IBM Tivoli Intelligent Orchestrator and Tivoli
Provisioning Manager, Version 1.1.1

IBM

Installation Guide

Version 1.1.1

> **Note:**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page 93.

Contents

Part 1. Overview

This section contains general information about the contents of this book and includes the following:

Chapter 1. About this book

This chapter provides basic information about the contents of this book.

Document description

This book describes how to install and configure Tivoli® Intelligent Orchestrator or Tivoli Provisioning Manager on the supported platforms listed below.

- Windows® 2000 SP3
- Solaris 8
- AIX® 5.2
- Red Hat Advanced Server 2.1

It is intended for system administrators or for anyone else responsible for performing installation, configuration and basic maintenance tasks.

The instructions in this book apply to both Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager and will clearly identify any information or tasks which apply only to one application or the other.

Updates to this book

This Installation Guide, and any updated versions of this Installation Guide, are available as PDF files at the Tivoli Software Library Web site:

`http://www.ibm.com/tivoli`

To learn about last-minute changes to the product, see the updated product README file, which is also available from the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager Technical Library Web site.

Conventions used in this book

This book uses the following highlighting conventions:

Boldface type	Indicates commands or graphical user interface (GUI) controls such as names of fields, icons, or menu choices.
`Monospace type`	Indicates examples of text you enter exactly as shown, file names, and directory paths and names.
Italic type	Used to emphasize words. Italics also indicate names for which you must substitute the appropriate values for your system.

This icon marks a Tip - additional information that can help you complete a task.

> **Important**
> These sections highlight especially important information.

> **Attention**
>
> These sections highlight information intended to protect your data.

Knowledge requirements

This book should be read by system administrators or anyone else responsible for installing and configuring Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

People who are installing and configuring Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager should have knowledge in the following areas:

- The operating system you are installing on
- IBM® DB2 Universal Database™
- IBM Directory Server
- WebSphere® Application Server

Chapter 2. Preinstallation requirements

This section describes the hardware and software supported Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager and the supported configurations.

Supported Hardware

You must ensure that you meet the following minimum hardware requirements before installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager:

- For IBM Compatible PC with Microsoft Windows 2000 Server:
  - 1.7 GHz Intel Pentium 4 processor or equivalent
  - 2GB of free memory
  - 20 GB of free disk space
- For IBM pSeries with AIX 5.2:
  - 400 MHz Power 3ii CPU or equivalent
  - 1GB of free memory
  - 20 GB of free disk
- For IBM Compatible PC with Red Hat Linux Advanced Server 2.1:
  - 1.7 GHz Intel Pentium 4 processor or equivalent
  - 2GB of free memory
  - 20 GB of free disk space
- For Sun processor with Solaris 8:
  - 1GHz CPU
  - 2 GB RAM minimum
  - 20 GB of free disk

Note: Systems below these recommended minimums may be used in environments that support a limited number of users and where longer server initialization times can be tolerated.

Supported Software

You must ensure that you meet the following minimum software requirements before installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

Supported Software on Managing Servers

For managing servers, that is, the servers upon which Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager is installed:

- One of the following operating system levels:
  - Microsoft Windows 2000 Server with Service Pack 3
  - AIX 5.2 64–bit only
  - Linux Intel, Red Hat Enterprise Linux Advanced Server 2.1 (2.4 Kernel)
  - Sun Solaris 8, with the following patches:
    - 108528-22

- Patch 112438-02 (Not needed for Solaris 8 HW 12/02, but may be required for earlier Solaris 8 updates. A reboot is necessary after this patch has been installed.)
- Patch 109147-26 (Not needed for Solaris 8 HW 12/02, but may be required for earlier Solaris 8 updates. A reboot is necessary after this patch has been installed.)

- Database environment:
  - DB2 Universal Database, Workgroup Unlimited Edition V8.1.2 (bundled with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager)
- WebSphere Application Server, Base Edition V5.0.1 (bundled with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager)
- Directory Server environment:
  - IBM Directory Server, V5.1 (bundled with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager)
- LDAP Client(s)
- Database client(s)
- Telnet client
- FTP client
- On Windows 2000 only: Cygwin DLL 1.3.18 or higher
- Expect 5.3 or higher is required for all environments and is available at:
  - **For AIX:**
    `http://www.ibm.com/servers/aix/products/aixos/linux/download.html`
  - **For Linux:** Red Hat Enterprise Linux AS 2.1 package installer (optional component)
  - **For Windows:** Cygwin installation (selectable component)
    `http://www.cygwin.com/`

Supported Software on Managed Servers

For managed servers, that is, the servers which Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager are configured to manage in your data center, the following operating systems are supported:

- AIX Support:
  - AIX V5.1 64-bit
  - AIX V5.2 64-bit
- Microsoft Support:
  - Windows 2000 Server
  - Windows 2000 Advanced Server
  - Windows Server 2003 Standard Edition
  - Windows Server 2003 Enterprise Edition
- Linux on zSeries Support:
  - z/VM 4.4
  - SuSE Linux Enterprise Server 7 for S/390 and zSeries
  - SuSE Linux Enterprise Server 7 for IBM zSeries
- Linux on Intel Support:
  - Red Hat Enterprise Linux AS 2.1
  - Red Hat Linux 7.2, 7.3, 8.0
  - SuSE 8.0, 8.1

- SuSE Linux Enterprise Server 7
- SuSE Linux Enterprise Server 8 or other distribution Powered by United Linux 1.0
- Sun Solaris Support
  - Solaris V8 64-bit

Managed Server Software Prerequisites

WIndows Servers Managed by Tivoli Intelligent Orchestrator: On the Windows platform, Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require that Cygwin be installed on a managed server if there is not another installer on that machine which will act as a proxy installer. That is, if Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager is going to install software directly on the managed to server, using its automation packages, then Cygwin must be installed on the managed server. However, if another application will be acting as Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager's proxy for installing software, then Cygwin is not required. For example, if applications like Tivoli Configuration Manager, HP-Compaq's RDP, or Citrix Installation Manager, are installed on a managed server and will act as the proxy installer, then Cygwin does not need to be installed.

If Cygwin is installed on a Windows server managed by Tivoli Intelligent Orchestrator, you must ensure that the PATH environment variable on Windows machines managed by Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager has the following information at the beginning of the string for the correct shutdown to be executed:

`<drive>:\cygwin\home\thinkcontrol;<drive>:\cygwin\bin`

For some workflows to complete successfully, a bash utility must be installed on managed servers. Refer to the Installing the Utility Prerequisites section in the appropriate chapter, depending on which platform you need to install bash on.

Open Source Applications

The following third-party Open Source applications are shipped with, and installed as part of, Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager:

Open Source Name	Purpose
Jasperreports 0.5.0	HTML/XML Generating Reporting Tool
Itext 0.81	Utility to generate PDF files from HTML
POI 1.5.1	Create OLE 2 Compound Document Format Using Java
JMGMT 1.1b	SNMP monitors
Xalan-j 2-3-1	XSLT, Xpath processor, XML code generator
Log4j.jar 1.2.8	Logging facility library
Commons-beanutils.jar 1.1	Wrapper for Java reflection and introspection
Commons-collections.jar 1.0	Collections. Used by Jasper Report
Commons-digester.jar 1.1.1	XMI to Java mapping. Used by Jasper Report
Avalon 4.0	Java common framework
Xerces2 Java Parser 2.1	Parser for XML files to XML Java Objects
Jaxen 1-0-FCS	Xpath engine for Java BSD

4.0 Beta 2	API program and reference implementatioin
Jdom.jar beta-8	Java representation of XML document
Struts.jar 1.0.2	Framework to build web application with Java
Jakarta-regexp-1.2.jar	Regular expressions for Java

For more information on the licensing terms of these Open Source products, refer to the `readme.txt` file located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager product CD.

Supported Configurations

Tivoli Intelligent Orchestrator must be installed in a homogeneous operating environment, with the exception of the directory server. If the directory server is installed on a separate server from Tivoli Intelligent Orchestrator and its other prerequisite software, then the directory server can be on a different platform.

Installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager is only supported in the following configurations:

Option 1
> If installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager across 2 servers, both servers must be running the same operating environment. The software should be installed on the servers as follows:
> - **On server 1**: Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, WebSphere Application Server, and SSH
> - **On server 2**: The directory server application, the database application, and SSH.

Option 2
> If installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager across 3 servers, the servers must be running the same operating environment. As noted above, the directory server is the exception; it may be installed on a different platform. The software should be installed on the servers as follows:
> - **On server 1**: Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, WebSphere Application Server, Phoenix, and SSH
> - **On server 2**: The database application, and SSH.
> - **On server 3**: The directory server application.

Reviewing the README file

Reviewing the README file is an important prerequisite for installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. The README file contains information about last-minute changes to the product. The README file can be found in the root directory of the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. The README file name is: `readme.txt`.

Part 2. Installing the Prerequisites

This section contains information on installing the prerequisite software for Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager, and includes the following chapters:

Chapter 3. Default User IDs and Passwords

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require that a default set of user IDs and default passwords be created and used during installation and configuration. A command line tool is provided to change the passwords of each default user ID after Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager has been installed. For instructions on changing the default passwords after installation, refer to "Changing Default Passwords" on page 81.

The table below describes which default user ID and password is required for each of the prerequisite applications, Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, and where it is used.

User name	Default Password	Description
tioadmin	*<user defined>*	• User-defined in the operating system. • Used to log onto the operating system. • Also used to install Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.
tioldap	tioldap	• Defined in the Tivoli Intelligent Orchestrator `ldap.ldif` file which is imported into IBM Directory Server • Used by WebSphere to connect to the Directory Server • This account must be given rights to search user accounts.
wasadmin	wasadmin	• Defined in the Tivoli Intelligent Orchestrator `ldap.ldif` file which is imported into IBM Directory Server • Used by WebSphere as the administrator account. • Used to start, stop and otherwise manage WebSphere
tioappadmin	tioappadmin	• Defined in the Tivoli Intelligent Orchestrator `ldap.ldif` file which is imported into IBM Directory Server • Used to log into the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager web console. • This is the initial application user which should have all rights.
tiointernal	internal	• Defined in the Tivoli Intelligent Orchestrator `ldap.ldif` file which is imported into IBM Directory Server • Used by the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager server for system initiated actions

tiodb	*<user defined>*	• User-defined during DB2 Universal Database installation.
		• Used by WebSphere Application Server, Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager.
		• This is the database user.

Chapter 4. Windows Pre-Installation Requirements

This chapter provides details about the prerequisite software that must be installed and configured prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on Windows in a two tier configuration as described in "Supported Configurations" on page 8. The steps below will document the pre-installation requirements for the following configuration:

- **Database server**: user accounts, database requirements, directory server requirements
- **Tivoli Intelligent Orchestrator server**: user accounts, database client, WebSphere Application Server

Notes:

1. The instructions provided below are intended to be used as guidance only. It is recommended that you refer to the documentation for each prerequisite product or fix for complete installation, configuration and usage information.

2. There are additional prerequisites for servers managed by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to "Managed Server Software Prerequisites" on page 7 for details.

Installing and Configuring Database Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed in the section below are not met.

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Create a local user account, `tioadmin` with Administrator privileges. When you create the account, modify the user profile properties to set the Local Path to: `<drive>:\<Cygwin_installdir>\home\thinkcontrol`, where *<Cygwin_installdir>* is the directory where you plan to install Cygwin in step 3.

2. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 3 provides instructions on installing and configuring Cygwin's OpenSSH.

3. Cygwin Version 1.3.22 or higher must be installed. For information on obtaining and installing Cygwin, refer to the following Web site:

   `http://www.cygwin.com`

   When installing Cygwin, do the following requirements:

   a. Ensure you log on to the Windows server using the `tioadmin` user account specified above.

   b. During the Cygwin installation, on the **Select Package** panel, select the following packages:

Note: The location of these packages may vary depending on the version of Cygwin you are installing.

Category	Package
Admin	cron, cygrunsrv, shutdown
Archive	sharutils, unzip, zip
Base	all packages
Database	accept default packages
Devel	cvs
Doc	cygwin-doc
Editors	ed, vim
Games	accept default packages
Graphics	none
Interpreters	Expect, gawk
Libs	accept default packages
Mail	accept default packages
Math	accept default packages
Misc	accept default packages
Net	inetutils, openssh, whois
Publishing	accept default packages
Shells	accept default packages (ensure ash, bash, and sh-utils are selected)
System	accept default packages
Text	more
Utils	clear, cygutils, time, file
Web	accept default packages
+XFree86	accept default packages
+_PostInstallLast	accept default packages

   c. Open a Cygwin bash shell window and do the following:

      1) To generate host keys, switch to the `/usr/bin` directory and run `./ssh-host-config -y`.

      2) When prompted for environment variables, press **Enter** to accept the defaults.

   d. Switch to the `/var` directory and type the following:
```
export CYGWIN=ntsec
chmod 700 empty
```

   e. Start the Cygwin service by running the following command:
```
cygrunsrv -S sshd
```

   f. Type `cd` to return to the Cygwin home directory.

   g. To generate the user keys, type
```
ssh–keygen –t rsa -N ""
```

      When prompted, accept the defaults by pressing **Enter**.

   h. Switch to the `/.ssh` directory by typing: `cd .ssh`

   i. Run the command: `cat id_rsa.pub > authorized_keys`

j. To configure SSH to accept connections from new hosts without prompting for confirmation, create a file in /home/thinkcontrol/.ssh called `config`. The file should contain the following line:

```
StrictHostKeyChecking no
```

k. To verify that SSH is configured properly, do the following:

1) Ensure the Cygwin service is started.

2) To log in to the local host through SSH, type `ssh tioadmin@<localhost>`, where *<localhost>* is your host name. If SSH is properly configured you will see the following message:

```
Fanfare!!!
You are successfully logged in to this server!!!
```

3) Exit the bash shell by typing `exit`.

l. Copy the `id_rsa.pub` file, which contains the public keys, into the authorized keys file of the administrative account of any server in the data center which the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server must communicate with or manage. This includes the database server in a two or three server configuration, and any Windows servers in the data center which Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager is managing.

Installing DB2 Universal Database

While logged on as `tioadmin` install DB2 Universal Database, Workgroup Unlimited Edition V8.1.2, using the DB2 Universal Database CD shipped with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. When setting up your database application, ensure you meet the following requirements:

1. During installation:

   - Select the **Custom install** option and install the following packages: **Client Support**, **Admin Tools** and **Server Support**.

   - Select to create an instance. If you do not create an instance during installation, you will need to manually create an instance after installation.

   - Ensure there are no spaces in the installation path.

   - When prompted for a user ID, enter user `tiodb` and define a password. You will be prompted for this password during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

   Notes:

   1. You may be required to reboot the server after installing DB2.

   2. It is strongly recommended that you review the log file size settings for your database and increase the log file sizes if necessary. Refer to the documentation for your database product for instructions on setting log file sizes.

2. After installing DB2, and with the DB2 CD still in the CD drive, switch to the *<DB2_installdir>*\SQLLIB directory and run the following command:

```
db2licm -a <drive>\db2\license\db2wsue.lic
```

where *<drive>* is the CD drive. You should receive the following message:

```
DBI1402I License added successfully.
DBI1426I This product is now licensed for use as specified in
the License Acceptance and License Information
documents pertaining to the licensed copy of this
product.  USE OF THE PRODUCT CONSTITUTES ACCEPTANCE OF
```

```
THE TERMS OF THE IBM LICENSE ACCEPTANCE AND LICENSE
INFORMATION DOCUMENTS, LOCATED IN THE FOLLOWING
DIRECTORY: "<DB2_installdir>\SQLLIB\license\en"
```

3. While logged in as `tiodb`, open a DB2 command window and create the database for Tivoli Intelligent Orchestrator by entering the following command:

   `db2 create database <db_name>`

   where *<db_name>* is the name of the database you wish to create. Record the name of the database, as you will require it in step 1b on page 23.

4. Create the tablespace for the database by doing the following:

   a. Ensure you are logged in as `tiodb`.

   b. Connect to the newly created database by issuing the following command:

      `db2 connect to <db_name> user tiodb using <tiodb_pwd>`

      where *<db_name>* is the name of the database you created in step 3, and *<tiodb_pwd>* is the password for user ID `tiodb`.

   c. Use the `tablespace.sql` script located in the `samples` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Run the command:

      `db2 -tvf tablespace.sql`

In a later step, you will also configure the DB2 client application on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server to communicate with the database server.

Installing and Configuring IBM Directory Server, 5.1

IBM Directory Server, 5.1 may be installed on the database server or on a separate server, as described in "Supported Configurations" on page 8. Perform the following steps either on the database server or on a dedicated IBM Directory Server machine.

Tivoli Intelligent Orchestrator must be installed in a homogeneous operating environment, with the exception of the directory server. If the directory server is installed on a separate server from Tivoli Intelligent Orchestrator and its other prerequisite software, then the directory server can be an a heterogeneous platform.

An LDAP client must be install on the Tivoli Intelligent Orchestrator server to allow it to communicate with the directory server.

Attention: You must install and configure the IBM Directory Server 5.1 prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. The following instructions are provided as guidance only. For complete details on installing and configuring the directory server for your customized environment, refer the IBM Directory Server 5.1 documentation at the following URL:

`http://publib.boulder.ibm.com/tividd/td/IBMDirectoryServer5.1.html`

To install and configure IBM Directory Server 5.1, do the following:

1. Before you can configure the LDAP database in step 7b on page 17, you must create a user ID for the user who will own the database. The user ID you specify will own the database instance where the DB2 database will exist, and the DB2 instance will be in the user's home directory. The user ID can be no longer than 8 characters. In addition , the user must be a member of the Administrators group.

2. Insert the IBM Directory Server, 5.1 CD in the drive and double-click the `setup.exe` icon in the `\ids_ismp` folder. Follow the prompts to complete the installation.

3. The installation path cannot have a space in the path. If you are using the default installation path, change the installation directory to `<drive>:\Progra~1\IBM\LDAP` or select a custom path.

4. Select a **Custom** install and do one of the following:
   - If you are installing IBM Directory Server on the same machine as DB2 Universal Database, Workgroup Unlimited Edition V8.1, deselect the DB2 option. You do not need to install the version of DB2 which is part of the IBM Directory Server installation, since you have already installed the version of DB2 which is supported by and bundled with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager.
   - If you are installing IBM Directory Server on a dedicated server, which is not the DB2 server, ensure the DB2 option is selected. IBM Directory Server requires a local database be installed.

