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Part 1. Overview

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

- Chapter 1, “About this book,” on page 3
- Chapter 2, “Preinstallation requirements,” on page 5
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 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
• 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:

<table>
<thead>
<tr>
<th>Open Source Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jasperreports 0.5.0</td>
<td>HTML/XML Generating Reporting Tool</td>
</tr>
<tr>
<td>Itext 0.81</td>
<td>Utility to generate PDF files from HTML</td>
</tr>
<tr>
<td>POI 1.5.1</td>
<td>Create OLE 2 Compound Document Format Using Java</td>
</tr>
<tr>
<td>JMGMT 1.1b</td>
<td>SNMP monitors</td>
</tr>
<tr>
<td>Xalan-j 2.3-1</td>
<td>XSLT, Xpath processor, XML code generator</td>
</tr>
<tr>
<td>Log4j.jar 1.2.8</td>
<td>Logging facility library</td>
</tr>
<tr>
<td>Commons-beanutils.jar 1.1</td>
<td>Wrapper for Java reflection and introspection</td>
</tr>
<tr>
<td>Commons-collections.jar 1.0</td>
<td>Collections. Used by Jasper Report</td>
</tr>
<tr>
<td>Commons-digester.jar 1.1</td>
<td>XMI to Java mapping. Used by Jasper Report</td>
</tr>
<tr>
<td>Avalon 4.0</td>
<td>Java common framework</td>
</tr>
<tr>
<td>Xerces2 Java Parser 2.1</td>
<td>Parser for XML files to XML Java Objects</td>
</tr>
<tr>
<td>Jaxen 1-0-FCS</td>
<td>Xpath engine for Java BSD</td>
</tr>
</tbody>
</table>

Chapter 2. Preinstallation requirements
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,” on page 11
- Chapter 4, “Windows Pre-Installation Requirements,” on page 13
- Chapter 5, “AIX Pre-Installation Requirements,” on page 25
- Chapter 6, “Linux Pre-Installation Requirements,” on page 39
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.

<table>
<thead>
<tr>
<th>User name</th>
<th>Default Password</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 1dap.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 1dap.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 1dap.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 1dap.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_inсталldir>\home\thinkcontrol, where <Cygwin_inсталldir> 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.

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

1. 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
   ```

14   IBM Tivoli Intelligent Orchestrator and Tivoli Provisioning Manager, Version 1.1.1: Installation Guide
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>\SQL11B 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:

    DB21402I License added successfully.
    DB21426I 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.

   `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.

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

   `db2 create tablespace <db_name>`

   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 on 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 to the IBM Directory Server 5.1 documentation at the following URL:


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>:\Program Files\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 .1dif 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_installldir>\home\thinkcontrol, where 
<Cygwin_installldir> 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.

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

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` located in `\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` 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.

```java
# 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:

```java
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:

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

and change it to:

```java
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 to 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:

```bash
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:

**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:

```
```

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/.id_rsa
   $ cat $HOME/.id_rsa.pub >> $HOME/.ssh/authorized_keys

2) You can test this by running: ssh -v tiodmin@<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 tiodmin 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 connect 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:

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 db2adm). 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:
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 1dap.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:
      ```bash
      <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:
      ```bash
      <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:

**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:

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:

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

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


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 ssdh

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:

```bash
mgroupp sshd
mkuser -a pgrp=sshd login=false home=/var/empty
gcos="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:

```bash
ssh-keygen -t rsa -N "" -f $HOME/.ssh/id_rsa
```

```bash
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 tiodmin 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 tiodmin.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+rwx dltmqm nd endmqm strmqm endmq1sr runmqsc

g. Switch to the ‘run as’ user, tiodmin, 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 tiodmin. using the command:
   
   chown -R tiodmin.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/sqlib/db2profile ]; then
      . /home/db2inst1/sqlib/db2profile
   fi
   ```

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

      ```
      Export LD_LIBRARY_PATH=/home/db2inst1/sqlib/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 readme 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 `tiadmin` 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 3b 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 connect 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:


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=tiodap and the default password tiodap. 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\Apps\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.
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 45
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:

   g. Verify that you can see all of the users that are in the 1dif 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 3 for the changes to take effect.
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 [on page 47](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:

```bash
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.

