider application.

Note:
- After updating these configuration parameters you must log out and again login to the Interstage BPM Console for these changes to take effect.
- Note the following for `SSOFI.ProviderURL.<tenantName>` and `SSOFI.OpenIDPattern.<tenantName>` parameters:
  - If you add these new parameters for a specific tenant, then you must log out and again login to the Interstage BPM Console for these changes to take effect. You do not need to restart the OpenID Provider application.
  - If you modify the existing values of these parameters for a specific tenant, then you must restart the OpenID Provider application.

  For details, refer the section *Starting Interstage BPM OpenID Provider* on page 30.

For details about the Interstage BPM Console configuration file (console.conf) refer the *Interstage BPM Console Online Help*.

2. Update the following Interstage BPM Server configuration parameters:

Parameter	Mandatory?	Description
SSOToken (System-level)	Yes	Its value will be used to verify connection between Console and Server using SSO. It can be specified as: `SSOToken=<Value>` Ensure that the value is the same as that updated in `console.conf` in the step above.
IASSSOLoginConfFileEntryName (Tenant-level)	Yes	Its value must be: `IASSSOLoginConfFileEntryName= com.fujitsu.iflow.sso` **Note**: Activate or reactivate the Interstage BPM tenant for the configuration property changes to take effect.

For details of how to update Interstage BPM Server system and tenant parameters, refer the *Interstage BPM Server Administration Guide*.

Optional Configuration

Do the following steps if you meet any of the conditions:

- If you use the Local User Management during the setup of Interstage BPM Console
- If you update the LDAP configuration
- If you update the OpenID Provider configuration

1. Open the `config.properties` file located in the `<Console Shared Root>/ssofi/provider/<context-root-name>/` directory.

   Here,

   - `<Console Shared Root>`- is the value of `console_shared_root` parameter set in the configuration file during setup.
   - `<context-root-name>` - is the context-root name of the OpenID Provider application. Its value is `openid` if you are using the OpenID provider application that is setup by the Interstage BPM setup script.

2. Update the following parameters in this configuration file.

> **Note:** Any backslashes "\", colons ":" or equal signs "=" used in parameter values inside the configuration file must be escaped by backslashes.
>
> For example:
>
> `C\:\\Program Files`

Parameter	Mandatory?	Description
LDAPuid	Yes	This parameter specifies the name of the attribute that identifies the user ID within an LDAP login string. The value of this parameter can be any of the following: • For Oracle Directory Server Enterprise Edition: `LDAPuid=uid` • For Microsoft Active Directory: `LDAPuid=CN`
LDAPPeople	Yes	This parameter specifies the LDAP organization unit to be used for searching users. Its value will be: For users stored in the Directory Service: `LDAPPeople=ou\=People`

Parameter	Mandatory?	Description

OpenIDPattern	Yes	This parameter specifies the openID pattern, which defines the location of `host`, `provider-root-context`, and `user id` in the HTTP-URL passed to the OpenID Provider application. Its value must be in the following format:
		
		`OpenIDPattern=[http|https]\://{host}/{provider-root-context}/id/{id}`
		
		Here, only protocol (either `http` or `https`) should be modified.
		
		For example:
		`OpenIDPattern=http\://{host}/{provider-root-context}/id/{id}`

LDAPDBSuffix	Yes	This parameter specifies the directory sub-tree in the Directory Service where groups and users to be used are stored. For example: `LDAPDBSuffix=dc\=xxx,dc\=fujitsu,dc\=com` The users will be searched under the organization unit specified as the value of `LDAPPeople` parameter.

LDAPServer	Yes	This parameter identifies the server (machine name) on which the LDAP server is installed. Its value will be in the following format:
		
		`LDAPServer=<PROTOCOL NAME>://<LDAP SERVER HOST NAME/IP>:<PORT>`
		
		For example:
		`LDAPServer=ldap\://<hostname>\:<port>`
		
		If LDAP is used in secured mode (i.e. LDAP using SSL), then `<PROTOCOL NAME>` will be `ldaps` and `<PORT>` value will be `<ldap-ssl-port>`.
		