5. Select both the **Server** and **Client** to install.

6. After installation, copy the `thinkdynamics.schema` file from the `/samples` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD onto your hard drive.

7. Click **Start** > **Programs** > **IBM Directory Server 5.1** > **Directory Configuration** to open the **Configuration Manager**. Do the following to configure IBM Directory Server 5.1 for use with Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager:

   a. Click **Administrator DN/password** and set the Administrator/DN to `cn=tioldap` and the default password `tioldap`. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

   b. Click **Configure database** and follow the prompts to create a new database.

   c. Click **Manage suffixes** and set the **Suffix DN** to the appropriate values for your environment.

   d. Click **Manage Schema files** and do the following:
      1) Browse to the `thinkdynamics.schema` file you copied to your hard drive in step 6.
      2) Click **Add**, and then **OK**.

   e. Click **Import ldif data** and do the following:
      1) Browse to the `/samples` directory on the Tivoli Intelligent Orchestrator CD and add the `ldap.ldif` file.
      2) Click the **Standard import** radio button and then click **Import**.
      3) Watch for all entries to be added successfully.

   f. Exit the **Configuration Manager** tool.

   g. Perform additional IBM Directory Server configuration by doing the following:
      1) Open a command line and start the embedded WAS LDAP server by running the following command:

         `<drive>:\Progra~1\ldap\Appsrv\bin\startserver server1`

         If you changed the default installation directory, substitute the appropriate path in the command above.

      2) Open the IBM Directory Server Web console using the following URL:

```
http://localhost:9080/IDSWebApp/IDSjsp/Login.jsp
```

Select LDAP Host name to **Console Admin**, user name `superadmin` and password `secret`, then click **Login**.

3) Expand **Console Administration**, click on **Manage Console Servers**, and click **Add**.

4) Enter the host name of the directory server machine and click **OK**.

5) Open a command line and start the directory server by running the following command:

```
<drive>:\Progra~1\ldap\bin\ibmslapd
```

If you changed the default installation directory, substitute the appropriate path in the command above.

6) Log out of the Web console and log in with your host name as specified in 7g4. Set the user name as specified in step 7a on page 17.

7) Verify that you can see all of the users that are in the `.ldif` file. Expand **Directory management** and select **Manage entries.** Select **dc=ibm,dc=com** and click **Expand**.

8) By default, user passwords stored in IBM Directory Server are in clear-text format, which may represent a security concern. To enable password encryption for new users created by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager in IBM Directory Server, do the following in the Web console:

a) Start the LDAP service, by selecting **Server administration** > **Start/stop/restart server**.

b) 3. After the service is started successfully, configure the security policy by navigating to **Server administration** > **Manage security properties**.

c) Select **Password policy** on the right panel. Do the following:

i. From the **Password encryption** drop-down, select **SHA**

ii. Enable the **Password policy enabled** check box.

iii. Click **OK**.

d) Restart the LDAP service, as described in step 7g8a, for the changes to take effect.

Installing and Configuring Tivoli Intelligent Orchestrator Server Prerequisites

The Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager installations check to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed in the section below are not met.

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Create a local user account, `tioadmin` with Administrator privileges. When you create the account, modify the user profile properties to set the Local Path to: *<drive>*:*<Cygwin_installdir>*\home\thinkcontrol, where *<Cygwin_installdir>* is the directory where you plan to install Cygwin in step 3 on page 19.

2. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 3 provides instructions on installing and configuring Cygwin's OpenSSH.

3. Cygwin Version 1.3.22 or higher must be installed. For information on obtaining and installing Cygwin, refer to the following Web site:

   `http://www.cygwin.com`

   When installing Cygwin, do the following requirements:

   a. Ensure you log on to the Windows server using the `tioadmin` user account specified above.

   b. During the Cygwin installation, on the **Select Package** panel, select the following packages:

   Note: The location of these packages may vary depending on the version of Cygwin you are installing.

Category	Package
Admin	cron, cygrunsrv, shutdown
Archive	sharutils, unzip, zip
Base	all packages
Database	accept default packages
Devel	cvs
Doc	cygwin-doc
Editors	ed, vim
Games	accept default packages
Graphics	none
Interpreters	Expect, gawk
Libs	accept default packages
Mail	accept default packages
Math	accept default packages
Misc	accept default packages
Net	inetutils, openssh, whois
Publishing	accept default packages
Shells	accept default packages (ensure ash, bash, and sh-utils are selected)
System	accept default packages
Text	more
Utils	clear, cygutils, time, file
Web	accept default packages
+XFree86	accept default packages
+_PostInstallLast	accept default packages

   c. After installing Cygwin, open a Cygwin bash shell window and do the following:

1) To generate host keys, switch to the /usr/bin directory and run
   ./ssh-host-config -y.

2) When prompted for environment variables, press **Enter** to accept the
   defaults.

d. Switch to the /var directory and type the following:

```
export CYGWIN=ntsec
chmod 700 empty
```

e. Start the Cygwin service by running the following command:

```
cygrunsrv -S sshd
```

f. Type cd to return to the Cygwin home directory.

g. To generate the user keys, type

```
ssh–keygen –t rsa -N ""
```

When prompted, accept the defaults by pressing **Enter**.

h. Switch to the /.ssh directory by typing: cd .ssh

i. Run the command: cat id_rsa.pub > authorized_keys

j. To configure SSH to accept connections from new hosts without prompting
   for confirmation, create a file in /home/thinkcontrol/.ssh called config.
   The file should contain the following line:

```
StrictHostKeyChecking no
```

k. To verify that SSH is configured properly, do the following:

1) Ensure the Cygwin service is started.

2) To log in to the local host through SSH, type ssh
   tioadmin@<*localhost*>, where <*localhost*> is your host name. If SSH is
   properly configured you will see the following message:

```
Fanfare!!!
You are successfully logged in to this server!!!
```

3) Exit the bash shell by typing exit.

l. Copy the id_rsa.pub file, which contains the public keys, into the
   authorized keys file of the administrative account of any server in the data
   center which the Tivoli Intelligent Orchestrator or Tivoli Provisioning
   Manager server must communicate with or manage. This includes the
   database server in a two or three server configuration, and any Windows
   servers in the data center which Tivoli Intelligent Orchestrator or Tivoli
   Provisioning Manager is managing.

Installing WebSphere Application Server

To install WebSphere Application Server and the fixes it requires, do the following:

1. Install WebSphere Application Server, 5.0, which is shipped with Tivoli
   Intelligent Orchestrator and Tivoli Provisioning Manager. For installation
   instructions, refer to the WebSphere Application Server documentation available
   at the following URL:

```
http://www-3.ibm.com/software/webservers/appserv/was/library/
```

Use the following points as guidelines when installing:

a. When you select an installation path, ensure there are no spaces in the path.

b. Select **Custom Install** and deselect the **Application Server Samples** option.

c. During installation select **Run Application Server and HTTP server as a
   system service**.

d. When prompted for a user name, enter user `tioadmin` and the corresponding password. This is the local operating system user name with Administrator privileges.

> **Note:** If a dialog box appears with message ID `INST0056E`, click **OK** and continue. No further action is required.

2. After installing WebSphere Application Server, 5.0 you must install Fix Pack 1, which is shipped on a CD packaged with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. To install Fix Pack 1, follow the documentation provided on the CD. When installing Fix Pack 1, note the following:
   - Open the system **Services** and stop the WebSphere Application Server, IBM HTTP and IBM HTTP Administration services. The Fix Pack installation will fail if these services are running.
   - Install the fix pack by running the `updateWizard.bat` file. Accept all defaults.

3. Install the MQ CSD03 patch, by doing the following:
   a. Ensure the WebSphere Application Server is stopped.
   b. Run the following command from a command line window to check whether or not the MQ CSD03 or higher is already installed.

      ```
      mqver
      ```

      If the command shows that you have already had the MQ CSD03 or above installed on the server, you do not have to install the MQ CSD03 fix and you can proceed to step 4. If the command returns the following information, you already have MQ CSD03 installed:

      ```
      Name:  WebSphere MQ
      Version:  530.4  CSD03
      ....
      ....
      ```

   c. Insert the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD into the CD drive.
   d. Switch to the `\patches\csd03` directory, and run the `WINDOWS_CSD03_U200187A.exe` and follow the prompts to complete the installation.

4. Apply the following MQ fixes for embedded messaging. The fixes are located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD.
   - Apply `IY43610.windows.zip` fix located in the `\patches\I_43610` directory, by following the instructions in the `readme.iy43610.txt` file.
   - Apply `InterimIY44803.windows.zip` fix located in the `\patches\I_44803` directory, by following the instructions in the `readme.iy44803.txt` file.

5. Apply the WebSphere Application Server PQ75055 fix, located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD in the `\patches\WAS_PQ75055` directory. To apply the fix, do the following:
   a. Create an `update` directory under the WebSphere Application Server installation directory.
   b. Copy the `updateInstaller.zip` file and `apar_PQ75055.zip` file from the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD to the `/update` directory you created.
   c. Unzip the `updateInstaller.zip` and `apar_PQ75055.zip`.
   d. Start the update wizard by running `updateWizard.bat`.
   e. When prompted, select **Install fixes**.

f. On the fix directory panel, ensure the directory path is
   <WAS_installdir>\update\efixes\... Wait for the fix jar file to be picked up,
   then select and install it.

6. Install the WebSphere Application Server Application Client, by doing the
   following:

   a. Insert the WebSphere Application Server Application Client CD into the CD
      drive.

   b. Unzip the file in the \win directory, and then from the \nt directory, run
      install.exe.

   c. When prompted, select **Custom** install and select **J2EE and Java thin
      application client** and **Embedded Messaging client**. Do not select **Samples**.

   d. Ensure there are no spaces in the installation path by either changing the
      path to *<drive>*:\Progra~1\WebSphere\AppClient or a custom installation
      path.

      Important

      The WebSphere Application Client must be installed in the WebSphere
      home directory. If you installed WebSphere Application Server in the
      default installation directory, then you can accept the Application
      Client default installation directory.

      However, if you selected a custom installation directory for WebSphere
      Application Server, then you must install the Application Client in the
      same directory as WebSphere Application Server. For example, if you
      installed WebSphere Application Server in
      <drive>:\myinstall\WebSphere, then the WebSphere Application Client
      should be installed in *<drive>*:\myinstall\WebSphere\AppClient.

      ---

   e. Reboot the machine.

7. After installing the WebSphere Application Server Application Client, add the
   following lines to the end of the java.security file in the
   <WAS_AppClient_installdir>\java\jre\lib\security\ directory.

   ```
   # Class to instantiate as the javax.security.auth.login.Configuration provider.
   #
   login.configuration.provider=com.ibm.security.auth.login.ConfigFile
   # Default login configuration file
   #
   login.config.url.1=file:/<WAS_AppClient_installdir>/properties/wsjaas_client.conf
   ```

   where *<WAS_AppClient_installdir>* is the installation path for the WebSphere
   Application Server Application Client, including the drive letter. Ensure that the
   login.config.url.1 setting has the correct path to wsjaas_client.conf.

   Note: You must use *forward* slashes in the directory path for the line, including
   the WAS Application Client installation directory:

   ```
   login.config.url.1=file:/<WAS_AppClient_installdir>/properties/wsjaas_client.conf
   ```

8. Edit the *<WAS_AppClient_installdir>*\properties\sas.client.props file. Locate
   the line:

   ```
   com.ibm.CORBA.loginSource=prompt
   ```

   and change it to:

   ```
   com.ibm.CORBA.loginSource=none
   ```

Installing the DB2 Universal Database and IBM Directory Server Clients

You will need to install the DB2 Universal Database client and the IBM Directory Server client on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server, so that it can communicate with the remote database and directory server machines. Do the following:

1. Install the DB2 Universal Database client application from the DB2 Administration Client CD. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator.

   After installing the database client, you must configure the client to communicate with the database server. If you have not yet installed the database server, return to this step after installing the database server.

   Note: The following instructions are provided as guidance only. Refer the DB2 Universal Database v8.1 documentation for complete details on the commands in the steps below.

   To configure a DB2 client to communicate with the database server, do the following:

   a. If you have not already done so, log on as `tioadmin` to the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server which has the database client installed.

   b. Open a DB2 command line processor and enter the following commands:

   ```
   catalog tcpip node <db_node> remote <dbserver_hostname> server 50000
   catalog db <db_name> as <db_alias> at node <db_node>
   ```

   where the variables are defined as follows:

   db_node
   > A local, user-defined alias for the node to be cataloged. This is an arbitrary name on the user's workstation, used to identify the node. It should be a meaningful name to make it easier to remember. The name must conform to database manager naming conventions.

   dbserver_hostname
   > The host name of the node where the target database resides. The host name is the name of the node that is known to the TCP/IP network. Maximum length is 255 characters.

   db_name
   > Specifies the name of the database to catalog. This is the name of the database you created in step 3 on page 16.

   db_alias
   > Specifies an alias as an alternate name for the database being cataloged. If an alias is not specified, the database manager uses db_name as the alias. Record the value used, as you will be prompted for it during Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager installation.

2. Install and configure the IBM Directory Server 5.1 client, according to the documentation provided by IBM Directory Server 5.1.

The next step

After installing and configuring all the prerequisite software listed above, do the following:

1. If you have not yet done so, review the README file. For more information about the read me file, refer to "Reviewing the README file" on page 8.
2. Depending on which product you are installing, proceed to one of the following chapters:
   - Chapter 8, "Installing Tivoli Intelligent Orchestrator," on page 69, or
   - Chapter 9, "Installing Tivoli Provisioning Manager," on page 73.

Chapter 5. AIX Pre-Installation Requirements

This chapter provides details about the prerequisite software that must be installed and configured prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on AIX in a two tier configuration as described in "Supported Configurations" on page 8. The steps below will document the pre-installation requirements for the following configuration:

- **Database server**: user accounts, database requirements, directory server requirements
- **Tivoli Intelligent Orchestrator server**: user accounts, database client, WebSphere Application Server

Notes:

1. The instructions provided below are intended to be used as guidance only. It is recommended that you refer to the documentation for each prerequisite product or fix for complete installation, configuration and usage information.

2. There are additional prerequisites for servers managed by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to "Managed Server Software Prerequisites" on page 7 for details.

Installing and Configuring Database Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met.

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Use SMIT to do the following:
   a. Create the group `tioadmin`.
   b. Create the user account `tioadmin`. Specify the **Primary Group** as `tioadmin`. Specify the HOME directory as `/home/thinkcontrol`.

2. Obtain and install the **bash**, **bash-doc**, **unzip** and **tar** RPM packages from the following URL:

   `http://www.ibm.com/servers/aix/products/aixos/linux/download.html`

   Notes:

   1. Ensure that GNU tar exists in `tioadmin`'s PATH (`/usr/local/bin`), preceding the AIX tar utility in `/usr/bin`, as the AIX tar does not handle path names longer than 127 characters.

   2. Ensure that the GNU tar is not in the PATH of `root` or any other administrative ID as this may cause problems for System Administrators. The AIX `mksysb` command will fail if it does not use the AIX supplied version of tar.

3. While logged in as `root`, create two groups called **mqm** and **mqbrkrs**.

4. Create a user `mqm` in group `mqm`. Ensure the home directory is set to `/usr/mqm`.

5. Add `root`, `mqm` and `tioadmin` to both groups by doing the following:
   a. Open the `/etc/group` file in an editor.

b. Scroll down to locate the mqm and mqbrkrs entries in the file.

c. Add `mqm`, `root` and `tioadmin` to end of each line. For example, after adding these users, the line should look similar to the following:

```
mqm:x:501:root,tioadmin,mqm
```

6. While logged in as `root`, create the directory /usr/local/jakarta-avalon-phoenix. Then change ownership to user and group `tioadmin`, using the following commands:

```
chown tioadmin.tioadmin /usr/local/jakarta-avalon-phoenix
```

7. Expect 5.3 or higher is required for all environments and is available at:

```
http://www.ibm.com/servers/aix/products/aixos/linux/download.html
```

Expect also requires that you download and install the packages `tcl` and `tk` from the same site. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

8. You must install the Tivoli GUID package located in the `\tools\Tivoli-guid\AIX` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. To install Tivoli GUID, follow the instructions in the `read.me` file in the `/tools/Tivoli-guid/AIX` directory on the CD.

9. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 10 provides instructions on installing and configuring the required version of SSH.

10. OpenSSH version 3.4 or higher must be installed and configured. To install the `openssh` fileset, do the following:

a. Install the following file sets:
   - openssh.base
   - openssh.license
   - openssh.msg.en_US
   - openssh.man.en_US

   These file sets can be installed from either the AIX Base installation media, or from the following URL:

   ```
   http://www.ibm.com/developerworks
   ```

   In the left navigation frame, click **Open Source Projects** and then click **OpenSSH for AIX Images**. Select **OpenSSH 3.6** or higher.

b. Start the ssh daemon by running the command: `/usr/bin/startsrc -s sshd`

   Note: If the AIX machine that OpenSSH is installed on has GSA installed, the sshd daemon will not start. This is a known problem. You will need to first check to see if the sshd user exists on the system. If not, it should be created with the following commands:

   ```
   mkgroup sshd
   mkuser -a pgrp=sshd login=false home=/var/empty
   gecos="OpenSSH privilege separation" account_locked=true sshd
   ```

c. As user `tioadmin`, configure SSH so that the server can communicate with relevant users on other systems and components of the data center.

   Attention: Ensure that you are logged on to user ID `tioadmin` directly. Do not `su -` to `tioadmin` or the following steps will fail to run correctly.

Do the following:

1) Run the following commands:

```
ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
```

2) You can test this by running: `ssh -v tioadmin@<localhost>`, where *<localhost>* is your host name. If SSH is properly configured, you will not be prompted for a password.

3) Copy the public key for user `tioadmin` to the servers that you need to log in to, using Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

4) It is required to configure SSH to accept connections from new hosts without prompting for confirmation. Create a file in `/home/thinkcontrol/.ssh` called `config`. The file should contain the following line:

```
StrictHostKeyChecking no
```

5) Copy the `id_rsa.pub` file into the authorized keys file of the target server administrative account to the database server and any managed server running Cygwin. This file must be copied to any new servers brought under Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager's control.

Installing DB2 Universal Database

Install DB2 Universal Database, Workgroup Unlimited Edition V8.1.2. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to the DB2 installation documentation for information on installing DB2.