```bash
# 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:

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

and change it to:

```bash
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:

```bash
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.

```bash
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\fixes`... 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+rwx crtmqm dltemqm endmqm strmqm endmqqlsr 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/sqlib/db2profile ]; then
  . /home/db2inst1/sqlib/db2profile
fi
```
d. Add the following lines to /home/thinkcontrol/.profile

```
Export LD_LIBRARY_PATH=/home/db2inst1/sqlib/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](http://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:

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 rsa -f /usr/local/etc/ssh_host_rsa_key -N ""
         ssh-keygen -t dsa -f /usr/local/etc/ssh_host_dsa_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.

```bash
#!/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/.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/sqlib/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/.bash ] && . $HOME/.bashrc

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 Orchestration 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:


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 Orchestration. 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 user’s, 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 Orchestration 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 1dap.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
      ./autosf stop
      ./autosf 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:

   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-gui\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_rsa_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:
#!/bin/sh
pid='/usr/bin/ps -e | /usr/bin/grep sshd | /usr/bin/sed -e 's/\^*//g' -e 's/.*//g'
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 untaared 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 

<WS_installdir>\update\fixes\... 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:

```bash
# chown -R tioadmin:mqbrkrs *
# cd /opt/mqm/bin; chmod o+r+x 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 <WS_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+r+x crtmqm dltmqm nd endmqm strmqm endmqlsr runmqsc
```

`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>
```

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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:

```bash
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:

   ```bash
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/sqlib/db2profile ]; then
   . /home/db2inst1/sqlib/db2profile
   fi
   ```

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

   ```
   Export LD_LIBRARY_PATH=/home/db2inst1/sqlib/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
   - 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:
      
      \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:

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 ldif1ldap 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.

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 `<drive>`\cygwin\home\thinkcontrol is where you will install Tivoli 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 tiodldap.
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:

• [lb on page 23](#)
• [lb on page 37](#)
• [lb on page 49](#)

Database owner name
Enter the default database user name tioldb.

Password
Enter the default password for the tioldb 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:


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 L0CKTIME0UT=-1 (no timeout). The Tivoli Provisioning Manager installation runs a script to change the L0CKTIME0UT value to 120.

---

**The next step**

After installing Tivoli 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 81.

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 `1dif.1dap` 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.

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 ldiff.1dap 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.

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_installldir/tools directory, where TIO_installldir 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 wasnadmin user name and password. After using the changePassword command to change the wasnadmin password, stop the server and enter the old wasnadmin password. When starting the server, with the tio.sh start command, use the new wasnadminpassword.

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.xml`
- `<WAS_HOME>\installedApps\<host_name>\TCEAR.ear\META-INF\ibm-application-bnd.xml`

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/11b 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.
</actions>

<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.
</items>

<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.
</device-models>

<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.
</post-install-workflows>

<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.
</property>

<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.
</software=products>

<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"?>
<!--
/********************************************************************************
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-->
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*---------------------------------------------------------------------*/
<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="java-plugin/com.ibm.thinkdynamics.javaplugin.software.AIX.GetRoutingTableInfo.xml" action="java-plugin"/>
</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-models>
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>

<table>
<thead>
<tr>
<th>Method</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>listAllStr</td>
<td>none</td>
<td>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.</td>
</tr>
<tr>
<td>installDriver</td>
<td>&lt;driverName&gt;</td>
<td>It installs the specified driver.</td>
</tr>
<tr>
<td>forceInstallDriver</td>
<td>&lt;driverName&gt;</td>
<td>Forcibly re-installs Automation Package items even if they are already installed. Used primarily during Automation Package development and troubleshooting.</td>
</tr>
<tr>
<td>uninstallDriver</td>
<td>&lt;driverName&gt;</td>
<td>It uninstalls the specified driver.</td>
</tr>
<tr>
<td>getDriverStatus</td>
<td>&lt;driverName&gt;</td>
<td>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.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>listDeviceModels</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It returns a list of all installed device models and, for each device model,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the Automation Package that defined it.</td>
<td></td>
</tr>
<tr>
<td>getDescription</td>
<td>&lt;driverName&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Returns a short description of the Automation Package.</td>
<td></td>
</tr>
<tr>
<td>getDocumentation</td>
<td>&lt;driverName&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Displays a readme file for the Automation Package to stdout.</td>
<td></td>
</tr>
<tr>
<td>listInstalledDeviceModels</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>List of device models only for installed Automation Packages.</td>
<td></td>
</tr>
</tbody>
</table>

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`.  

Appendix C. Deploying Automation Packages 91
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