		For example:
		`LDAPServer=ldaps\://<hostname>\:<port>`

DirectoryService	Yes	This parameter indicates the directory server to be used for user authentication. Its value can be: • For Oracle Directory Server Enterprise Edition:`DirectoryService=1` • For Microsoft Active Directory: `DirectoryService=3` If you specify any other value, it will cause an error.

Parameter	Mandatory?	Description

LDAPContextFactory	Yes	This parameter specifies the name of the LDAP Context Factory class used to authenticate users against a Directory Service. The initial value is as mentioned below:
		`LDAPContextFactory=`
		`com.sun.jndi.ldap.LdapCtxFactory`

LDAPConnectionTimeout	No	This parameter specifies the time duration after which the connection to LDAP will be lost. The value of this parameter is the time in milliseconds. If this property is not specified, a default value `30000` milliseconds will be used. If it is left blank or an incorrect value (less than Zero) is specified, it will cause an error. `LDAPConnectionTimeout=30000`
SessionTimeout	No	This parameter specifies the time duration (in minutes) after which the session timeout will occur. If the value is not specified or an incorrect value is specified, a default value `1440` will be used. For example: `SessionTimeout=1440`

3. Restart the Interstage BPM OpenID Provider for the configuration property changes to take effect.

D.2 Configuration for SSL

SSO Authentication configuration in secured mode:

1. Open the `config.properties` file located in the `<Console Shared Root>/ssofi/provider/<context-root-name>/` directory.

   Here,

   - `<Console Shared Root>` - is the value of `console_shared_root` parameter set in the configuration file during setup.
   - `<context-root-name>` - is the context-root name of the OpenID Provider application. Its value is `openid` if you are using the OpenID provider application that is setup by the Interstage BPM setup script.

2. Update the following parameters in this configuration file:

Parameter	Mandatory?	Description

OpenIDPattern	Yes	For implementing SSL, use the `https` protocol. For example:
		`OpenIDPattern=https\://{host}/`
		`{provider-root-context}/id/{id}`

> **Note:** Restart the Interstage BPM OpenID Provider for the configuration property changes to take effect. For details, refer the section *Starting Interstage BPM OpenID Provider* on page 30.

3. Update following parameters in the `console.conf` located in the `<Console Shared Root>/console/conf` directory.

Parameter	Mandatory?	Description
SSOFI.ProviderURL.<tenantName>	Yes	Use the `https` protocol in the URL specified for this parameter.
SSOFI.OpenIDPattern.<tenantName>	No	If you are specifying value for this parameter and implementing SSL, then use the `https` protocol.
SSOFI.TrustStore	No	Specify the path of trust store JVM option that contains all the required trusted certificates. This is an optional parameter. If you do not specify, value configured in the JVM used by Interstage BPM will be used. **Note**: • If you have already set `javax.net.ssl.trustStore` in the application server JVM, then please use same keystore for this property otherwise setting a new value in this property will override previous setting of keystore. It is better to use previous keystore. • Ensure that you use only forward slashes (/) in the path of trust store.

> **Note:** After updating the configuration parameters you must log out and again login to the Interstage BPM Console for these changes to take effect.

For details about the Interstage BPM Console configuration file (console.conf) refer the *Interstage BPM Console Online Help*.

Appendix E: Troubleshooting

E.1 Log File Information

For details about Log Files, refer the **Configuring Log Files** topic in the *Interstage BPM Server Administration Guide*.

E.2 Resolving Specific Error Situations

E.2.1 Interstage BPM Server Fails to Start

Check the `Error.log` file in the `<engine directory>/server/instance/default/logs` directory.