1. During installation:
   - Select to create an instance. If you do not create an instance during installation, you will need to manually create an instance after installation.
   - When prompted to enter a user ID and password, enter user ID `tiodb` and select a password. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

   Note: It is strongly recommended that you review the log file size settings for your database and increase the log file sizes if necessary. Refer to the documentation for your database product for instructions on setting log file sizes.

2. After installing DB2, and with the DB2 CD still in the drive, switch to the *<DB2_installdir>*/SQLLIB directory and run the following command:

```
db2licm -a <drive>/license/db2wsue.lic
```

   where *<drive>* is the CD drive mount point. You should receive the following message:

```
DBI1402I License added successfully.
DBI1426I This product is now licensed for use as specified in
the License Acceptance and License Information
documents pertaining to the licensed copy of this
product.  USE OF THE PRODUCT CONSTITUTES ACCEPTANCE OF
THE TERMS OF THE IBM LICENSE ACCEPTANCE AND LICENSE
INFORMATION DOCUMENTS, LOCATED IN THE FOLLOWING
DIRECTORY: "<DB2_installdir>/SQLLIB/license/en"
```

3. Add `tiodb` to the group for the DB2 user ID you specified during the DB2 installation. By default, that group is db2grp1.

4. Edit the `.profile` file in the home directory of both the `root` and `tioadmin` user, to add the following lines:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
. /home/db2inst1/sqllib/db2profile
fi
```

5. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqllib/java:$LD_LIBRARY_PATH
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi
```

6. Create the database for Tivoli Intelligent Orchestrator by entering the following commands:

```
su - tiodb
db2 create database <db_name>
```

where *<db_name>* is the name of the database you wish to create. Record the name of the database, as you will require it in step 1b on page 37.

7. Create the tablespace for the database by doing the following:

a. Ensure you are logged in as `tiodb`.

b. Connect to the newly created database by issuing the following command:

```
db2 conect to <db_name> user tiodb using <tiodb_pwd>
```

where *<db_name>* is the name of the database you created in step 6, and *<tiodb_pwd>* is the password for user ID `tiodb`.

c. Use the `tablespace.sql` script located in the `samples` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Run the command:

```
 db2 -tvf tablespace.sql
```

8. You must configure the DB2 client application on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server to communicate with the database server. Perform the steps outlined in step 1 on page 36.

Installing and Configuring IBM Directory Server, 5.1

IBM Directory Server, 5.1 may be installed on the database server or on a separate server, as described in "Supported Configurations" on page 8. Perform the following steps either on the database server or on a dedicated IBM Directory Server machine.

Tivoli Intelligent Orchestrator must be installed in a homogeneous operating environment, with the exception of the directory server. If the directory server is installed on a separate server from Tivoli Intelligent Orchestrator and its other prerequisite software, then the directory server can be an a heterogeneous platform.

Attention: You must install and configure the IBM Directory Server 5.1 prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. The following instructions are provided as guidance only. Refer the IBM Directory Server 5.1 documentation for complete details on installing and configuring the directory server for your customized environment. IBM Directory Server documentation is available at the following URL:

`http://publib.boulder.ibm.com/tividd/td/IBMDirectoryServer5.1.html`

If you are installing IBM Directory Server on the same machine as DB2 Universal Database, Workgroup Unlimited Edition 8.1 you do not need to install the version of DB2 which is part of the IBM Directory Server installation, since you have already installed the version of DB2 which is supported by and bundled with Tivoli Intelligent Orchestrator. If you are installing IBM Directory Server on a dedicated server, which is not the DB2 server, ensure the DB2 option is selected. IBM Directory Server requires a local database be installed.

Before you configure install IBM Directory Server, you must create a user ID for the user who will own the database used by the Directory Server. The user ID you specify will own the database instance where the DB2 database will exist, and the DB2 instance will be in the user's home directory. The user ID can be no longer than 8 characters. In addition:

- The user's Primary group can be any general group (such as `other`, `dbsysadm`, or `db2iadm`).There might be some groups that do not work correctly as the user's primary group when configuring the database. For example, if the user's primary group on Linux is `users`, problems might occur. Use `other` if you want to be sure that the Primary group will work.
- The user `root` must be a member of the user's primary group. If `root` is not a member of this group, add `root` as a member of the group.
- For best results, the user's login shell should be the Korn shell script (/usr/bin/ksh).
- The user's password must be set correctly and ready to use. For example, the password cannot be expired or waiting for a first-time validation of any kind. (The best way to verify that the password is correctly set is to telnet to the same computer and successfully log in with that user ID and password.)
- The user must have a home directory and must be the owner of the home directory.
- The group ownership of the user's home directory must be the user's primary group.
- When configuring the database, it is not necessary, but only customary, to specify the home directory of the user ID as the database location. However, if you specify some other location, the user's home directory still must have 3 to 4 MB of space available. This is because DB2 creates links and adds files into the home directory of the instance owner (that is, the User) even though the database itself is elsewhere.

After installation, go to the `/usr/bin` directory and issue the command `./ldapxcfg` to open the **Configuration Manager**. Do the following to configure IBM Directory Server 5.1 for use with Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager:

1. Check to see if port 9090 is being used by `websm`, by running the following command:

   `netstat -an | grep 9090`

   If there is a match, run the following command to disable `websm`:

```
/usr/websm/bin/wsmserver -disable
```

2. Copy the `thinkdynamics.schema` file from the `/samples` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD onto your hard drive.

3. In the Configuration Manager, click **Administrator DN/password** and set the Administrator/DN to `cn=tioldap` and the default password `tioldap`. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

4. Click **Configure database** and follow the prompts to create a new database.

5. Click **Manage suffixes** and set the **Suffix DN** to the appropriate values for your environment.

6. Click **Manage Schema files** and do the following:
   a. Browse to the `thinkdynamics.schema` file you copied to your hard drive in step 2.
   b. Click **Add**, and then **OK**.

7. Click **Import ldif data** and do the following:
   a. Browse to the `/samples` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD and add the `ldap.ldif` file.
   b. Click the **Standard import** radio button and then click **Import**.
   c. Watch for all entries to be added successfully.

8. Exit the **Configuration Manager** tool.

9. Perform additional IBM Directory Server configuration by doing the following:
   a. Open a command line and start the WAS server by running the following command:

   `<Install_dir>/ldap/appsrv/bin/startserver server1`

   b. Open the IBM Directory Server Web console using the following URL:

   `http://localhost:9080/IDSWebApp/IDSjsp/Login.jsp`

   Login with the user name `superadmin` and password `secret`, then click **Login**.

   c. Click **Create a node** and enter the host name of the directory server machine.

   d. Set the user name as specified in step 3.

   e. Open a command line and start the directory server by running the following command:

   `<Install_dir>/ldap/bin/ibmslapd`

   f. Log out of the Web console and log in as your new node, which is your host name.

   g. Verify that you can see all of the users that are in the `ldif` file.

   h. By default, user passwords stored in IBM Directory Server are in clear-text format, which may represent a security concern. To enable password encryption for new users created by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager in IBM Directory Server, do the following in the Web console:

      1) Start the LDAP service, by selecting **Server administration** > **Start/stop/restart server**.

      2) 3. After the service is started successfully, configure the security policy by navigating to **Server administration** > **Manage security properties**.

      3) Select **Password policy** on the right panel. Do the following:

a) From the **Password encryption** drop-down, select **SHA**

b) Enable the **Password policy enabled** check box.

c) Click **OK**.

4) Restart the LDAP service, as described in step 9h1 on page 30, for the changes to take effect.

Installing and Configuring Tivoli Intelligent Orchestrator Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met. The steps below are divided into the following sections:

1. "Installing the Utility Prerequisites" on page 25
2. "Installing WebSphere Application Server" on page 33
3. "Installing the DB2 Universal Database and IBM Directory Server Client Applications" on page 36

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Create a user account `tioadmin` as part of the group `tioadmin`, which is required to install and run Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

2. Set the `HOME` variable to be `/home/thinkcontrol` for user `tioadmin`.

3. Obtain and install the **bash**, **bash-doc**, **unzip** and **tar** RPM packages from the following URL:

   `http://www.ibm.com/servers/aix/products/aixos/linux/download.html`

   Notes:

   1. Ensure that GNU tar exists in `tioadmin`'s PATH (`/usr/local/bin`), preceding the AIX tar utility in `/usr/bin`, as the AIX tar does not handle path names longer than 127 characters.

   2. Ensure that the GNU tar is not in the PATH of `root` or any other administrative ID as this may cause problems for System Administrators. The AIX `mksysb` command will fail if it does not use the AIX supplied version of tar.

4. Install JRE 1.4 (32-bit version) locally, which can be downloaded from the following URL:

   `http://www.ibm.com/developerworks/java/jdk/index.html`

   Do not overwrite the existing JDK level installed with WebSphere Application Server. After installing JRE 1.4, edit the `$HOME/tools/reports_all.sh` file and change the `JAVA_HOME` variable to reflect the location of JRE 1.4.

5. While logged in as `root`, create two groups called **mqm** and **mqbrkrs**.

6. Create a user `mqm` in group `mqm`. Ensure the home directory is set to `/usr/mqm`.

7. Add `root`, `mqm` and `tioadmin` to both groups by doing the following:

   a. Open the `/etc/group` file in an editor.

   b. Scroll down to locate the mqm and mqbrkrs entries in the file.

   c. Add `mqm`, `root` and `tioadmin` to end of each line. For example, after adding these users, the line should look similar to the following:

      `mqm:x:501:root,tioadmin,mqm`

8. While logged in as `root`, create the directory `/usr/local/jakarta-avalon-phoenix`. Then change ownership to user and group `tioadmin`, using the following commands:

   ```
   chown tioadmin.tioadmin /usr/local/jakarta-avalon-phoenix
   ```

9. Expect 5.3 or higher is required for all environments and is available at:

   ```
   http://www.ibm.com/servers/aix/products/aixos/linux/download.html
   ```

   Expect also requires that you download and install the packages `tcl` and `tk` from the same site. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

10. You must install the Tivoli GUID package located in the `\tools\Tivoli-guid\AIX` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. To install Tivoli GUID, log in as `root` and run the following command: `rpm -Uvh <package_name>`.

11. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 12 provides instructions on installing and configuring the required version of SSH.

12. OpenSSH version 3.4 or higher must be installed and configured. To install the `openssh` fileset, do the following:

    a. Install the following file sets:
       - openssh.base
       - openssh.license
       - openssh.msg.en_US
       - openssh.man.en_US

    These file sets can be installed from either the AIX Base installation media, or from the following URL:

    ```
    http://www.ibm.com/developerworks
    ```

    In the left navigation frame, click **Open Source Projects** and then click **OpenSSH for AIX Images**. Select **OpenSSH 3.6** or higher.

    b. Start the ssh daemon by running the command: `/usr/bin/startsrc -s sshd`

       Note: If the AIX machine that OpenSSH is installed on has GSA installed, the sshd daemon will not start. This is a known problem. You will need to first check to see if the sshd user exists on the system. If not, it should be created with the following commands:

       ```
       mkgroup sshd
       mkuser -a pgrp=sshd login=false home=/var/empty
       gecos="OpenSSH privilege separation" account_locked=true sshd
       ```

    c. As user `tioadmin`, configure SSH so that the server can communicate with relevant users on other systems and components of the data center.

       Attention: Ensure that you are logged on to user ID `tioadmin` directly. Do not `su -` to `tioadmin` or the following steps will fail to run correctly.

       Do the following:

       1) Run the following commands:

          ```
          ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
          cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
          ```

2) You can test this by running: `ssh -v tioadmin@localhost`. If SSH is properly configured, you will not be prompted for a password.

3) Copy the public key for user `tioadmin` to the servers that you need to log in to, using Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

4) It is required to configure SSH to accept connections from new hosts without prompting for confirmation. Create a file in `/home/thinkcontrol/.ssh` called `config`. The file should contain the following line:

   `StrictHostKeyChecking no`

5) Copy the `id_rsa.pub` file into the authorized keys file of the target server administrative account to the database server and any managed server running Cygwin. This file must be copied to any new servers brought under Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager's control.

Installing WebSphere Application Server

To install WebSphere Application Server and the fixes it requires, do the following:

1. Before installing WebSphere Application Server, check to see if port 9090 is being used by `websm`, by running the following command:

   `netstat -an | grep 9090`

   If there is a match, run the following command to disable `websm`:

   `/usr/websm/bin/wsmserver -disable`

2. While logged in as `root`, install WebSphere Application Server, 5.0, which is shipped with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. The WebSphere Application Server 5.0 installation does not support a graphical install on AIX 5.2. Therefore, you must start the install with files provided by fix pack 1, by doing the following:

   a. Download the following files from the WebSphere Application Server Support website, located at:

      `www.ibm.com/websphere`

      Click Support and search by filename to locate the document titled *Installing WebSphere 5.0.x on AIX 5.2*.
      - `PrereqChecker.xml` and
      - `PrereqChecker.dtd`

   b. Switch to the `/aix` directory and invoke the install with the following command:

      `./install -W osLevelCheckActionBean.configFilePath="/tmp/prereqChecker.xml"`

   c. When prompted, select a **Custom** install. Ensure **Embedded Messaging** is selected, but do not select **Samples**.

3. After installing WebSphere Application Server, 5.0 you must install Fix Pack 1, which is available on CD in the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager bundle. When installing Fix Pack 1, note the following:

   - The `JAVA_HOME` environment variable must be set before installing the Fix Pack. To set the environment variable, run `./setupCmdLine.sh` in the WebSphere Application Server `/bin` directory.
   - To install the Fix Pack, switch to the CD and run the `./updateWizard.sh` command.

4. Install the WebSphere Application Server Application Client, by doing the following:

   a. Switch to the WebSphere Application Server Application Client CD.

   b. Run the following command: `export DISPLAY=<IP_address>`, where *<IP_address>* represents the IP address of the machine from which you are running the installation.

   c. Begin the installation by running the following command: `./install` and follow the prompts.

      Note: The Application Client must be installed at the same level as WebSphere Application Server. For example, if WebSphere Application Server is installed in `/usr/WebSphere/AppServer`, then the Application Client must be installed in `/usr/WebSphere/AppClient`.

   d. Select a **Custom** install and when prompted, select the following features to install:

      - **J2EE and java thin application client**
      - **Embedded Messaging client**

5. After installing the WebSphere Application Server Application Client, add the following lines to the end of the `java.security` file in the `<WAS_AppClient_installdir>`/java/jre/lib/security/ directory.

   ```
   # Class to instantiate as the javax.security.auth.login.Configuration provider.
   #
   login.configuration.provider=com.ibm.security.auth.login.ConfigFile
   # Default login configuration file
   #
   login.config.url.1=file:/<WAS_AppClient_installdir>/properties/wsjaas_client.conf
   ```

   where *<WAS_AppClient_installdir>* is the installation path for the WebSphere Application Server Application Client. Ensure that the `login.config.url.1` setting has the correct path to `wsjaas_client.conf`.

6. Edit the `<WAS_AppClient_installdir>`/properties/sas.client.props file. Locate the line:

   ```
   com.ibm.CORBA.loginSource=prompt
   ```

   and change it to:

   ```
   com.ibm.CORBA.loginSource=none
   ```

7. Stop the WebSphere Application Server before proceeding to install the fixes in the steps below.

8. While logged on as `root`, install the MQ CSD03 patch, which consists of several individual fixes, located in the `/patches/csd03` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Read the `readme.CSD03.txt` file for instructions on untarring and installing the patches. Do *not* install the following packages:

   - MQ Samples
   - MQ Support for DCE

   Note: You can run the following command in a command line window to check whether or not the MQ CSD03 or higher is already installed. Switch to the `/mqm/bin` directory to run the command.

   ```
   mqver
   ```

   If the command shows that you have already had the MQ CSD03 or above installed on the server, you do not have to install the MQ CSD03

fix and you can proceed to step 9. If the command returns the following information, you already have MQ CSD03 installed:

```
Name:  WebSphere MQ
Version:  530.4  CSD03
....
....
```

9. Apply the following MQ Interim fixes provided in the `/patches` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD:

   a. To install the interim fix IY_43610, do the following:

      1) Switch to the `/patches/I_43610` directory.

      2) Uncompress the `tar` file. For example, you can use the command: `uncompress IY43610.aix.tar.Z`. Then untar the file with the command: `tar-xvf IY43610.aix.tar`.

      3) Follow the instructions in the `readme.iy43610.txt` file to install the fixes.

      4) When asked to copy the files, copy them to the `/usr/mqm/lib` directory.

   b. To install the interim fix IY44803, do the following:

      1) Switch to the `/patches/I_44803` directory.

      2) Uncompress the `tar` file. For example, you can use the command: `uncompress IY44803.aix.tar.Z`.

      3) Follow the instructions in the `readme.iy44803.txt` file to install the fixes. `InterimIY44803.aix.tar` should be untarred from the root directory, as it will replace the contents of `/usr/mqm/java` directory. You may wish to back up this directory before untarring the fix.

10. Apply the WebSphere Application Server PQ75055 fix, located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD in the `/patches/WAS_PQ75055` directory. To apply the fix, do the following:

    a. Create an `/update` directory under the WebSphere Application Server installation directory.

    b. Copy the `updateInstaller.zip` file and `apar_PQ75055.zip` file from the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD to the `/update` directory you created.

    c. Unzip the `updateInstaller.zip` and `apar_PQ75055.zip`.

    d. Start the update wizard by running `updateWizard.sh`.

    e. When prompted, select **Install fixes**.

    f. On the fix directory panel, ensure the directory path is `<WAS_installdir>`/update/. Wait for the fix jar file to be picked up, then select and install it.

11. If the WebSphere Application Server samples were not installed during the WebSphere Application Server installation, the JMS listener does not automatically start the first time. To start the JMS listener, do the following:

    a. Start the WebSphere Application Server.

    b. Open the WebSphere Application Server Administration console at: `http://<host_name>:9090/admin`.

    c. Select **Application Servers** > **Server1** > **Server Component**, and the click **JMS Servers**.

    d. Set the initial state to **Started**, and click **Apply**. Save the configuration changes. Click **OK** to exit.

12. Change WebSphere Application Server to run as `tioadmin`, allowing `tioadmin` to start, stop and configure WebSphere Application Server. Do the following:

    a. Ensure you are logged on as `root`.

b. Open the administrative console at http://<host_name>:9090/admin/to complete the following steps:

   1) Click **Servers** > **Application Servers** > *<server_name>* > **Process Definition** > **Process Execution**.

   2) Specify tioadmin for the **Run As User** property user ID to be used to start the application server. This user ID is referred to in later steps as the "run as" user ID.

   3) Save the configuration.

   4) Click **Servers** > **Application Servers** > *<server_name>* > **Runtime**. Note the values for **cell_name**, **node_name** and **server**.

c. Run the ./stopServer.sh server1 command to stop WebSphere Application Server

d. Change the permissions of the WebSphere Application Server root installation directory. Change the group owner to the mqbrkrs group. For example, you can run the command:

   chown -R tioadmin.mqbrkrs $WAS_HOME

e. Delete the default queue manager for the application server, by doing the following:

   1) Switch to the *<WAS_installdir>*/bin directory

   2) Using the values you noted in step 12b4, run the deletemq command:

      ./deletemq.sh <cell_name> <node_name> <server_name>

f. Switch to the /usr/mqm/bin directory and run the following command:

   chmod o+rx crtmqm dltmqm_nd endmqm strmqm endmqlsr runmqsc

g. Switch to the 'run as' user, tioadmin, to create the embedded messaging queue manager and broker for the application server by running the following command:

   ./createmq.sh /usr/WebSphere/AppServer <cell_name> <node_name> <server_name>

   where *<cell_name>*, *<node_name>*, and *<server_name>* are the values you noted in step 12b4

You can now start the Application Server using the "run as" user ID.

Note: Note that if you apply fixes to WAS in the future, the fix install will require you to run as root to apply the fixes. This may mean that certain files will have their ownership changed back to root. You will need to change the ownership back to tioadmin. using the command:

chown –R tioadmin.mqbrkrs *

in the /usr/WebSphere/AppServer directory to change the ownership of all files in all subdirectories.

Installing the DB2 Universal Database and IBM Directory Server Client Applications

You will need to install the DB2 Universal Database client and the IBM Directory Server client on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server, so that it can communicate with the remote database and directory server machines. Do the following:

1. Install the DB2 database client from the DB2 Administration Client CD. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator.

After installing the database client, you must configure the client to communicate with the database server. If you have not yet installed the database server, return to this step after installing the database server.

Note: The following instructions are provided as guidance only. Refer the DB2 Universal Database v8.1 documentation for complete details on the commands in the steps below.

To configure a DB2 client to communicate with the database server, do the following:

a. If you have not already done so, log on as `tioadmin` to the server with the database client installed.

b. Open a DB2 command line processor and enter the following commands:

```
catalog tcpip node <db_node> remote <dbserver_hostname> server 50000
catalog db <db_name> as <db_alias> at node <db_node>
```

where the variables are defined as follows:

db_node
A local alias for the node to be cataloged. This is an arbitrary name on the client machine, used to identify the node. It should be a meaningful name to make it easier to remember. The name must conform to database manager naming conventions.

dbserver_hostname
The host name of the node where the target database resides. The host name is the name of the node that is known to the TCP/IP network. Maximum length is 255 characters.

db_name
Specifies the name of the database to catalog. This is the name of the database you created in step 6 on page 28.

db_alias
Specifies an alias as an alternate name for the database being cataloged. If an alias is not specified, the database manager uses db_name as the alias. Record the value used, as you will be prompted for it during Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager installation.

c. Add `tiodb` to the group for the DB2 user ID you specified during the DB2 installation. By default, that group is db2grp1.

d. Edit the `.profile` file in the home directory of both the `root` and `tioadmin` user, to add the following lines:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
. /home/db2inst1/sqllib/db2profile
fi
```

e. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqllib/java:$LD_LIBRARY_PATH
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi
```

2. Install and configure the IBM Directory Server 5.1 client, according to the documentation provided by IBM Directory Server 5.1.

The next step

After installing and configuring all the prerequisite software listed above, do the following:

1. If you have not yet done so, review the README file and install any additional fixes mentioned in the README file. For more information about the read me file, refer to "Reviewing the README file" on page 8.
2. Depending on which product you are installing, proceed to one of the following chapters:
   - Chapter 8, "Installing Tivoli Intelligent Orchestrator," on page 69, or
   - Chapter 9, "Installing Tivoli Provisioning Manager," on page 73.

Chapter 6. Linux Pre-Installation Requirements

This chapter provides details about the prerequisite software that must be installed and configured prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on Linux Intel in a two tier configuration as described in "Supported Configurations" on page 8. The steps below will document the pre-installation requirements for the following configuration:

- **Database server**: user accounts, database server, directory server
- **Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server**: user accounts, WebSphere Application Server, database and LDAP clients

Notes:

1. The instructions provided below are intended to be used as guidance only. It is recommended that you refer to the documentation for each prerequisite product or fix for complete installation, configuration and usage information.

2. There are additional prerequisites for servers managed by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to "Managed Server Software Prerequisites" on page 7 for details.

Installing and Configuring Database Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met.

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Create a user account `tioadmin` as part of the group `tioadmin`, which is required to install and run Tivoli Intelligent Orchestrator.

2. In the `/etc/passwd` file, set the HOME variable to be `/home/thinkcontrol` for user `tioadmin`.

3. While logged in as `root`, create two groups called **mqm** and **mqbrkrs**, using the `groupadd` command.

4. Create a user `mqm` in group `mqm`, using the following command: `adduser -g mqm mqm`

5. Add `root`, `mqm` and `tioadmin` to both groups by doing the following:

   a. Open the `/etc/group` file in an editor.

   b. Scroll down to locate the mqm and mqbrkrs entries in the file.

   c. Add `mqm`, `root` and `tioadmin` to end of each line. For example, after adding these users, the lines should look similar to the following:

      `mqm:x:501:root,tioadmin,mqm`

6. While logged in as root, create the directory `/usr/local/jakarta-avalon-phoenix`. Then change ownership to user and group `tioadmin`, using the following commands:

   `chown tioadmin.tioadmin /usr/local/jakarta-avalon-phoenix`

7. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. Expect

is not installed by default for Red Hat Advance Server 2.1. It can be installed through the package installer or downloaded from www.redhat.com.

8. You must install the Tivoli GUID package located in the \tools\Tivoli-guid\Linux directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. To install Tivoli GUID, run the following command: `rpm -Uvh <package_name>`.

9. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 10 provides instructions on installing and configuring the required version of SSH.

10. SSH must be installed and configured. It may be installed by default on RedHat Advanced Server. After ensuring it is installed, do the following:

    a. As user `tioadmin`, configure SSH so that the server can communicate with relevant users on other systems and components of the data center.

       Attention: Ensure that you are logged on to user ID `tioadmin` directly. Do not `su -` to `tioadmin` or the following steps will fail to run correctly.

       1) Run the following commands:
          ```
          ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
          cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
          ```

       2) You can test this by running: `ssh -v tioadmin@<localhost>`, where <localhost> is your host name. If SSH is properly configured, you will not be prompted for a password.

       3) It is required to configure SSH to accept connections from new hosts without prompting for confirmation. Create a file in `/home/thinkcontrol/.ssh` called `config`. The file should contain the following line:
          ```
          StrictHostKeyChecking no
          ```

    b. Add the SSH path into `tioadmin` `.profile` file, by adding the following line:
       ```
       export PATH=/usr/bin:$PATH
       ```

    c. Copy the `id_rsa.pub` file into the authorized keys file of the target server administrative account to the database server and any managed server running Cygwin. This file must be copied to any new server brought under Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager's control.

Installing DB2 Universal Database

Install DB2 Universal Database, Workgroup Unlimited Edition V8.1.2. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator. Refer to the DB2 installation documentation for information on installing DB2.

1. During installation:
   - Select to create an instance. If you do not create an instance during installation, you will need to manually create an instance after installation.
   - When prompted to enter a user ID and password, enter user ID `tiodb` and select a password. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

Note: It is strongly recommended that you review the log file size settings for your database and increase the log file sizes if necessary. Refer to the documentation for your database product for instructions on setting log file sizes.

2. To update your DB2 product license key on Linux, use the following command:

```
/opt/IBM/db2/V8.1/adm/db2licm -a <filename>
```

where *<filename>* is the full path and file name for the license file. For example, if the CD-ROM is mounted as /mnt1, the filename will be mnt1/db2wsue/db2/license/db2wsue.lic. You should receive the following message:

```
DBI1402I License added successfully.
DBI1426I This product is now licensed for use as specified in
the License Acceptance and License Information
documents pertaining to the licensed copy of this
product.  USE OF THE PRODUCT CONSTITUTES ACCEPTANCE OF
THE TERMS OF THE IBM LICENSE ACCEPTANCE AND LICENSE
INFORMATION DOCUMENTS, LOCATED IN THE FOLLOWING
DIRECTORY: "<DB2_installdir>\SQLLIB\license\en"
```

3. Add `tiodb` to the group for the DB2 user ID you specified during the DB2 installation. By default, that group is db2grp1.

4. Edit the `.profile` file in the home directory of both the `root` and `tioadmin` user, to add the following lines:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
. /home/db2inst1/sqllib/db2profile
fi
```

5. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqllib/java:$LD_LIBRARY_PATH
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi
```

6. Create the database for Tivoli Intelligent Orchestrator by entering the following commands:

```
su - tiodb
db2 create database <db_name>
```

where *<db_name>* is the name of the database you wish to create. Record the name of the database, as you will require it in step 1b on page 49.

7. Create the tablespace for the database by doing the following:

   a. Ensure you are logged in as `tiodb`.

   b. Connect to the newly created database by issuing the following command:

   ```
   db2 conect to <db_name> user tiodb using <tiodb_pwd>
   ```

   where *<db_name>* is the name of the database you created in step 6, and *<tiodb_pwd>* is the password for user ID `tiodb`.

   c. Use the `tablespace.sql` script located in the `/samples` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Run the command:

   ```
    db2 -tvf tablespace.sql
   ```

8. In a later step, you will configure the DB2 client application on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server to communicate with the database server. The steps outlined in step 1 on page 49

Installing and Configuring IBM Directory Server, 5.1

IBM Directory Server, 5.1 may be installed on the database server or on a separate server, as described in "Supported Configurations" on page 8. Perform the following steps either on the database server or on a dedicated IBM Directory Server machine.

Tivoli Intelligent Orchestrator must be installed in a homogeneous operating environment, with the exception of the directory server. If the directory server is installed on a separate server from Tivoli Intelligent Orchestrator and its other prerequisite software, then the directory server can be an a heterogeneous platform.

Attention: You must install and configure the IBM Directory Server 5.1 prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. The following instructions are provided as guidance only. Refer the IBM Directory Server 5.1 documentation for complete details on installing and configuring the directory server for your customized environment. IBM Directory Server documentation is available at the following URL:

`http://publib.boulder.ibm.com/tividd/td/IBMDirectoryServer5.1.html`

If you are installing IBM Directory Server on the same machine as DB2 Universal Database, Workgroup Unlimited Edition 8.1 you do not need to install the version of DB2 which is part of the IBM Directory Server installation, since you have already installed the version of DB2 which is supported by and bundled with Tivoli Intelligent Orchestrator. If you are installing IBM Directory Server on a dedicated server, which is not the DB2 server, ensure the DB2 option is selected. IBM Directory Server requires a local database be installed.

Before installing IBM Directory server, the package `nss_ldap` which comes with Linux Advanced Server 2.1 must be uninstalled from RPM.

Before you configure install IBM Directory Server, you must create a user ID for the user who will own the database used by the Directory Server. The user ID you specify will own the database instance where the DB2 database will exist, and the DB2 instance will be in the user's home directory. The user ID can be no longer than 8 characters. In addition:

- The user's Primary group can be any general group (such as `other`, `dbsysadm`, or `db2iadm`). There might be some groups that do not work correctly as the user's primary group when configuring the database. For example, if the user's primary group on Linux is `users`, problems might occur. Use `other` if you want to be sure that the Primary group will work.
- The user `root` must be a member of the user's primary group. If `root` is not a member of this group, add `root` as a member of the group.
- For best results, the user's login shell should be the Korn shell script (/usr/bin/ksh). If this has not already been installed as part of the operating system, refer to the RedHat Linux documentation to install the Korn shell.
- The user's password must be set correctly and ready to use. For example, the password cannot be expired or waiting for a first-time validation of any kind. (The best way to verify that the password is correctly set is to telnet to the same computer and successfully log in with that user ID and password.)
- The user must have a home directory and must be the owner of the home directory.
- The group ownership of the user's home directory must be the user's primary group.

- When configuring the database, it is not necessary, but only customary, to specify the home directory of the user ID as the database location. However, if you specify some other location, the user's home directory still must have 3 to 4 MB of space available. This is because DB2 creates links and adds files into the home directory of the instance owner (that is, the User) even though the database itself is elsewhere.

After installation, go to the `/usr/bin` directory and issue the command `./ldapxcfg` to open the **Configuration Manager**. Do the following to configure IBM Directory Server 5.1 for use with Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager:

1. After installation, copy the `thinkdynamics.schema` file from the `/samples` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD onto your hard drive.
2. In Configuration Manager, click **Administrator DN/password** and set the Administrator/DN to `cn=tioldap` and the default password `tioldap`. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.
3. Click **Configure database** and follow the prompts to create a new database.
4. Click **Manage suffixes** and set the **Suffix DN** to the appropriate values for your environment.
5. Click **Manage Schema files** and do the following:
   a. Browse to the `thinkdynamics.schema` file you copied to your hard drive in step 1.
   b. Click **Add**, and then **OK**.
6. Click **Import ldif data** and do the following:
   a. Browse to the `\samples` directory on the Tivoli Intelligent Orchestrator CD and add the `ldap.ldif` file.
   b. Click the **Standard import** radio button and then click **Import**.
   c. Watch for all entries to be added successfully.
7. Exit the **Configuration Manager** tool.
8. Perform additional IBM Directory Server configuration by doing the following:
   a. Open a command line and start the WAS server by running the following command:

      `<Install_dir>\ldap\Appsrv\bin\startserver.sh server1`
   b. Open the IBM Directory Server Web console using the following URL:

      `http://localhost:9080/IDSWebApp/IDSjsp/Login.jsp`

      Login with the user name `superadmin` and password `secret`, then click **Login**.
   c. Click **Create a node** and enter the host name of the directory server machine.
   d. Set the user name as specified in step 2.
   e. Open a command line and start the directory server by running the following command:

      `<Install_dir>/ldap/bin/ibmslapd`
   f. Log out of the Web console and log in as your new node, which is your host name.

g. Verify that you can see all of the users that are in the `ldif` file. Expand **Directory management** and select **Manage entries.** Select **dc=ibm,dc=com** and click **Expand**.

h. By default, user passwords stored in IBM Directory Server are in clear-text format, which may represent a security concern. To enable password encryption for new users created by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager in IBM Directory Server, do the following in the Web console:

1) Start the LDAP service, by selecting **Server administration** > **Start/stop/restart server**.

2) 3. After the service is started successfully, configure the security policy by navigating to **Server administration** > **Manage security properties**.

3) Select **Password policy** on the right panel. Do the following:

   a) From the **Password encryption** drop-down, select **SHA**

   b) Enable the **Password policy enabled** check box.

   c) Click **OK**.

4) Restart the LDAP service, as described in step 8h1, for the changes to take effect.

Installing and Configuring Tivoli Intelligent Orchestrator Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met. The steps below are divided into the following sections:

1. "Installing the Utility Prerequisites"
2. "Installing WebSphere Application Server" on page 45
3. "Installing the DB2 Universal Database and IBM Directory Server Client Applications" on page 49

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Create a user account `tioadmin` as part of the group `tioadmin`, which is required to install and run Tivoli Intelligent Orchestrator.

2. In the `/etc/passwd` file, set the `HOME` variable to be `/home/thinkcontrol` for user `tioadmin`.

3. While logged in as `root`, create two groups called **mqm** and **mqbrkrs**, using the `groupadd` command.

4. Create a user `mqm` in group `mqm`, using the following command: `adduser -g mqm mqm`

5. Add `root`, `mqm` and `tioadmin` to both groups by doing the following:

   a. Open the `/etc/group` file in an editor.

   b. Scroll down to locate the mqm and mqbrkrs entries in the file.

   c. Add `mqm`, `root` and `tioadmin` to end of each line. For example, after adding these users, the line should look similar to the following:

   `mqm:x:501:root,tioadmin,mqm`

6. While logged in as root, create the directory `/usr/local/jakarta-avalon-phoenix`. Then change ownership to user and group `tioadmin`, using the following commands:

```
chown tioadmin.tioadmin /usr/local/jakarta-avalon-phoenix
```

7. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. Expect is not installed by default for Red Hat Advance Server 2.1. It can be installed through the package installer or downloaded from `www.redhat.com`.

8. You must install the Tivoli GUID package located in the `\tools\Tivoli-guid\Linux` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. To install Tivoli GUID, run the following command: `rpm -Uvh <package_name>`.

9. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 10 provides instructions on installing and configuring the required version of SSH.

10. SSH must be installed and configured. It may be installed by default on RedHat Advanced Server. After ensuring it is installed, do the following:

    a. As user `tioadmin`, configure SSH so that the server can communicate with relevant users on other systems and components of the data center.

       Attention: Ensure that you are logged on to user ID `tioadmin` directly. Do not `su -` to `tioadmin` or the following steps will fail to run correctly.

       1) Run the following commands:
          ```
          ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
          cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
          ```

       2) You can test this by running: `ssh -v tioadmin@localhost`. If SSH is properly configured, you will not be prompted for a password.

       3) It is required to configure SSH to accept connections from new hosts without prompting for confirmation. Create a file in `/home/thinkcontrol/.ssh` called `config`. The file should contain the following line:
          ```
          StrictHostKeyChecking no
          ```

    b. Add the SSH path into `tioadmin` `.profile` file, by adding the following line:
       ```
       export PATH=/usr/bin:$PATH
       ```

    c. Copy the `id_rsa.pub` file into the authorized keys file of the target server administrative account to the database server and any managed server running Cygwin. This file must be copied to any new server brought under Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager's control.

Installing WebSphere Application Server

To install WebSphere Application Server and the fixes it requires, do the following:

1. While logged in as `root`, install WebSphere Application Server, 5.0, which is shipped with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. For installation instructions, refer to the WebSphere Application Server documentation located at:

   `http://www-3.ibm.com/software/webservers/appserv/was/library/`

   Select a **Custom** install and deselect the **Samples**. When you select an installation path, ensure there are no spaces in that path. Before you start WebSphere Application Server for the first time, you must complete 10 on page 47.

2. After installing WebSphere Application Server, 5.0 you must install Fix Pack 1, which is shipped on a CD packaged with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Install Fix Pack 1 according to the directions in the `readme` file. Ensure you install the Embedded Messaging component.