Look for	What to do
`DbService : setConnection: Connection to database server failed. Is the database server running and reachable through the network? {ORA-01089: immediate shutdown in progress - no operations are permitted.`	Check if the database is running. Also check that you can access the database from the machine where the Interstage BPM Server is setup in case the database is running on a different machine. You can use `telnet <Database Server Hostname> <Port>` from the server host machine to check that the connection to the database host/port can be established.

`LdapBroker : getContext: Could not create the directory services. {[LDAP: error code 49 - Invalid Credentials]}`
 	
`LdapBroker : getGroupMembersByDN: Could not retrieve the user groups. {Could not create the directory services. {[LDAP: error code 49 - Invalid Credentials]}}`
 	
`LdapBroker : Could not retrieve the user groups. {Could not create the directory services. {[LDAP: error code 49 - Invalid Credentials]}}`
	Ensure that the user name/password as specified in the `LDAPAccessUserID` / `LDAPAccessUserPassword` parameters of the Interstage BPM Server are correct and you can login to your Directory Server using the above user name/password.

`getContext: Could not create the directory services.`
 	
`LdapBroker : getGroupMembersByDN: Could not retrieve the user groups. {Could not create the directory services.`
 	
`LdapBroker : Could not retrieve the user groups. {Could not create the directory services.`
	Ensure that the LDAP Server is running on the port as specified in the `LDAPServer` parameter of the Interstage BPM Server. You can use `telnet ldapServerHostName port` from the server host machine to check that the connection to the host/port can be established.

Look for	What to do
`IflowStartup : @(Failed to execute the IBPM startup routine task)Unable to deliver the message for the requested eventClass. {javax.naming.ServiceUnavailableException: A communication failure occurred while attempting to obtain an initial context with the provider URL: "iiop://<hostname>:<port>". Make sure that any bootstrap address information in the URL is correct and that the target name server is running. A bootstrap address with no port specification defaults to port 2809. Possible causes other than an incorrect bootstrap address or unavailable name server include the network environment and workstation network configuration.}`	This is because you setup WebSphere Application Server in a Cell (deployment manager and a managed node) environment, causing the `BOOTSTRAP_ADDRESS` port to be incorrect in some configuration files. 1. Get the correct value of the `BOOTSTRAP_ADDRESS` port from the WebSphere Application Server Console (from **Servers > Server Types** > **WebSphere application servers** > <ServerName> > **Ports**). 2. Update the value of the `BOOTSTRAP_ADDRESS` port for the following entries in the `iflowClient.properties` file, as well as Interstage BPM properties in the database. (For steps to change the server properties, refer the *Interstage BPM Server Administration Guide*.) • `JMSNamingProviderURL` (in the format `iiop://<hostname>:<BOOSTRAP_ADDRESS>`) • `NamingProviderURL` (in the format `iiop://<hostname>:<BOOSTRAP_ADDRESS>`)

E.2.2 Error in Trace.log

Check the `Trace.log` in the `<engine directory>/server/instance/default/logs` directory.

Look for	What to do
`getGroupMembersByDN: Could not retrieve the user groups. {[LDAP: error code 32 - No Such Object]}`	Possible cause of this error: A user has been deleted from the Directory Server (LDAP Server) but the reference of it is still there in one of the groups.

E.2.3 Failure in Writing to an Oracle Database

When the updating of an Oracle database table fails, for example, when you try to archive a process instance, check the Oracle alert log file located in the `<Oracle Installation Dir>/admin/<DB instance name>/bdump` directory, for example:

`C:\ProgramFiles\Oracle\admin\orcl\bdump\alert_orcl.log`

The following error may be observed:

`{Database add/create request failed. {ORA-08103: object no longer exists}}`

This failure may be due to the fact that the Datafile size reached the file size limit on the hard disk of the database server.

The system administrator of the database server needs to increase the file size on the database server hard disk.