   The `JAVA_HOME` variable must be set before installing the fix pack. If you encounter problems running the `<WAS_installdir>`/bin/setupCmdLine.sh command as documented in the Fix Pack readme file, you can set the environment variable by running the following command:

   `export JAVA_HOME=/<WAS_installdir>/java`

3. Install the WebSphere Application Server Application Client, by doing the following:

   a. Switch to the `/linux` on the WebSphere Application Server Application Client CD.

   b. Begin the installation by running the following command: `./install` and follow the prompts.

      Note: The Application Client must be installed at the same level as WebSphere Application Server. For example, if WebSphere Application Server is installed in `/usr/WebSphere/AppServer`, then the Application Client must be installed in `/usr/WebSphere/AppClient`.

   c. Select a **Custom** install and when prompted, select the following features to install:
      - J2EE and java thin application client
        - Embedded Messaging client

4. After installing the WebSphere Application Server Application Client, add the following lines to the end of the `java.security` file in the `<WAS_AppClient_installdir>`/java/jre/lib/security/ directory.

   ```
   # Class to instantiate as the javax.security.auth.login.Configuration provider.
   #
   login.configuration.provider=com.ibm.security.auth.login.ConfigFile
   # Default login configuration file
   #
   login.config.url.1=file:<WAS_AppClient_installdir>/properties/wsjaas_client.conf
   ```

   where *<WAS_AppClient_installdir>* is the installation path for the WebSphere Application Server Application Client. Ensure that the `login.config.url.1` setting has the correct path to `wsjaas_client.conf`.

5. Edit the `<WAS_AppClient_installdir>`/properties/sas.client.props file. Locate the line:

   `com.ibm.CORBA.loginSource=prompt`

   and change it to:

   `com.ibm.CORBA.loginSource=none`

6. Stop the WebSphere Application Server before proceeding to install the fixes in the steps below.

7. While logged on as `root`, use the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD to install the MQ CSD03 patch, which consists of several individual fixes, located in the `patches\Csd03` directory. Install each package with the following command:

   `rpm -Uvh <file_name>`

   You will need to install the Runtime package first, because it is a prerequisite of other packages. Do not install the **Samples** patch in MQ CSD03.

> **Note:** You can run the following command from a command line window to check whether or not the MQ CSD03 or higher is already installed.
>
> ```
> cd /opt/mqm/bin
> mqver
> ```
>
> If the command shows that you have already had the MQ CSD03 or above installed on the server, you do not have to install the MQ CSD03 fix and you can proceed to step 9 on page 35. If the command returns the following information, you already have MQ CSD03 installed:
>
> ```
> Name:  WebSphere MQ
> Version:  530.4  CSD03
> ....
> ....
> ```

8. From the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD, apply the following MQ Interim fixes provided in the /patches directory:

   a. To install the interim fix IY_43610, do the following:

      1) Switch to the /patches/I_43610 directory.

      2) Uncompress the tar file. For example, you can use the command: `gunzip IY43610.linux.intel.tar.gz`. and then untar the file with the command:

         `tar-xvf IY43610.linux.intel.tar`

      3) Follow the instructions in the readme.iy43610.txt file to install the fixes.

      4) When asked to copy the files, copy them to the /opt/mqm/lib directory.

   b. To install the interim fix IY44803, do the following:

      1) Switch to the /patches/I_44803 directory.

      2) Uncompress the `InterimIY44803.linux.intel.tar` file. For example, you can use the command: `gunzip IY44803.linux.intel.tar.Z`.

      3) Follow the instructions in the readme.iy44803.txt file to install the fixes. `InterimIY44803.aix.tar` should be untarred from the root directory, as it will replace the contents of /opt/mqm/java directory. You may wish to back up this directory before untarring the fix.

9. Apply the WebSphere Application Server PQ75055 fix, located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD in the /patches/WAS_PQ75055 directory. To apply the fix, do the following:

   a. Create an /update directory under the WebSphere Application Server installation directory.

   b. Copy the `updateInstaller.zip` file and `apar_PQ75055.zip` file from the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD to the /update directory you created.

   c. Unzip the `updateInstaller.zip` and `apar_PQ75055.zip`.

   d. Start the update wizard by running `updateWizard.sh`.

   e. When prompted, select **Install fixes**.

   f. On the fix directory panel, ensure the directory path is *<WAS_installdir>*\update\efixes\... Wait for the fix jar file to be picked up, then select and install it.

10. If the WebSphere Application Server samples were not installed during the WebSphere Application Server installation, the JMS listener does not automatically start the first time. To start the JMS listener, do the following:

    a. Start the WebSphere Application Server.

    b. Open the WebSphere Application Server Administration console at:
`http://<host_name>:9090/admin`.

    c. Select **Application Servers** > **Server1** > **Server Component**, and the click **JMS Servers**.

    d. Set the initial state to **Started**, and click **Apply**. Save the configuration changes. Click **OK** to exit.

11. Change WebSphere Application Server to run as `tioadmin`, allowing `tioadmin` to start, stop and configure WebSphere Application Server. Do the following:

    a. Ensure you are logged on as `root`.

    b. Open the administrative console at `http://<host_name>:9090/admin/`to complete the following steps:

       1) Click **Servers** > **Application Servers** > *<server_name>* > **Process Definition** > **Process Execution**.

       2) Specify `tioadmin` for the **Run As User** property user ID to be used to start the application server. This user ID is referred to in later steps as the "run as" user ID.

       3) Save the configuration.

       4) Click **Servers** > **Application Servers** > *<server_name>* > **Runtime**. Note the values for **cell_name**, **node_name** and **server**.

    c. Run the `./stopServer.sh server1` command to stop WebSphere Application Server

    d. Change the permissions of the WebSphere Application Server root installation directory. Change the group owner to the `mqbrkrs` group. For example, you can run the command:

`chown -R tioadmin.mqbrkrs $WAS_HOME`

    e. Delete the default queue manager for the application server, by doing the following:

       1) Switch to the `<WAS_installdir>/bin` directory

       2) Using the values you noted in step 11b4, run the `deletemq` command:

`./deletemq.sh <cell_name> <node_name> <server_name>`

    f. Switch to the `/opt/mqm/bin` directory and run the following command:

`chmod o+rx crtmqm dltmqm endmqm strmqm endmqlsr runmqsc`

    g. Switch to the 'run as' user, `tioadmin`, to create the embedded messaging queue manager and broker for the application server by running the following command from the `/opt/WebSphere/AppServer/bin` directory:

`./createmq.sh /opt/WebSphere/AppServer <cell_name> <node_name> <server_name>`

where *<cell_name>*, *<node_name>*, and *<server_name>* are the values you noted in step 11b4.

You can now start the Application Server using the "run as" user ID.

Note: Note that if you apply fixes to WAS in the future, the fix install will require you to run as root to apply the fixes. This may mean that certain files will have their ownership changed back to root. You will need to change the ownership back to `tioadmin`. using the command:

`chown –R tioadmin.mqbrkrs *`

in the `/opt/WebSphere/AppServer` directory to change the ownership of all files in all subdirectories.

12. Reboot the server for the file ownership changes to take effect.

13. In RedHat Linux Advanced Server 2.1, the default hard limit for the number of open files is 1024. This may be inadequate for WAS, as it requires an upper limit of 32000 open files. To resolve this issue so that a non-root user such as `tioadmin` can change the value for the maximum number of open files up to a hard limit, you need to append the following two lines to `/etc/security/limits.conf`:

```
 *              soft    nofile          1024
 *              hard    nofile          32000
```

The server must then be rebooted to have these changes take effect.

Installing the DB2 Universal Database and IBM Directory Server Client Applications

You will need to install the DB2 Universal Database client and the IBM Directory Server client on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server, so that it can communicate with the remote database and directory server machines. Do the following:

1. Install the DB2 database client. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator.

   After installing the database client, you must configure the client to communicate with the database server. If you have not yet installed the database server, return to this step after installing the database server.

   Note: The following instructions are provided as guidance only. Refer the DB2 Universal Database v8.1 documentation for complete details on the commands in the steps below.

   To configure a DB2 client to communicate with the database server, do the following:

   a. If you have not already done so, log on as `tioadmin` to the server with the database client installed.

   b. Open a DB2 command line processor and enter the following commands:

   ```
   catalog tcpip node <db_node> remote <dbserver_hostname> server 50000
   catalog db <db_name> as <db_alias> at node <db_node>
   ```

   where the variables are defined as follows:

   db_node
   > A local alias for the node to be cataloged. This is an arbitrary name on the client machine, used to identify the node. It should be a meaningful name to make it easier to remember. The name must conform to database manager naming conventions.

   dbserver_hostname
   > The host name of the node where the target database resides. The host name is the name of the node that is known to the TCP/IP network. Maximum length is 255 characters.

   db_name
   > Specifies the name of the database to catalog. This is the name of the database you created in step 6 on page 41.

   db_alias
   > Specifies an alias as an alternate name for the database being cataloged. If an alias is not specified, the database manager uses

db_name as the alias. Record the value used, as you will be
prompted for it during Tivoli Intelligent Orchestrator and Tivoli
Provisioning Manager installation.

  c. Edit the .profile file in the home directory of both the root and tioadmin
user, to add the following lines:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
. /home/db2inst1/sqllib/db2profile
fi
```

  d. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqllib/java:$LD_LIBRARY_PATH
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi
```

2. Install and configure the IBM Directory Server 5.1 client, according to the
documentation provided by IBM Directory Server 5.1.

The next step

After installing and configuring all the prerequisite software listed above, do the
following:

1. If you have not yet done so, review the README file and install any additional
fixes mentioned in the README file. For more information about the read me
file, refer to "Reviewing the README file" on page 8.

2. Depending on which product you are installing, proceed to one of the
following chapters:

- Chapter 8, "Installing Tivoli Intelligent Orchestrator," on page 69, or
- Chapter 9, "Installing Tivoli Provisioning Manager," on page 73.

Chapter 7. Solaris Pre-Installation Requirements

This chapter provides details about the prerequisite software that must be installed and configured prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on Solaris in a two tier configuration as described in "Supported Configurations" on page 8. The steps below will document the pre-installation requirements for the following configuration:

- **Database server**: user accounts, database requirements, directory server requirements
- **Tivoli Intelligent Orchestrator server**: user accounts, database client, WebSphere Application Server

Notes:

1. The instructions provided below are intended to be used as guidance only. It is recommended that you refer to the documentation for each prerequisite product or fix for complete installation, configuration and usage information.
2. There are additional prerequisites for servers managed by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to "Managed Server Software Prerequisites" on page 7 for details.

Installing and Configuring Database Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met.

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Ensure you have applied the required operating system patches, as documented in "Supported Software on Managing Servers" on page 5.
2. By default on Solaris, /home is under the control of `automountd`. When preparing to install Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on Solaris, to allow creation of the `tioadmin` home directory, do the following:

   a. Run the following commands:

      ```
      TERM=vt100
      export TERM
      ```

   b. Edit the `/etc/auto_master` file and comment out the `/home` line and save the file.

   c. Run the following commands:

      ```
      cd /etc/init.d
      ./autofs stop
      ./autofs start
      ```

3. Create a user account `tioadmin` as part of the group `tioadmin`, which is required to install and run Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.
4. Set the `HOME` variable for user `tioadmin` to be `/home/thinkcontrol` and set the log in shell to `/bin/bash`. If the bash shell is not part of the Solaris 8 OE installation, the latest bash package can be downloaded from `www.sunfreeware.com` and installed.

5. As user `root`, install Expect 5.3 or higher to the `/usr/bin` directory instead of the default `/usr/local/bin` directory. Alternatively, you can create a symbolic link for Expect to the `/usr/bin` directory.

   Expect is required for all environments and is available at:

   `http://www.ibm.com/servers/aix/products/aixos/linux/download.html`

   Expect also requires that you download and install the packages `tcl`, `tk`, and `libgcc` from the same site. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

6. While logged in as root, download the latest GNU tar package from `www.sunfreeware.com` and install it. The latest downloadable GNU tar version as of this writing is 1.13.19.

   Note:

   Ensure that GNU tar exists in `tioadmin`'s PATH (`/usr/local/bin`), preceding any other tar utilities in `/usr/bin`.

7. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 8 provides instructions on installing and configuring the required version of SSH.

8. OpenSSH version 3.4 or higher must be installed and configured. Do the following:

   a. Ensure you have installed the following:
      - The Solaris operating system patch 112438–02, as described in "Supported Software" on page 5.
      - The latest `libgcc` package as described in step 5.
      - Install the latest **OpenSSL** and **OpenSSH** packages, which can be found at the following URL:

        `http://www.sunfreeware.com`

   b. To configure `sshd`, do the following:

      1) Create the sshd user by typing the following commands:
         ```
         mkdir /var/empty
         chown root:sys /var/empty
         chmod 755 /var/empty
         groupadd sshd
         useradd -g sshd -c 'sshd privsep' -d /var/empty -s /bin/false sshd
         ```
      2) Create the host keys by doing the following:
         a) Add `/usr/local/bin` to PATH for user `root` and activate the new PATH.
         b) Run the following commands:
            ```
            ssh-keygen -t rsa1 -f /usr/local/etc/ssh_host_key -N ""
            ssh-keygen -t dsa -f /usr/local/etc/ssh_host_dsa_key -N ""
            ssh-keygen -t rsa -f /usr/local/etc/ssh_host_rsa_key -N ""
            ```
         c) Disable password authentication by appending the line:
            ```
            PasswordAuthentication  no
            ```

            to the file `/usr/local/etc/sshd_config`.
         d) Create a script to start and stop the sshd daemon. Create a file `/etc/init.d/sshd` with the following contents:

> **Note:** Some text may appear on separate lines for presentation
> purposes only.

```
#!/bin/sh
pid='/usr/bin/ps -e | /usr/bin/grep sshd | /usr/bin/sed -e
    's/∧ *//' -e 's/ .*//''
case $1 in
'start')
 /usr/local/sbin/sshd
 ;;
'stop')
 if [ "${pid}" != "" ]
 then
  /usr/bin/kill ${pid}
 fi
 ;;
*)
 echo "usage: /etc/init.d/sshd {start|stop}"
 ;;
esac
```

   e) Set the ownership and permissions for /etc/init.d/sshd using the
      following commands:

```
chown root:sys /etc/init.d/sshd
chmod 555 /etc/init.d/sshd
ln -s ../init.d/sshd /etc/rc2.d/S98sshd
ln –s ../init.d/sshd /etc/rc1.d/K28sshd
```

c. Start the ssh daemon by running the command: /etc/rc2.d/S98sshd start

d. As user tioadmin, configure SSH so that the server can communicate with
relevant users on other systems and components of the data center.

Attention: Ensure that you are logged on to user ID tioadmin directly. Do
not su - to tioadmin or the following steps will fail to run correctly.

Do the following:

1) Run the following commands:

```
ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
echo "StrictHostKeyChecking  no" >> $HOME/.ssh/config
```

2) Append the $HOME/.ssh/id_rsa.pub file to the
<HOME_dir>/.ssh/authorized_keys file of the user whose system you
wish to access through ssh. For example, you can append the
$HOME/.ssh/id_rsa.pub file to the authorized_keys file of the tioadmin
user on the database server, and access it by issuing the following
command:

```
$ /usr/local/bin/ssh tioadmin@<db_server> ls -la
```

where <db_server> is the host name of the database server you are
connecting with. You should see the content of home directory listed for
the local user tioadmin on the database server.

3) You can test this by running: ssh -v tioadmin@<localhost>, where
<localhost> is your host name. If SSH is properly configured, you will
not be prompted for a password.

4) Copy the public key for user tioadmin to the servers that you need to
log in to, using Tivoli Intelligent Orchestrator or Tivoli Provisioning
Manager.

Installing DB2 Universal Database

Install DB2 Universal Database, Workgroup Unlimited Edition V8.1.2. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Refer to the DB2 installation documentation for information on installing DB2.

> **Important**
>
> You must modify the kernel configuration parameters before installing DB2. Refer to the *Modifying Kernel Parameters* topic in the DB2 product documentation for complete details. The recommended kernel parameters will vary depending on your system configuration.

1. During installation:
   - Select to create an instance. If you do not create an instance during installation, you will need to manually create an instance after installation.
   - When prompted to enter a user ID and password, enter user ID `tiodb` and select a password. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.

   Note: It is strongly recommended that you review the log file size settings for your database and increase the log file sizes if necessary. Refer to the DB2 documentation for instructions on setting log file sizes.

2. Disable the automounter by executing the commands below, while logged in as user `root`:

   ```
   /etc/init.d/autofs stop
   mv /etc/rc2.d/S74autofs /etc/rc2.d/_S74autofs
   ```

   Your system may use a different file or link name. Substitute that information instead.

3. After installing DB2, and with the DB2 CD still in the drive, switch to the `<DB2_installdir>`/SQLLIB directory and run the following command:

   ```
   db2licm -a <drive>/license/db2wsue.lic
   ```

   where *<drive>* is the CD drive mount point. You should receive the following message:

   ```
   DBI1402I License added successfully.
   DBI1426I This product is now licensed for use as specified in
   the License Acceptance and License Information
   documents pertaining to the licensed copy of this
   product.  USE OF THE PRODUCT CONSTITUTES ACCEPTANCE OF
   THE TERMS OF THE IBM LICENSE ACCEPTANCE AND LICENSE
   INFORMATION DOCUMENTS, LOCATED IN THE FOLLOWING
   DIRECTORY: "<DB2_installdir>/SQLLIB/license/en"
   ```

4. Add `tiodb` to the group for the DB2 user ID you specified during the DB2 installation. By default, that group is db2grp1.

5. Edit the `.profile` file in the home directory of both the `root` and `tioadmin` user, to add the following lines:

   ```
   if [ -f /home/tiodb/sqllib/db2profile ]; then
   . /home/tiodb/sqllib/db2profile
   fi
   ```

6. Add the following lines to /home/thinkcontrol/.profile

```
export LD_LIBRARY_PATH=~tiodb/sqllib/lib:$LD_LIBRARY_PATH
export PATH=/usr/local/bin:$PATH
ulimit -n 32000
```

> **Note:** Since user `tioadmin` uses the bash shell as the login shell, which is fine for a line-mode login (for example, via telnet), logins via a window manager such as CDE may not create a complete login environment, which is required for Tivoli Intelligent Orchestrator to function properly. This can be resolved by moving the entire contents of the `.profile` file to the `.bashrc` file, and recreating the `.profile` file with only one line in it:
>
> ```
> [ -f $HOME/.bashrc ] && . $HOME/.bashr
> ```
>
> Ensure there is a space between `"."` and `$HOME/.$bashrc`.

7. Create the database for Tivoli Intelligent Orchestrator by entering the following commands:

   ```
   su - tiodb
   db2 create database <db_name>
   ```

   where *<db_name>* is the name of the database you wish to create. Record the name of the database, as you will require it in step 1b on page 64.

8. Create the tablespace for the database by doing the following:

   a. Ensure you are logged in as `tiodb`.

   b. Connect to the newly created database by issuing the following command:

      ```
      db2 conect to <db_name> user tiodb using <tiodb_pwd>
      ```

      where *<db_name>* is the name of the database you created in step 7, and *<tiodb_pwd>* is the password for user ID `tiodb`.

   c. Use the `tablespace.sql` script located in the `samples` directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Run the command:

      ```
      db2 -tvf tablespace.sql
      ```

9. You must configure the DB2 client application on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server to communicate with the database server. Perform the steps outlined in step 1 on page 64.

Installing and Configuring IBM Directory Server, 5.1

IBM Directory Server, 5.1 may be installed on the database server or on a separate server, as described in "Supported Configurations" on page 8. Perform the following steps either on the database server or on a dedicated IBM Directory Server machine.

Tivoli Intelligent Orchestrator must be installed in a homogeneous operating environment, with the exception of the directory server. If the directory server is installed on a separate server from Tivoli Intelligent Orchestrator and its other prerequisite software, then the directory server can be an a heterogeneous platform.

Attention: You must install and configure the IBM Directory Server 5.1 prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. The following instructions are provided as guidance only. Refer the IBM Directory Server 5.1 documentation for complete details on installing and configuring the directory server for your customized environment. IBM Directory Server documentation is available at the following URL:

`http://publib.boulder.ibm.com/tividd/td/IBMDirectoryServer5.1.html`

If you are installing IBM Directory Server on the same machine as DB2 Universal Database, Workgroup Unlimited Edition 8.1 you do not need to install the version of DB2 which is part of the IBM Directory Server installation, since you have already installed the version of DB2 which is supported by and bundled with Tivoli Intelligent Orchestrator. If you are installing IBM Directory Server on a dedicated server, which is not the DB2 server, ensure the DB2 option is selected. IBM Directory Server requires a local database be installed.

Before you configure install IBM Directory Server, you must create a user ID for the user who will own the database used by the Directory Server. The user ID you specify will own the database instance where the DB2 database will exist, and the DB2 instance will be in the user's home directory. The user ID can be no longer than 8 characters. In addition:

- The user's Primary group can be any general group (such as `other`, `dbsysadm`, or `db2iadm`).There might be some groups that do not work correctly as the user's primary group when configuring the database. For example, if the user's primary group on Linux is `users`, problems might occur. Use `other` if you want to be sure that the Primary group will work.
- The user `root` must be a member of the user's primary group. If `root` is not a member of this group, add `root` as a member of the group.
- For best results, the user's login shell should be the Korn shell script (`/usr/bin/ksh`).
- The user's password must be set correctly and ready to use. For example, the password cannot be expired or waiting for a first-time validation of any kind. (The best way to verify that the password is correctly set is to telnet to the same computer and successfully log in with that user ID and password.)
- The user must have a home directory and must be the owner of the home directory.
- The group ownership of the user's home directory must be the user's primary group.
- When configuring the database, it is not necessary, but customary, to specify the home directory of the user ID as the database location. However, if you specify some other location, the user's home directory still must have 3 to 4 MB of space available. This is because DB2 creates links and adds files into the home directory of the instance owner (that is, the User) even though the database itself is elsewhere.
- Use the `/opt/IBMldaps/bin/ibmslapd` command to start IBM Directory Server. You will need to do the following:
  1. Comment out the line starting with `ibmdir` in the `/etc/inittab` file.
  2. Create boot-up script or links as necessary for `/opt/IBMldaps/bin/ibmslapd`.
  3. Use `/etc/slapd.pid` to stop IBM Directory Server.

After installation, do the following to configure IBM Directory Server 5.1 for use with Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager:

1. Switch to the /usr/bin directory and issue the command ./ldapxcfg to open the **Configuration Manager**.
2. Copy the thinkdynamics.schema file from the /samples directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD onto your hard drive.
3. In the Configuration Manager, click **Administrator DN/password** and set the Administrator/DN to cn=tioldap and the default password tioldap. Record this password, as you will be prompted for it during the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation.
4. Click **Configure database** and follow the prompts to create a new database.
5. Click **Manage suffixes** and set the **Suffix DN** to the appropriate values for your environment.
6. Click **Manage Schema files** and do the following:
   a. Browse to the thinkdynamics.schema file you copied to your hard drive in step 2.
   b. Click **Add**, and then **OK**.
7. Click **Import ldif data** and do the following:
   a. Browse to the /samples directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD and add the ldap.ldif file.
   b. Click the **Standard import** radio button and then click **Import**.
   c. Watch for all entries to be added successfully.
8. Exit the **Configuration Manager** tool.
9. Perform additional IBM Directory Server configuration by doing the following:
   a. Open a command line and start the WAS server by running the following command:

      <Install_dir>\ldap\Appserver\bin\startserver server1
   b. Open the IBM Directory Server Web console using the following URL:

      http://localhost:9080/IDSWebApp/IDSjsp/Login.jsp

      Login with the user name superadmin and password secret, then click **Login**.
   c. Click **Create a node** and enter the host name of the directory server machine.
   d. Set the user name as specified in step 3.
   e. Open a command line and start the directory server by running the following command:

      <Install_dir>/ldap/bin/ibmslapd
   f. Log out of the Web console and log in as your new node, which is your host name.
   g. Verify that you can see all of the users that are in the ldif file. Expand **Directory management** and select **Manage entries.** Select **dc=ibm,dc=com** and click **Expand**.
   h. By default, user passwords stored in IBM Directory Server are in clear-text format, which may represent a security concern. To enable password encryption for new users created by Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager in IBM Directory Server, do the following in the Web console:
      1) Start the LDAP service, by selecting **Server administration** > **Start/stop/restart server**.

2) 3. After the service is started successfully, configure the security policy by navigating to **Server administration** > **Manage security properties**.

3) Select **Password policy** on the right panel. Do the following:

    a) From the **Password encryption** drop-down, select **SHA**

    b) Enable the **Password policy enabled** check box.

    c) Click **OK**.

4) Restart the LDAP service, as described in step 9h1 on page 57, for the changes to take effect.

Installing and Configuring Tivoli Intelligent Orchestrator Server Prerequisites

The Tivoli Intelligent Orchestrator installation checks to ensure that all prerequisite software is installed. Installation will not proceed if the prerequisites listed below are not met. The steps below are divided into the following sections:

1. "Installing the Utility Prerequisites"
2. "Installing WebSphere Application Server" on page 60
3. "Installing the DB2 Universal Database and IBM Directory Server Client Applications" on page 64

Installing the Utility Prerequisites

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require specific user IDs and utilities be configured prior to installation. Do the following:

1. Ensure you have applied the required operating system patches, as documented in "Supported Software on Managing Servers" on page 5.

2. By default on Solaris, /home is under the control of `automountd`. When preparing to install Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager on Solaris, to allow creation of the `tioadmin` home directory, do the following:

    a. Run the following commands:

```
TERM=vt100
export TERM
```

    b. Edit the `/etc/auto_master` file and comment out the `/home` line and save the file.

    c. Run the following commands:

```
cd /etc/init.d
./autofs stop
./autofs start
```

3. Create a user account `tioadmin` as part of the group `tioadmin`, which is required to install and run Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

4. Set the `HOME` variable for user `tioadmin` to be `/home/thinkcontrol` and set the log in shell to `/bin/bash`. If the bash shell is not part of the Solaris 8 OE installation, the latest bash package can be downloaded from `www.sunfreeware.com` and installed.

5. While logged in as `root`, create two groups called **mqm** and **mqbrkrs**.

6. Create a user `mqm` in group `mqm`. Ensure the home directory is set to `/home/mqm`.

7. Add `root`, `mqm` and `tioadmin` to the mqm and mqbrkrs groups.

8. While logged in as `root`, type the following commands:

```
mkdir –p /usr/local/jakarta-avalon-phoenix
chown tioadmin:tioadmin /usr/local/jakarta-avalon-phoenix
```

9. As user `root`, install Expect 5.3 or higher. Expect is required for all environments and is available at:

```
http://www.ibm.com/servers/aix/products/aixos/linux/download.html
```

   Expect also requires that you download and install the packages `tcl`, `tk`, and `libgcc` from the same site. Expect is a tool for automating keystrokes and must be installed prior to installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

10. You must install the Tivoli GUID package located in the `\tools\Tivoli-guid\Sun` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD. To install Tivoli GUID, type the following command:

```
# pkgadd –d <path>/TIVguid.pkg
```

   where `<path>` is the directory path to the Tivoli GUID package to be installed.

11. While logged in as root, download the latest GNU tar package from `www.sunfreeware.com` and install it. The latest downloadable GNU tar version as of this writing is 1.13.19.

12. Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager make extensive use of the SSH, telnet and ftp protocols. Ensure these protocols are available on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager managed from and managed to servers. Step 13 provides instructions on installing and configuring the required version of SSH.

13. OpenSSH version 3.4 or higher must be installed and configured. Do the following:

   a. Ensure you have installed the following:
      - The Solaris operating system patch 112438–02, as described in "Supported Software" on page 5.
      - The latest `libgcc` package as described in step 9.
      - Install the latest **OpenSSL** and **OpenSSH** packages, which can be found at the following URL:

      ```
      http://www.sunfreeware.com
      ```

   b. To configure `sshd`, do the following:

      1) Create the sshd user by typing the following commands:

      ```
      mkdir /var/empty
      chown root:sys /var/empty
      chmod 755 /var/empty
      groupadd sshd
      useradd -g sshd -c 'sshd privsep' -d /var/empty -s /bin/false sshd
      ```

      2) Create the host keys by doing the following:

         a) Add `/usr/local/bin` to PATH for user `root` and activate the new PATH.

         b) Run the following commands:

         ```
         ssh-keygen -t rsa1 -f /usr/local/etc/ssh_host_key -N ""
         ssh-keygen -t dsa -f /usr/local/etc/ssh_host_dsa_key -N ""
         ssh-keygen -t rsa -f /usr/local/etc/ssh_host_rsa_key -N ""
         ```

         c) Disable password authentication by appending the line:

         ```
         PasswordAuthentication  no
         ```

         to the file `/usr/local/etc/sshd_config`.

         d) Create a script to start and stop the sshd daemon. Create a `/etc/init.d/sshd` file with the following contents:

> **Note:** Some text may appear on separate lines for presentation purposes only.

```
#!/bin/sh
pid='/usr/bin/ps -e | /usr/bin/grep sshd | /usr/bin/sed -e
        's/^ *//' -e 's/ .*//''
case $1 in
'start')
 /usr/local/sbin/sshd
 ;;
'stop')
 if [ "${pid}" != "" ]
 then
  /usr/bin/kill ${pid}
 fi
 ;;
*)
 echo "usage: /etc/init.d/sshd {start|stop}"
 ;;
esac
```

  e) Set the ownership and permissions for /etc/init.d/sshd using the
     following commands:

```
chown root:sys /etc/init.d/sshd
chmod 555 /etc/init.d/sshd
ln -s ../init.d/sshd /etc/rc2.d/S98sshd
ln -s ../init.d/sshd /etc/rc1.d/K28sshd
```

c. Start the ssh daemon by running the command: /etc/rc2.d/S98sshd start

d. As user tioadmin, configure SSH so that the server can communicate with
   relevant users on other systems and components of the data center.

   Attention: Ensure that you are logged on to user ID tioadmin directly. Do
   not su - to tioadmin or the following steps will fail to run correctly.

   Do the following:

   1) Run the following commands:

```
ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
cat $HOME/.ssh/id_rsa.pub >> $HOME/.ssh/authorized_keys
echo "StrictHostKeyChecking  no" >> $HOME/.ssh/config
```

   2) Append the $HOME/.ssh/id_rsa.pub file to the
      <*HOME_dir*>/.ssh/authorized_keys file of the user whose system you
      wish to access through ssh. For example, you can append the
      $HOME/.ssh/id_rsa.pub file to the authorized_keys file of the tioadmin
      user on the database server, and access it by issuing the following
      command:

```
$ /usr/local/bin/ssh tioadmin@<db_server> ls -la
```

      where <*db_server*> is the host name of the database server you are
      connecting with. You should see the content of home directory listed
      for the local user tioadmin on the database server.

   3) You can test this by running: ssh -v tioadmin@<*localhost*>, where
      <*localhost*> is your host name. If SSH is properly configured, you will
      not be prompted for a password.

   4) Copy the public key for user tioadmin to the servers that you need to
      log in to, using Tivoli Intelligent Orchestrator or Tivoli Provisioning
      Manager.

Installing WebSphere Application Server

To install WebSphere Application Server and the fixes it requires, do the following:

1. As user root, edit the /etc/system file and add the following:

```
set semsys:seminfo_semaem = 16384
set semsys:seminfo_semopm = 100
set semsys:seminfo_semume = 256
set rlim_fd_cur=1024
set rlim_fd_max=34000
```

Reboot the system to activate the change.

2. Before installing WebSphere Application Server, check to see if port 9090 is being used by websm, by running the following command:

```
netstat -an | grep 9090
```

If there is a match, run the following command to disable websm:

```
 /usr/websm/bin/wsmserver -disable
```

3. While logged in as root, install WebSphere Application Server, 5.0, which is shipped with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager. Perform a full installation as documented in the WebSphere Application Server product documentation.

4. After installing WebSphere Application Server, 5.0 you must install Fix Pack 1, which is available on CD in the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager bundle.

5. After installing WebSphere Application Server, ensure you remove the Samples.

6. While logged on as root, install the WebSphere Application Server Application Client, by doing the following:

   a. Switch to the WebSphere Application Server Application Client CD.

   b. Run the following command: export DISPLAY=<IP_address>, where <IP_address> represents the IP address of the machine from which you are running the installation.

   c. Begin the installation by running the following command: ./install and follow the prompts.

      Note: The Application Client must be installed at the same level as WebSphere Application Server. For example, if WebSphere Application Server is installed in /usr/WebSphere/AppServer, then the Application Client must be installed in /usr/WebSphere/AppClient.

   d. Select a **Custom** install and when prompted, select only the following features to install:
      - **J2EE and java thin application client**
      - **Embedded Messaging client**

      Do not install the Samples.

7. After installing the WebSphere Application Server Application Client and while still logged in as root, add the following lines to the end of the java.security file in the <WAS_AppClient_installdir>/java/jre/lib/security/ directory.

```
# Class to instantiate as the javax.security.auth.login.Configuration provider.
#
login.configuration.provider=com.ibm.security.auth.login.ConfigFile
# Default login configuration file
#
login.config.url.1=file:/<WAS_AppClient_installdir>/properties/wsjaas_client.conf
```

where <WAS_AppClient_installdir> is the installation path for the WebSphere Application Server Application Client. Ensure that the login.config.url.1 setting has the correct path to wsjaas_client.conf.

8. Edit the *<WAS_AppClient_installdir>*/properties/sas.client.props file. Locate the line:

```
com.ibm.CORBA.loginSource=prompt
```

and change it to:

```
com.ibm.CORBA.loginSource=none
```

9. Stop the WebSphere Application Server before proceeding to install the fixes in the steps below.

10. While logged on as `root`, install the MQ CSD03 patch, which consists of several individual fixes, located in the /patches/csd03 directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD. Read the readme.CSD03.txt file for instructions on untarring and installing the patches. Do *not* install the following packages:

   - MQ Samples
   - MQ Support for DCE

   Note: You can run the following command in a command line window to check whether or not the MQ CSD03 or higher is already installed. Switch to the /mqm/bin directory to run the command.

   ```
    mqver
   ```

   If the command shows that you have already had the MQ CSD03 or above installed on the server, you do not have to install the MQ CSD03 fix and you can proceed to step 11. If the command returns the following information, you already have MQ CSD03 installed:

   ```
   Name:  WebSphere MQ
   Version:  530.4  CSD03
   ....
   ....
   ```

11. Apply the following MQ Interim fixes provided in the /patches directory on the Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager CD:

    a. To install the interim fix IY_43610, do the following:
       1) Switch to the /patches/I_43610 directory.
       2) Uncompress the `tar` file. For example, you can use the command: `uncompress IY43610.sun.tar.Z`. Then untar the file with the command: `tar -xvf IY43610.sun.tar`.
       3) Follow the instructions in the readme.iy43610.txt file to install the fixes.
       4) When asked to copy the files, copy them to the /opt/mqm/lib directory.

    b. To install the interim fix IY44803, do the following:
       1) Switch to the /patches/I_44803 directory.
       2) Uncompress the `tar` file. For example, you can use the command: `uncompress IY44803.sun.tar.Z`.
       3) Follow the instructions in the readme.iy44803.txt file to install the fixes. InterimIY44803.sun.tar should be untarred from the root directory, as it will replace the contents of /opt/mqm/java directory. You may wish to back up this directory before untarring the fix.

12. Apply the WebSphere Application Server PQ75055 fix, located on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD in the /patches/WAS_PQ75055 directory. To apply the fix, do the following:

    a. Create an /update directory under the WebSphere Application Server installation directory.

b. Copy the `updateInstaller.zip` file and `apar_PQ75055.zip` file from the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD to the `/update` directory you created.

c. Unzip the `updateInstaller.zip` and `apar_PQ75055.zip`.

d. Start the update wizard by running `updateWizard.sh`.

e. When prompted, select **Install fixes**.

f. On the fix directory panel, ensure the directory path is `<WAS_installdir>\update\efixes\...` Wait for the fix jar file to be picked up, then select and install it.

13. If the WebSphere Application Server samples were not installed during the WebSphere Application Server installation, the JMS listener does not automatically start the first time. To start the JMS listener, do the following:

a. Start the WebSphere Application Server.

b. Open the WebSphere Application Server Administration console at: `http://<host_name>:9090/admin`.

c. Select **Application Servers** > **Server1** > **Server Component**, and the click **JMS Servers**.

d. Set the initial state to **Started**, and click **Apply**. Save the configuration changes. Click **OK** to exit.