E.3 Errors during Setup of the Interstage BPM Server

If you have trouble executing the setup script, you can check the cause of error by viewing `deployment.log`. The deployment log is created at the following location:

On Windows: `<engine directory>\server\deployment\logs\deployment.log`

On Unix: `<engine directory>/server/deployment/logs/deployment.log`

The following tables explain the possible causes of errors during server startup and the appropriate action(s) to take:

Setup of IBPM fails when trying to setup a new build

I	Cause	The build directory of the existing installed build was deleted, without un-installing the build or un-installation failed.

	Action	**For Windows**
		
		Manually delete the earlier build's registry-entry, as follows:
		
		1. Go to **Start > Run**, type `regedit`, click **OK**.
		2. In the **Registry Editor** screen, go to **HKEY_LOCAL_MACHINE > SOFTWARE > Fujitsu > Install > Interstage BPM Server** .
		3. Delete the **Interstage BPM Server** registry entry under **Install** key.
		4. Go to **HKEY_LOCAL_MACHINE > SOFTWARE > Microsoft > Windows > CurrentVersion > Fujitsu > Interstage BPM Server**.
		5. Delete the **Interstage BPM Server** registry entry under **Fujitsu** key. This will ensure complete deletion of the registry entry for Windows platform.
		6. Go to **HKEY_LOCAL_MACHINE > SOFTWARE > Microsoft > Windows > CurrentVersion > Uninstall > DFC70E37-68E7-469C-A253-9ED7BB3BCD23**.
		7. Delete the **Interstage Business Process Manager xx.x** registry entry under **Uninstall** key. This will ensure complete deletion of the registry entry for Windows platform.
		
		For Solaris
		
		Manually delete the Solaris package information, as follows:
		
		1. Open the Command Prompt window and run the command `pkginfo -l FJSVibpm` from any location of the Solaris machine, to check if the Solaris package information still exists.
		2. If the Solaris package information is displayed, then delete the package information using the following steps:
		  a. Create a file named **ibpm.uninst** under the **/tmp** location.
		  b. Run the command `pkgrm FJSVibpm` to delete the Solaris package.
		  c. Run the command `pkginfo -l FJSVibpm` once more, to ensure that the Solaris package has been deleted successfully. If no information is displayed, then it confirms that the Solaris package has been completely deleted from the Solaris platform.
		
		For Linux
		
		Manually delete the RPM package information, as follows:
		
		1. Open the Command Prompt window and run the command `rpm -qi FJSVibpm` from any location of the Linux machine, to check if the RPM package still exists.
		2. If the RPM package information is displayed, then delete the package information using the command `rpm -e FJSVibpm`.
		3. Run the command `rpm -qi FJSVibpm` once more to ensure that the RPM package has been deleted successfully. If no information is displayed, then it confirms that the RPM package has been completely deleted from the Linux platform.

An error occurred during Interstage BPM database creation/update

I	Cause	One of the following values provided during setup were wrong: • Database Administrator user name • Database Administrator password

	Action	Restore the database from the backup of the database made before setting up Interstage BPM. Update the `setup.config` file and run the setup script again.
II	Cause	One of the following values provided during setup were wrong: • Host name of the database server • Database SID (database instance name) • Database port
	Action	Restore the database from the backup of the database made before setting up Interstage BPM. Update the `setup.config` file and run the setup script again.
III	Cause	Database server is not running.
	Action	Start the database server. Update the `setup.config` file and run the setup script again.

Errors caused by JDBC Connection

I	Cause	The SQLRecoverableException occurs. This is caused by Oacle Bug 6485149.
	Action	Please contact Oracle Technical Support team for further instructions.

Errors caused by JDK Version

I	Cause	The version of JDK specified during setup does not match the version required for this application server.
	Action	You need to update `JAVA_HOME` variable of system environment and run the setup script again. Please update `JAVA_HOME` with `setIBPMJava.bat/setIBPMJava.sh` that exists in `<engine directory>/server/deployment/bin` when the error happens when the script of Interstage BPM is executed after completing the setup.

Problems related to LDAP Server Access

I	Cause	Even if LDAP server is up, the error message `Unable to connect to specified directory server` appears. This happens when Super user or Tenant Administrator is not registered in LDAP server.
	Action	Please register the Super user and Tenant Administrator in the LDAP server before executing the setup script.