14. Change WebSphere Application Server to run as `tioadmin`, allowing `tioadmin` to start, stop and configure WebSphere Application Server. Do the following:

a. Ensure you are logged on as `root`.

b. Open the administrative console at `http://<host_name>:9090/admin/`to complete the following steps:

1) Click **Servers** > **Application Servers** > *<server_name>* > **Process Definition** > **Process Execution**.

2) Specify `tioadmin` for the **Run As User** property user ID to be used to start the application server. This user ID is referred to in later steps as the "run as" user ID.

3) Save the configuration.

4) Click **Servers** > **Application Servers** > *<server_name>* > **Runtime**. Note the values for **cell_name**, **node_name** and **server**.

c. Run the `./stopServer.sh server1` command to stop WebSphere Application Server

d. Change the permissions of the WebSphere Application Server root installation directory. Change the group owner to the `mqbrkrs` group. For example, you can run the following command:

```
# chown -R tioadmin:mqbrkrs *
# cd /opt/mqm/bin; chmod o+rx crtmqm dltmqm_nd endmqm strmqm endmqlsr runmqsc
```

e. Delete the default queue manager for the application server, by doing the following:

1) Switch to the `<WAS_installdir>/bin` directory

2) Using the values you noted in step 14b4, run the `deletemq` command:

```
./deletemq.sh <cell_name> <node_name> <server_name>
```

f. Switch to the `/usr/mqm/bin` directory and run the following command:

```
chmod o+rx crtmqm dltmqm_nd endmqm strmqm endmqlsr runmqsc
```

g. Switch to the 'run as' user, `tioadmin`, to create the embedded messaging queue manager and broker for the application server by running the following command:

```
./createmq.sh /opt/WebSphere/AppServer <cell_name> <node_name> <server_name>
```

where *<cell_name>*, *<node_name>*, and *<server_name>* are the values you noted in step 12b4 on page 36

You can now start the Application Server using the "run as" user ID.

Note: Note that if you apply fixes to WAS in the future, the fix install will require you to run as root to apply the fixes. This may mean that certain files will have their ownership changed back to root. You will need to change the ownership back to tioadmin. using the command:

```
chown –R tioadmin.mqbrkrs *
```

in the /opt/WebSphere/AppServer directory to change the ownership of all files in all subdirectories.

Installing the DB2 Universal Database and IBM Directory Server Client Applications

You will need to install the DB2 Universal Database client and the IBM Directory Server client on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server, so that it can communicate with the remote database and directory server machines. Do the following:

Important

You must modify the kernel configuration parameters before installing the DB2 client. Refer to the *Modifying Kernel Parameters* topic in the DB2 product documentation for complete details. The recommended kernel parameters vary depending on your system configuration.

---

1. Install the DB2 database client from the DB2 Administration Client CD. The correct level of DB2 Universal Database is packaged with Tivoli Intelligent Orchestrator.

   After installing the database client, you must configure the client to communicate with the database server. If you have not yet installed the database server, return to this step after installing the database server.

   Note: The following instructions are provided as guidance only. Refer the DB2 Universal Database V8.1 documentation for complete details on the commands in the steps below.

   To configure a DB2 client to communicate with the database server, do the following:

   a. If you have not already done so, log on as tioadmin to the server with the database client installed.

   b. Open a DB2 command line processor and enter the following commands:
   ```
   catalog tcpip node <db_node> remote <dbserver_hostname> server 50000
   catalog db <db_name> as <db_alias> at node <db_node>
   ```

   where the variables are defined as follows:

   db_node
   > A local alias for the node to be cataloged. This is an arbitrary name on the client machine, used to identify the node. It should be a meaningful name to make it easier to remember. The name must conform to database manager naming conventions.

   dbserver_hostname
   > The host name of the node where the target database resides. The

> host name is the name of the node that is known to the TCP/IP
> network. Maximum length is 255 characters.

> **db_name**
>> Specifies the name of the database to catalog. This is the name of
>> the database you created in step 7 on page 55.

> **db_alias**
>> Specifies an alias as an alternate name for the database being
>> cataloged. If an alias is not specified, the database manager uses
>> db_name as the alias. Record the value used, as you will be
>> prompted for it during Tivoli Intelligent Orchestrator and Tivoli
>> Provisioning Manager installation.

c. Add db2inst1 to the group for the DB2 user ID you specified during the
DB2 installation. By default, that group is db2grp1.

d. Edit the .profile file in the home directory of both the root and tioadmin
user, to add the following lines:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
. /home/db2inst1/sqllib/db2profile
fi
```

e. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqllib/java:$LD_LIBRARY_PATH
```

2. Install and configure the IBM Directory Server 5.1 client, according to the
documentation provided by IBM Directory Server 5.1.

The next step

After installing and configuring all the prerequisite software listed above, do the
following:

1. If you have not yet done so, review the README file and install any additional
fixes mentioned in the README file. For more information about the read me
file, refer to "Reviewing the README file" on page 8.

2. Depending on which product you are installing, proceed to one of the
following chapters:
   - Chapter 8, "Installing Tivoli Intelligent Orchestrator," on page 69, or
   - Chapter 9, "Installing Tivoli Provisioning Manager," on page 73.

Part 3. Installing Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager

This section contains information on installing Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager, and includes the following chapters:

- Chapter 8, "Installing Tivoli Intelligent Orchestrator," on page 69
- Chapter 9, "Installing Tivoli Provisioning Manager," on page 73
- Chapter 10, "Upgrading to Tivoli Intelligent Orchestrator, V1.1.0," on page 77

Chapter 8. Installing Tivoli Intelligent Orchestrator

This chapter provides instructions on installing Tivoli Intelligent Orchestrator on any of the supported platforms. Platform-specific steps will be clearly marked.

To install Tivoli Intelligent Orchestrator, do the following:

1. You must be logged on to the system as user `tioadmin`. Ensure that the `tioadmin` user ID has the required permissions, as described in the Prerequisites chapter for the platform you are installing on.

2. **Windows only**:

   Set the system PATH variable as follows:

   a. Click **Start** > **Settings** > **Control Panel** > **System** > **Advanced Tab**.

   b. Click the **Environment Variables** button and add the following line to the System **PATH** variable:

      `<drive>:\cygwin\home\thinkcontrol\bin`

      where `\cygwin\home\thinkcontrol` is where you will install Tivoli Intelligent Orchestrator. If you installed Cygwin in a custom directory, substitute that path.

3. Insert the Tivoli Intelligent Orchestrator CD into the CD drive. If you are installing on Unix or Linux, mount the CD-ROM drive, but do not change directory to the mount point. Changing directories to the mount point will lock the CD drive and prevent you from being able to swap CDs.

4. Depending on which platform you are installing on, run one of the following commands:

   - **Windows**: Switch to the `/install` directory and run `setupwin32.exe`
   - **AIX**: Issue the following command: `mount_point/install/setupaix.bin`
   - **Solaris**: Issue the following command: `mount_point/setupsolarisSparc.bin`
   - **Redhat Linux**: Issue the following command: `mount_point/install/setuplinux.bin`

5. Read the Welcome panel and click **Next**.

6. The Software License Agreement panel displays. Review the terms of the license agreement.

   If you accept the terms of license agreement, select **I accept the terms in the license agreement** and click **Next**.

   If you decline the terms of the license agreement, select **I do not accept the terms in the license agreement** and click **Next**. A confirmation window is shown with the message: `Do you really wish to decline the license agreement?` Click **Yes** to exit the installation program *or* click **No** to be returned back to the Software License Agreement panel.

7. **Windows only:** If you accept the license agreement, the Locate Installation Directory panel displays. Enter the installation directory where Cygwin is installed. Tivoli Intelligent Orchestrator must be installed in the same directory. Click **Next**.

8. You are prompted for information about IBM Directory Server. Complete the fields as follows:

LDAP Administrator user name
> For Tivoli Intelligent Orchestrator, Version 1.1.1, the default user name is `tioldap`.

LDAP Administrator user password
> The default password is `tioldap`. This password can be changed after installation.

Fully Qualified Host name
> Fully qualified host name (for example, *hostname.domain.*com) of the LDAP server.

Host port
> Port used to communicate with the LDAP server.

Click **Next** to continue.

Note: If the LDAP server is not available or cannot be detected by Tivoli Intelligent Orchestrator, there may be a delay of up to three minutes, until the timeout threshold is reached.

9. On the WebSphere Configuration panel, specify the DNS suffix name and the directory where WebSphere Application Server 5.0.1 is installed.

   After you click **Next**, InstallShield will verify that it can communicate with the WebSphere Application Server and that the WebSphere Application Server is properly configured for Tivoli Intelligent Orchestrator. This may take a few minutes. If the verification is successful, InstallShield will proceed to the next panel. If an error occurs, you will be returned to this panel to verify the information entered. Click **Next** to continue.

10. You are prompted to enter information about the database server, to allow Tivoli Intelligent Orchestrator to connect to it. Complete the fields as follows:

    Remote Alias for the Tivoli Intelligent Orchestrator database
    > The database name alias that the Tivoli Intelligent Orchestrator installation will use. This must match the database alias you created in one of the following steps, depending on your platform:
    > - 1b on page 23
    > - 1b on page 37
    > - 1b on page 49

    Database owner name
    > Enter the default database user name `tiodb`.

    Password
    > Enter the default password for the `tiodb` user ID, which you defined when installing DB2.

    Host name or IP address
    > Host name or IP address of the database server.

    Host port
    > Port used to communicate with the database server.

    Client Home Directory
    > Home directory for the database client which must be already installed.

    Click **Next** to continue.

11. The **Installation Preview** panel summarizes the information you have entered. Review the information to ensure it is accurate.

If the information is correct, click **Next** to continue.

If the information is incorrect, click **Back** to return to the previous panels to correct the appropriate fields.

12. As Tivoli Intelligent Orchestrator is being installed, a panel displays showing the progress of the installation. The installation is complete when the summary panel displays. If you would like to start the Tivoli Intelligent Orchestrator services immediately, click the check box. Click **Next** to exit the installation wizard.

13. After completing the Tivoli Intelligent Orchestrator installation you must install JRE 1.4 (32-bit version) locally. The AIX and Linux versions can be downloaded from the following URL:

    `http://www.ibm.com/developerworks/java/jdk/index.html`

    Refer to the Sun and Microsoft sites for the version appropriate to those platforms. Do not overwrite the existing JDK level installed with WebSphere Application Server. After installing JRE 1.4, edit the `$HOME/tools/reports_all.sh` file and change the `JAVA_HOME` variable to reflect the location of JRE 1.4.

Note: By default DB2 8.1.2 has `LOCKTIMEOUT=-1` (no timeout). The Tivoli Intelligent Orchestrator installation runs a script to change the `LOCKTIMEOUT` value to 120.

The next step

After installing Tivoli Intelligent Orchestrator, do the following:

1. If you have not yet done so, review the `README` file. For more information about the `README` file, refer to "Reviewing the README file" on page 8.

2. Proceed to Appendix A, "Post-Installation Tasks," on page 81 for information on changing the default passwords used during installation, as well as optional instructions on modifying the default `ldif.ldap` file if desired.

3. Refer to Appendix B, "Administrative Tasks," on page 85 for information on starting and stopping the Tivoli Intelligent Orchestrator server and accessing the main console.

4. Refer to the *Overview Guide* and the `Operators Guide` for details on using Tivoli Intelligent Orchestrator.

Chapter 9. Installing Tivoli Provisioning Manager

This chapter provides instructions on installing Tivoli Provisioning Manager on any of the supported platforms. Platform-specific steps will be clearly marked.

To install Tivoli Provisioning Manager, do the following:

1. You must be logged on to the system as user `tioadmin`. Ensure that the `tioadmin` user ID has the required permissions, as described in the Prerequisites chapter for the platform you are installing on.

2. **Windows only**:

   Set the system PATH variable as follows:

   a. Click **Start** > **Settings** > **Control Panel** > **System** > **Advanced Tab**.

   b. Click the **Environment Variables** button and add the following line to the System **PATH** variable:

      `<drive>:\cygwin\home\thinkcontrol\bin`

      where `\cygwin\home\thinkcontrol` is where you will installTivoli Provisioning Manager. If you installed Cygwin in a custom directory, substitute that path.

3. Insert the Tivoli Provisioning Manager CD into the CD drive. If you are installing on Unix or Linux, mount the CD-ROM drive, but do not change directory to the mount point. Changing directories to the mount point will lock the CD drive and prevent you from being able to swap CDs.

4. Depending on which platform you are installing on, run one of the following commands:

   - **Windows**: Switch to the `/install` directory and run `setupwin32.exe`
   - **AIX**: Issue the following command: *mount_point*`/setupaix.bin`
   - **Solaris**: Issue the following command: *mount_point*`/setupsolarisSparc.bin`
   - **Redhat Linux**: Issue the following command: *mount_point*`/setuplinux.bin`

5. Read the Welcome panel and click **Next**.

6. The Software License Agreement panel displays. Review the terms of the license agreement.

   If you accept the terms of license agreement, select **I accept the terms in the license agreement** and click **Next**.

   If you decline the terms of the license agreement, select **I do not accept the terms in the license agreement** and click **Next**. A confirmation window is shown with the message: `Do you really wish to decline the license agreement?` Click **Yes** to exit the installation program *or* click **No** to be returned back to the Software License Agreement panel.

7. **Windows only:** If you accept the license agreement, the Locate Installation Directory panel displays. Enter the installation directory where Cygwin is installed. Tivoli Provisioning Manager must be installed in the same directory. Click **Next**.

8. You are prompted for information about IBM Directory Server. Complete the fields as follows:

   LDAP Administrator user name

   > For Tivoli Intelligent Orchestrator, Version 1.1.1, the default user name is `tioldap`.

LDAP Administrator user password
        The default password is `tioldap`. This password can be changed after installation.

Fully Qualified Host name
        Fully qualified host name (for example, `hostname.domain.com`) of the LDAP server.

Host port
        Port used to communicate with the LDAP server.

Click **Next** to continue.

Note: If the LDAP server is not available or cannot be detected by Tivoli Provisioning Manager, there may be a delay of up to three minutes, until the timeout threshold is reached.

9. On the WebSphere Configuration panel, specify the DNS suffix name and the directory where WebSphere Application Server 5.0.1 is installed.

    After you click **Next**, InstallShield will verify that it can communicate with the WebSphere Application Server and that the WebSphere Application Server is properly configured for Tivoli Provisioning Manager. This may take a few minutes. If the verification is successful, InstallShield will proceed to the next panel. If an error occurs, you will be returned to this panel to verify the information entered. Click **Next** to continue.

10. You are prompted to enter information about the database server, to allow Tivoli Provisioning Manager to connect to it. Complete the fields as follows:

    Remote Alias for the Tivoli Provisioning Manager database
            The database name alias that the Tivoli Provisioning Manager installation will use. This must match the database alias you created in one of the following steps, depending on your platform:
    - 1b on page 23
    - 1b on page 37
    - 1b on page 49

    Database owner name
            Enter the default database user name `tiodb`.

    Password
            Enter the default password for the `tiodb` user ID, which you defined when installing DB2.

    Host name or IP address
            Host name or IP address of the database server.

    Host port
            Port used to communicate with the database server.

    Client Home Directory
            Home directory for the database client which must be already installed.

    Click **Next** to continue.

11. The **Installation Preview** panel summarizes the information you have entered. Review the information to ensure it is accurate.

    If the information is correct, click **Next** to continue.

    If the information is incorrect, click **Back** to return to the previous panels to correct the appropriate fields.

12. As Tivoli Provisioning Manager is being installed, a panel displays showing the progress of the installation. The installation is complete when the summary panel displays. If you would like to start the Tivoli Provisioning Manager services immediately, click the check box. Click **Next** to exit the installation wizard.

13. After completing the Tivoli Intelligent Orchestrator installation you must install JRE 1.4 (32-bit version) locally. The AIX and Linux versions can be downloaded from the following URL:

    `http://www.ibm.com/developerworks/java/jdk/index.html`

    Refer to the Sun and Microsoft sites for the version appropriate to those platforms. Do not overwrite the existing JDK level installed with WebSphere Application Server.

Note: By default DB2 8.1.2 has `LOCKTIMEOUT=-1` (no timeout). The Tivoli Provisioning Manager installation runs a script to change the `LOCKTIMEOUT` value to 120.

The next step

After installingTivoli Provisioning Manager, do the following:

1. If you have not yet done so, review the `README` file. For more information about the `README` file, refer to "Reviewing the README file" on page 8.

2. Proceed to Appendix A, "Post-Installation Tasks," on page 81 for information on changing the default passwords used during installation, as well as optional instructions on modifying the default `ldif.ldap` file if desired.

3. Refer to Appendix B, "Administrative Tasks," on page 85 for information on starting and stopping the Tivoli Intelligent Orchestrator server and accessing the main console.

4. Refer to the *Overview Guide* and the `Operators Guide` for details on using Tivoli Intelligent Orchestrator.

Chapter 10. Upgrading to Tivoli Intelligent Orchestrator, V1.1.0

This chapter provides instructions on upgrading from Tivoli Provisioning Manager to Tivoli Intelligent Orchestrator on any of the supported platforms. Platform-specific steps will be clearly marked. To upgrade to Tivoli Intelligent Orchestrator do the following:

1. Before you upgrade Tivoli Provisioning Manager, Version 1.1.0 to Tivoli Intelligent Orchestrator, Version 1.1.0, you *must* reset the password for user ID `wasadmin` back to the default password of `wasadmin`, using the command line tool as described in "Changing Default Passwords" on page 81.

2. **Linux and AIX only:**

   While logged in as either `root` or `tioadmin`, change the permissions on the `_jvm` directory by running the command:

   ```
   chmod -R 755 /home/thinkcontrol/_jvm
   ```

3. You must be logged on to the system as user `tioadmin`. Ensure that the `tioadmin` user ID has the required permissions.

4. Insert the Tivoli Intelligent Orchestrator CD into the CD drive. If you are installing on Unix or Linux, mount the CD-ROM drive, but do not change directory to the mount point. Changing directories to the mount point will lock the CD drive and prevent you from being able to swap CDs.

5. Depending on which platform you installing on, run one of the following commands:

   - **Windows**: Switch to the `/install` directory and run `setupwin32.exe`.
   - **AIX**: Issue the following command: *mount_point*`/install/setupaix.bin`
   - **Redhat Linux**: Issue the following command: *mount_point*`/install/setuplinux.bin`

6. Read the Welcome panel and click **Next**.

7. The Software License Agreement panel displays. Review the terms of the license agreement.

   If you accept the terms of license agreement, select **I accept the terms in the license agreement** and click **Next**.