Errors Pertaining to Active Directory

I	Cause	The Active Directory Server is remote and Active Directory is not running.
	Action	Start the Active Directory Server, and then run the setup script again.

II	Cause	Interstage BPM cannot connect to the Active Directory Server because one of the following values provided during setup was wrong: • Active Directory Key • Active Directory Organizational Unit
	Action	Update the `setup.config` file and run the setup script again.

Errors Pertaining to Oracle Directory Server Enterprise Edition

I	Cause	Interstage BPM cannot connect to the LDAP Server because one of the following values provided during setup was wrong: • LDAP Key • LDAP Organizational Unit
	Action	Update the `setup.config` file and run the setup script again.

Errors Pertaining to Un-setup

For JBoss Application Server:

I	Cause	Interstage BPM un-setup failed.

	Action	If un-setup fails, delete the following files and directories manually if exists:
		• From `<JBOSS_INSTALLATION_DIRECTORY>/server` directory:
		  • `ibpm` directory
		• From `<JBOSS_INSTALLATION_DIRECTORY>/bin` directory:
		  • `runIBPM.bat` file
		  • `runIBPM.sh` file
		  • `shutdownIBPM.bat` file
		  • `shutdownIBPM.sh` file
		  • `setEnv.cmd / setEnv.sh` file

E.4 Errors Related to Interstage BPM Database Creation/Update

Errors Pertaining to the Database

I	Cause	The Database Server is not running.
	Action	Start the Database Server, and then start the Interstage BPM Server.

Errors Pertaining to a Hostname Change

I	Cause	You changed the hostname of the computer where Interstage BPM Server has been setup. As the hostname occurs in the names and values of various configuration parameters of the Interstage BPM Server, the server cannot access its configuration settings.
	Action	In the `IBPMProperties` table of the Interstage BPM database, make the following changes: • In the `PROPERTYKEY` column, update any parameter names that have the hostname in the suffix. These parameters have the format `<PARAMETER_NAME>.<HOSTNAME>` or `<PARAMETER_NAME>.<HOSTNAME>.<SERVERNAME>`. • In the `PROPERTYVALUE` column, update any parameter values containing the hostname. To update the `IBPMProperties` table, use the appropriate database commands or a database client software.

E.5 Contacting Your Local Fujitsu Support Organization

If you are unable to troubleshoot your problem:

1. Replicate the actions that caused the error.
2. Contact your local Fujitsu Support organization and provide the following information:

   General Information
   • Operating System
   • Directory Service (type and version)
   • Database server (type and version)
   • JDK version
   • Application server (type and version)
   • Interstage BPM edition, version and build number
   • Major problem area
   • Priority of the issue
   • Environment in which the problem occurs

   Configuration Information
   • The configuration file that you exported from the Interstage BPM Server

   Log Files
   • All log files from `<engine directory>/server/instance/default/logs`
   • Setup log file from `<engine directory>/server/deployment/logs/deployment.log`

   OS System Logs
   • The Windows event log that you obtain using the Windows Event Viewer
   • Linux system logs stored in `/var/log/messages`
   • Solaris system logs stored in `/var/adm/messages`

   Problem Description
   • Description of the steps you performed before the problem occurred

- Frequency with which the problem occurs

Problem Details

- The application program and its source code that caused the error
- The XPDL file of the process definition that caused the error
- Information about Java Actions, Timers and Agents defined in the process definition
- Screenshot of the process instance history if the process instance goes into error state
- Stack trace if any exception is displayed

  You can obtain the stack trace by clicking **Details** on the error page displayed in the Interstage BPM Console.

- Screenshot of the exception wherever it is displayed
- Screenshot of the process instance (graphical view) if the process instance goes into error state or into an unexpected state
- Calendar files (`*.cal`) if timers are used
- The `agentsConfig.xml` file if agents are used

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