   If you decline the terms of the license agreement, select **I do not accept the terms in the license agreement** and click **Next**. A confirmation window is shown with the message: `Do you really wish to decline the license agreement?` Click **Yes** to exit the installation program *or* click **No** to be returned back to the Software License Agreement panel.

8. As Tivoli Intelligent Orchestrator is being installed, a panel displays showing the progress of the installation. During the installation you will be presented with a dialog prompt to replace the jvm. Agree to the prompt to replace the jvm.

9. The installation is complete when the summary panel displays. If you would like to start the Tivoli Intelligent Orchestrator services immediately, click the check box. Click **Next** to exit the installation wizard.

You have completed the Tivoli Intelligent Orchestrator upgrade. You are now ready to begin using Tivoli Intelligent Orchestrator.

The next step

You are now ready to do the following:

1. If you have not yet done so, review the README file. For more information about the README file, refer to "Reviewing the README file" on page 8.

2. Proceed to Appendix A, "Post-Installation Tasks," on page 81 for information on changing the default passwords used during installation, as well as optional instructions on modifying the default `ldif.ldap` file if desired.

3. Refer to Appendix B, "Administrative Tasks," on page 85 for information on starting and stopping the Tivoli Intelligent Orchestrator server and accessing the main console.

4. Refer to the *Overview Guide* and the `Operators Guide` for details on using Tivoli Intelligent Orchestrator.

Part 4. Appendixes

Appendix A. Post-Installation Tasks

Changing Default Passwords

Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager require that a default set of user IDs and default passwords be created and used during installation and configuration. A command line tool is provided to change the passwords after Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager has been installed. Using the command line tool, you can change the passwords for the following user IDs:

- `tioldap`
- `wasadmin`
- `tioappadmin`
- `tiointernal`
- `root`
- `tiodb`

To change the password for one of the default user IDs, do the following:

1. Ensure the following variables are currently defined: `WAS_HOME`, `JAVA_HOME`, `TC_HOME`. These environment variables should be defined after the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager installation process is complete.
2. Ensure the WebSphere Application Server is started.
3. Log in as `tioadmin`.
4. Switch to the *TIO_installdir*/`tools` directory, where *TIO_installdir* is the directory where Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager is installed.
5. Run one of the following commands, depending on which platform you are on:
   - **Windows**: `changePassword.cmd` *<user_ID> <new_password> <current_was_password>*
   - **AIX**: `changePassword.sh` *<user_ID> <new_password> <current_was_password>*
   - **Linux**: `changePassword.sh` *<user_ID> <new_password> <current_was_password>*

   where the variables are defines as follows:

   <user_ID>
   > The user ID whose password you want to change.

   <new_password>
   > The new password you want to use for the user ID.

   <current_was_password>
   > The current password for the `wasadmin` user ID. If you have not yet changed the `wasadmin` password, use the default value as defined in Chapter 3, "Default User IDs and Passwords," on page 11.

   You can only change the password for one user ID at a time.
6. Except when changing the password for user ID `tioappadmin`, you must restart the WebSphere Application Server and Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, after each password change for the change to take effect.

Refer to Appendix B, "Administrative Tasks," on page 85 for information on stopping and starting Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager.

Note: Stopping and starting the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server requires you to enter the `wasadmin` user name and password. After using the `changePassword` command to change the `wasadmin` password, stop the server and enter the *old* `wasadmin` password. When starting the server, with the `tio.sh start` command, use the *new* `wasadmin`password.

7. If you are changing the passwords for `root` and `tiodb`, the password change made by the command line tool is only registered within Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager. Additionally, you must also make the password change within the IBM Directory Server for user ID `root`, and within DB2 Universal Database for user ID `tiodb`. Refer to the respective product documentation for instructions on changing passwords for those user IDs.

Modifying the Default LDIF File

The sample LDIF file provided with Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager contains the default LDAP base DN values of `dc=ibm, dc=com`.

If you wish to change these values to reflect the appropriate settings for your environment, do the following:

1. Stop Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, WebSphere Application Server and IBM Directory Server.
2. From the `/samples` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager CD, copy the sample `ldap.ldif` file to a temporary directory on your Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server. Rename the file to `new_ldap.ldif`.
3. Add the new suffix DN and import the new ldif data to the LDAP server by doing the following:
   a. Open the Configuration Manager console by doing one of the following, depending on your platform:
      - **Windows only:**
        Click **Start** > **Programs** > **IBM Directory Server 5.1** > **Directory Configuration** to open the **Configuration Manager**.
      - **AIX, Linux or Solaris:**
        After installation, go to the `/usr/bin` directory and issue the command `./ldapxcfg` to open the **Configuration Manager**.
   b. Click **Manage suffixes** and set the **Suffix DN** to your custom values. Click **Add**.
   c. To import the updated ldif data, click **Import ldif data** and do the following:
      1) Browse to the directory where you saved the `new_ldap.ldif` file in step 2 and add the `ldap.ldif` file.
      2) Click the **Standard import** radio button and then click **Import**.
      3) Watch for all entries to be added successfully.

d. Next, you must modify the WebSphere Application Server security configuration. Replace all instances of dc=ibm, dc=com with the updated values in all of the files listed below:

- `<WAS_HOME>\config\cells\<host_name>\security.xml`
- `<WAS_HOME>\config\cells\<host_name>\applications\TCEAR.ear\deployments\`
  `TCEAR\META-INF\ibm-application-bnd.xmi`
- `<WAS_HOME>\installedApps\<host_name>\TCEAR.ear\META-INF\ibm-`
  `application-bnd.xmi`

where *<WAS_HOME>* is the WAS installation directory and *<host_name>* is the host name of the WAS server.

4. Modify the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager configuration files. Replace all instances of dc=ibm, dc=com with the updated values in all of the files listed below:

- **On Windows:**
  - `<CYGWIN_HOME>\home\thinkcontrol\config\user-factory.xml`
  - `<CYGWIN_HOME>\home\thinkcontrol\tools\was_security.jacl`

  where *<CYGWIN_HOME>* is the Cygwin installation directory.

- On AIX, Linux and Solaris:
  - `/home/thinkcontrol/config/user-factory.xml`
  - `/home/thinkcontrol/tools/was_security.jacl`

5. Start Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, WebSphere Application Server and IBM Directory Server.

Appendix B. Administrative Tasks

This chapter provides details on how to start and stop the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server, along with the instructions on accessing the main administrative console.

For further information on using Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager, refer to the *Operator's Guide*.

Starting the Server

Start the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server by doing the following:

- **Windows**:

  Log in as `tioadmin`. Click the **TIO_Start** icon on the desktop. You will be prompted to enter the WebSphere Application Server admin user name, which is the default `wasadmin` and the password. If you have not changed the password yet, the default password is `wasadmin`. Check the log file `<TIO_installdir>`/logs/tio_start.log for errors.

- **AIX**:

  1. Log in as user `tioadmin`.
  2. Switch to the `<TIO_installdir>`/tools directory.
  3. Run the command `./tio.sh start`. You will be prompted to enter the WebSphere Application Server admin user name, which is the default `wasadmin` and the password. If you have not changed the password yet, the default password is `wasadmin`.
  4. Check the log file `<TIO_installdir>`/logs/tio_start.log for errors.

- **Linux**:

  1. Log in as user `tioadmin`.
  2. Switch to the `<TIO_installdir>`/tools directory.
  3. Run the command `./tio.sh start`. You will be prompted to enter the WebSphere Application Server admin user name, which is the default `wasadmin` and the password. If you have not changed the password yet, the default password is `wasadmin`.
  4. Check the log file `<TIO_installdir>`/logs/tio_start.log for errors.

Stopping the Server

Stop the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server by doing the following:

- **Windows**:

  Log in as `tioadmin`. Click the **TIO_Stop** icon on the desktop. You will be prompted to enter the WebSphere Application Server admin user name, which is the default `wasadmin` and the password. If you have not changed the password yet, the default password is `wasadmin`. Check the log file `<TIO_installdir>`/logs/tio_stop.log for errors.

- **AIX**:

  1. Log in as user `tioadmin`.

2. Switch to the <*TIO_installdir*>/tools directory.
3. Run the command ./tio.sh stop. You will be prompted to enter the WebSphere Application Server admin user name, which is the default wasadmin and the password. If you have not changed the password yet, the default password is wasadmin.
4. Check the log file <*TIO_installdir*>/logs/tio_stop.log for errors.

Note: After stopping Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager and the WebSphere Application Server, some WebSphere client java processes may still be running. You can choose to manually kill these Java processes before restarting the servers by running the command: pkill -9 java

This command will kill all existing Java processes from the system.

- **Linux**:
  1. Log in as user tioadmin.
  2. Switch to the <*TIO_installdir*>/tools directory.
  3. Run the command ./tio.sh stop. You will be prompted to enter the WebSphere Application Server admin user name, which is the default wasadmin and the password. If you have not changed the password yet, the default password is wasadmin.
  4. Check the log file <*TIO_installdir*>/logs/tio_stop.log for errors.

Note: After stopping Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager and the WebSphere Application Server, some WebSphere client java processes may still be running. You can choose to manually kill these Java processes before restarting the servers by running the command: pkill -9 java

This command will force to kill all existing Java processes from the system.

Signing On to the System

Access the main Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager console by doing the following:

1. Open a Web browser and enter the following URL:

   http://<host_name>:9080/tcWebUI

   The Sign On screen is displayed.
2. Enter your user name and password. The default user name is tioappadmin and if you have not already changed the password, the default password is tioappadmin.

Signing Off From the System

To sign off from the system, click the Logoff button, which is located on the top, right-hand side of the screen. The Sign Off screen is displayed.

You will automatically be logged out of the system after thirty minutes of session inactivity.

Appendix C. Deploying Automation Packages

This appendix provides the guidelines for deploying Automation Packages, which may also be referred to as TC drivers. A default set of Automation Packages are installed when you install Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager.

Automation Packages Definition

Automation Packages are device drivers that support one particular type of software or physical device. It is a single package with a `.tcdriver` file extension that contains all of the workflows, database table entries, JAR files, and external scripts that are necessary to operate that physical device, for example a Cisco™ CSS11000 switch. All Automation Packages are located in the `$TC_HOME/drivers` directory on the Tivoli Intelligent Orchestrator or Tivoli Provisioning Manager server.

Contents of Automation Packages

Automation Packages are a single file in zip format having a specific internal structure. The structure of Automation Packages include the following directories:

command
: This directory contains all of the commands that are available for that specific physical device.

doc
: This directory contains the `readme.txt` file.

java-plugin
: This directory contains all of the Java plug-ins that are installed and used on that specific physical device.

TC-INF
: This directory contains the manifest file for the Automation Packages. For details on the content of the manifest file, refer to "Manifest File Contents."

workflow
: This directory contains a collection of workflows that have been developed to operate that specific physical device.

lib
: This directory contains any Java JAR files that need to be copied to the `<TC_HOME>/drivers/lib` directory and made available to the DE class path.

bin
: This directory contains any script files to be copied to a repository, for example `<TC_HOME>/bin`, which are then used by workflows.

Manifest File Contents

The manifest file for Automation Packages are an `.xml` file, `tc-driver.xml`, that contains the name and the version number of the Automation Packages, the version number of the Automation Packages template, and describes all of the driver's dependencies on other Automation Packages. The manifest file includes the following main sections:

<dependencies>
: This section lists all of the other drivers the current Automation Package depends on.

\<actions\>

This section lists all of the separate classes that are necessary to install separate items like Java drivers, commands, and so on.

\<items\>

This section lists all the items to be installed on the Automation Package. Each item identifies a certain operation that will be performed on that Automation Package.

\<device-models\>

This section lists all the items to be installed on the Automation Package. Each item identifies a certain operation that will be performed on that Automation Package.

\<post-install-workflows\>

This optional section names a workflow along with its parameters to be executed after all the items are installed. This workflow may be one installed by the current Automation Package, or one previously installed.

\<property\>

This optional section defines a macro substitution that can be used for any subsequent quoted strings in the manifest file, using an ″Ant like″ syntax. For example, if we have the following entry:

```
<property name="tc.pkg" location="com.thinkdynamics.kanaha.tcdrivermanager.action" />
```

then, wherever `${tc.pkg}` occurs in an attribute string inside `tc-driver.xml`, a substitution is made.

\<software=products\>

This section defines any software product entries to be installed in the Data Center Model database. The syntax is identical to the `<software>` element in the XML format used by the `xmlimport` utility, but has been extended to allow using the `${xxx}` properties substitutions within attribute values.

\<driver-name\>

Name of the driver

\<driver-version\>

Optional version number

\<description\>

Short, one sentence description of the purpose of this Automation Package.

\<documentation\>

Specifies the name of a text file in the Automation Package contents that provides an in-depth description and any special instructions. Here is an example of the syntax:

```
<documentation location="doc/readme.txt"/>
```

The following is an example of an .xml manifest file for the `AIX-Operating-System`:

Note: Some lines may be split in two, with the second line indented, for presentation purposes only. All lines, in particular those beginning with `<item name=` should be written on a single line with no line breaks.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
/****************************************************************
 * Licensed Materials - Property of IBM
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 * (C) Copyright IBM Corp.  2003
 * All Rights Reserved
```

```
      * US Government Users Restricted Rights -Use, duplication or
      * disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
      * ****************************************************************
      */
-->
<tc-driver>
 <tc-driver-format>1.0</tc-driver-format>
 <driver-name>AIX-Operating-System</driver-name>
 <version>1.0</version>

 <description>This Automation Package contains workflows for controlling
       AIX servers</description>
 <documentation location="doc/AIX-Operating-System.txt" />

 <dependencies>
                   <dependency name="core"/>
      </dependencies>
 <property name="tc.pkg" location="com.thinkdynamics.kanaha.tcdrivermanager.action"/>
 <actions>
  <action name="command" class="${tc.pkg}.SimpleCommandActions"/>
  <action name="copy-file" class="${tc.pkg}.CopyFileActions"/>
  <action name="workflow" class="${tc.pkg}.WorkflowActions"/>
  <action name="java-plugin" class="${tc.pkg}.JavaPluginActions"/>
 </actions>
 <items>

  <item name="repository/configIP.sh" action="copy-file">
   <param name="dest.path" value="${tc.home}/repository/AIX-Operating-System/configIP.sh"/>
   <param name="chmod" value="755" />
  </item>
  <item name="repository/configRoute.sh" action="copy-file">
   <param name="dest.path" value="${tc.home}/repository/AIX-Operating-System/configRoute.sh"/>
   <param name="chmod" value="755" />
  </item>
  <item name="doc/AIX-Operating-System.txt" action="copy-file">
   <param name="dest.path" value="${tc.home}/drivers/AIX-Operating-System.txt"/>
  </item>
<!--
  <item name="lib/AIX-Operating-System.jar" action="copy-file">
   <param name="dest.path" value="${tc.javaplugin.dir}/AIX-Operating-System.jar"/>
  </item>
-->

  <item name="java-plugin/com.ibm.thinkdynamics.javaplugin.software.AIX.
            GetRoutingTableInfo.xml"
          action="java-plugin"/>

  <item name="workflow/AIX Software Reboot Async.xml" action="workflow"/>
  <item name="workflow/AIX Software Reboot Sync.xml" action="workflow"/>
  <item name="workflow/AIX Copy File from Local.xml" action="workflow"/>
  <item name="workflow/AIX Remote Remove File.xml" action="workflow"/>
  <item name="workflow/AIX chdev an Interface.xml" action="workflow"/>
  <item name="workflow/AIX Add IP Address.xml" action="workflow"/>
  <item name="workflow/AIX Remove IP Address.xml" action="workflow"/>
  <item name="workflow/AIX Check OS Install.xml" action="workflow"/>
  <item name="workflow/AIX Apply Routing Table.xml" action="workflow"/>

 </items>

 <device-models>
  <device-model name="AIX Operating System" category="Software Products">
   <workflow name="AIX Software Reboot Async"/>
   <workflow name="AIX Software Reboot Sync"/>
   <workflow name="AIX Add IP Address"/>
   <workflow name="AIX Remove IP Address"/>
   <workflow name="AIX Check OS Install"/>
   <workflow name="AIX Apply Routing Table"/>
```

```
    </device-model>
  </device-models>

<!--
 <software-products>
   <software name="AIX" is-device-model="AIX Operating System" version="5.0"
     package_path="_" install_path="_" type="OPERATING_SYSTEM">
   </software>
 </software-products>
-->

  </tc-driver>
```

Automation Package Manager

Automation Package Manager is a utility that manages the Automation Packages.
It requires a configuration file, `$TC_HOME/config/tcdrivermanager.xml`, which
defines the location of the directory holding the drivers, and any other
`<properties>` definitions that are common to all Automation Packages. It also uses
`dcm.xml` and `objectview.prop` for database connection information. The
Automation Package Manager can run independently from any other Tivoli
Intelligent Orchestrator engines.

Commands for the tc-driver-manager

All of the commands available for the tc-driver-manager are briefly described in
the following table. The syntax for these commands has the following format:

`tc-driver-manager <method-name> <param1> <param2>`

Method	Parameter	Description
listAllStr	none	It returns a formatted list of Automation Package names, version, and installation status, and should be used for command line calls through the SOAP command-line interface.
installDriver	<driverName>	It installs the specified driver.
forceInstall- Driver	<driverName>	Forcibly re-installs Automation Package items even if they are already installed. Used primarily during Automation Package development and troubleshooting.
uninstallDriver	<driverName>	It uninstalls the specified driver.
getDriverStatus	<driverName>	It queries the status of the specified driver. The returned values can be: - installed, which means that the driver has been installed successfully from a driver file. - installed-permanent, which means that the driver is installed as part of the system installation, but has no driver file. This driver cannot be uninstalled. - not-installed, which means that the driver is not installed in the DCM, but exists as a drive file. - installation-in-progress, which means that the driver installation is in progress. - failed-to-install, which means that the driver installation failed.

`listDeviceModels`	none	It returns a list of all installed device models and, for each device model, the Automation Package that defined it.
`getDescription`	<driverName>	Returns a short description of the Automation Package
`getDocumentation`	<driverName>	Displays a readme file for the Automation Package to stdout.
`listInstalledDeviceModels`	none	List of device models only for installed Automation Packages.

For example, to get the status of the Simulator driver, the command line should be:

`tc-driver-manager getDriverStatus simulator`

where getDriverStatus is the `<method-Name>`, and simulator is the `driverName`.

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