

COMPAQ

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SCO UNIX Database Servers in Novell Networks

Compaq TechNote

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SCO UNIX Database Servers in Novell Networks

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Chapter 1

Overview

This TechNote explains how to install and configure a COMPAQ SYSTEMPRO Personal Computer System running SCO UNIX and ORACLE RDBMS as a database server in a NetWare network. The result is a NetWare workstation that can transparently access ORACLE data from a COMPAQ and SCO UNIX server. The end user need not know that the database information is coming from a UNIX-based server. This TechNote discusses two methods of implementation: the SPX/IPX Integrated Platform and the TCP/IP Integrated Platform.

Client-Server Computing

Client-server computing is based on the concept of cooperative processing between "front-end" and "back-end" computers each running separate programs that communicate with each other. The most common form of client-server computing is based on a distributed relational database model using these two major components.

The front-end computer is a personal computer and/or workstation used for data entry, graphical display, and to locally process subsets of data from back-end database servers. In contrast to the traditional minicomputer/ mainframe model of computing, less expensive front-end PCs and workstations are used to off load expensive host processing cycles.

The second component is the back-end database engine. Back-end servers can intelligently select and send subsets of data to front-end PCs for further processing. These sophisticated back-end database engines offer significantly more capacity, security, data integrity, and intelligence than the earlier PC LAN database servers.

Computing Models

The computing models defined in this TechNote are based on organizational productivity. These models integrate client-server computing into corporate-wide networks, provide the individual with access to corporate data, and preserve personal productivity computing. Corporate minicomputer applications are being rewritten for client-server platforms in a process called "applications rightsizing."

As applications migrate from minicomputers to client-server platforms, back-end servers must offer better price, performance, and functionality levels than the platforms they replace. Together, Compaq Computer Corporation and The Santa Cruz Operation, Inc. (SCO) offer database server solutions that support high-performance multiprocessor technology, open systems solutions, robust communications, and robust multitasking capabilities. These qualities make a COMPAQ and SCO UNIX platform an ideal choice for a database server.

SPX/IPX Platform Overview

This platform uses only the SPX/IPX protocol stack for both NetWare services as well as the ORACLE database services. This TechNote explains:

- This "single-protocol" platform
- Installing SPX/IPX in an SCO UNIX and ORACLE database server
- Accessing the database server from a NetWare workstation

There are two primary advantages of the SPX/IPX Integrated Platform over a TCP/IP Integrated platform. The SPX/IPX Integrated Platform is less expensive and easier to administer. No additional protocol software is required at the workstation.

TCP/IP Platform Overview

This platform uses a "dual-protocol" stack of both SPX/IPX and TCP/IP protocols at the workstation. NetWare services are available with the SPX/IPX stack and the ORACLE database services are available with the TCP/IP stack. The workstation software that provides this dual stack is LAN WorkPlace for DOS from Novell.

The primary advantage of the TCP/IP Integrated Platform is that it offers SCO UNIX services as well as standard NetWare services. This means that all of the capabilities of UNIX are available to the NetWare user.

Front-End Tools

This TechNote details the installation of two popular front-end tools: PowerBuilder and Forest & Trees. PowerBuilder is used to develop client-server applications that can input data as well as query existing databases. Forest & Trees is used to perform ad hoc queries and to develop applications that query existing databases. It also has the ability to process the data further in a variety of interesting ways, such as graphing data, providing automatic querying with alarms, and providing drill-down views of data (windows with successively more detail).

Refer to the documentation that comes with these products for more information.

Chapter 2

SPX/IPX Platform

This chapter provides you with the information to produce the SPX/IPX model. The following sections describe the SPX/IPX Platform and provide installation instructions.

Platform Components

The following figure illustrates the entire SPX/IPX Platform:

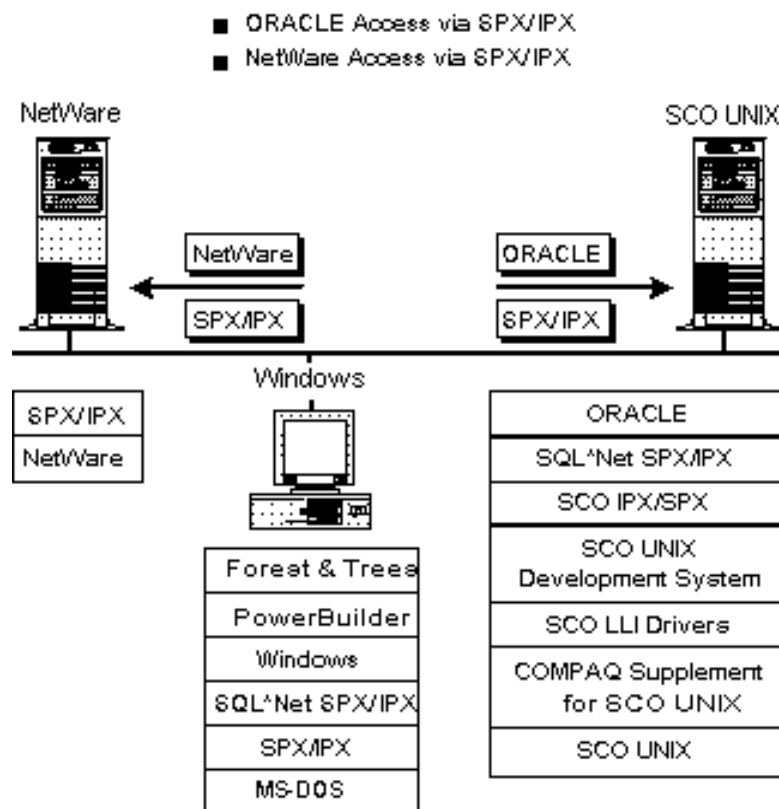


Figure 2-1. SPX/IPX Platform

The following table lists the components you will install on the NetWare server, the Windows workstation, and the SCO UNIX database server using this TechNote:

Table 2-1
Software Components to Install

NetWare Server	Windows Workstation	Database Server
none	SQL*Net SPX/IPX for DOS Version 1.1	SCO LLI Drivers Version 3.1
	PowerBuilder Version 2.0	SCO IPX/SPX Version 1.0
	Forest & Trees Version 2.0c	SQL*Net SPX/IPX for UNIX Version 1.1.0

Platform Concepts

It is important to understand some of the basic concepts used in this platform. The following sections explain SPX/IPX network addressing and operating system transparency.

SPX/IPX Network Addressing

NetWare network addresses are based on two numbers: the "external network number" and an "internal network number."

The external network number identifies a "logical network" and must be the same for all servers on the same logical network. It is possible for two logical networks to share the same physical network cable.

The internal network number refers to a specific machine and must be unique within a given external logical network. Usually, this address is written in hexadecimal notation. In this TechNote, we use the hexadecimal number, 0x12A34B, for the workstation.

Operating System Transparency and ORACLE Connect Strings

To establish a session with an ORACLE database server, the client must send a connect string to the server along with an ORACLE login ID and an ORACLE password. The connect string usually contains three fields of information: the protocol abbreviation, the server name, and the database identifier. For example, to log in via SPX/IPX to a UNIX server named *unxserv* where an ORACLE database identified as *orac* is running, you would use the following connect string:

```
x:unxserv:orac
```

The only change needed to log in to the same server and database via TCP/IP is to replace the letter "x" in the connect string with the letter "t."

```
t:unxserv:orac
```

The connect string is nearly identical for connecting to a NetWare and ORACLE server. For example:

```
x:orasrv  
t:nwsvr:orasrv
```

The result is that the end user need not know whether the data source is an ORACLE server running on UNIX or running on NetWare.

Pre-Installation Assumptions

This TechNote assumes two existing conditions:

- An operational NetWare network (NetWare 3.11 server with SPX/IPX is communicating with an MS-DOS workstation running Microsoft Windows).
- A COMPAQ SYSTEMPRO running SCO UNIX and ORACLE as a database server is physically connected on the same network, but has no network interface card (NIC) drivers or protocol stacks installed.

The following figure illustrates the configuration you should have in place before beginning this installation:

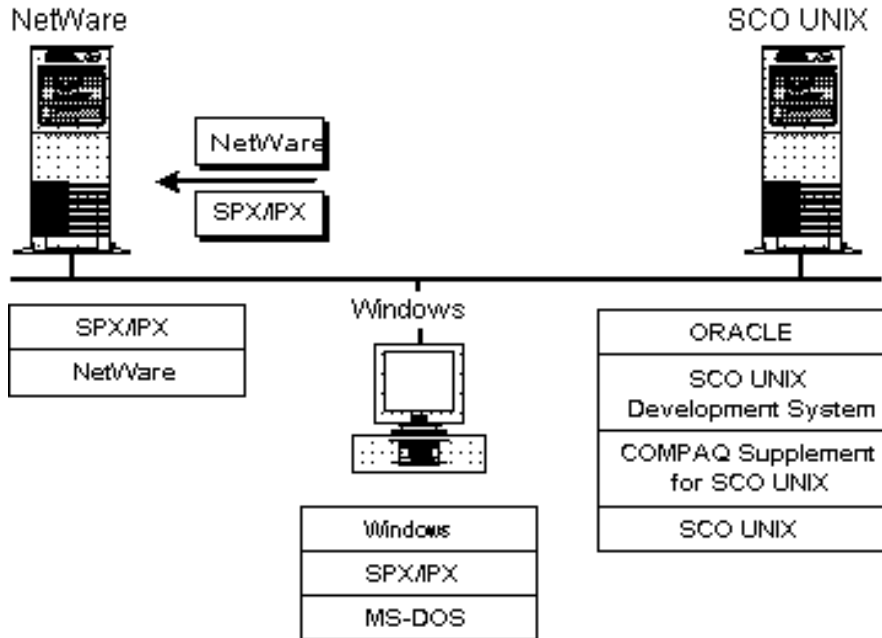


Figure 2-2. Pre-installed Software

If you have not completed this type of installation, you can refer to the *Compaq and Novell Integration ToolKit* and the *Compaq and SCO Client-Server ToolKit*, both published by Compaq Computer Corporation.

SCO UNIX Database Server

The following list describes the database server components you should have installed before you begin:

- COMPAQ SYSTEMPRO installed as a server
- Appropriate Ethernet network interface card (NIC) and cable
- SCO UNIX System V/386 Release 3.2 Version 4
- SCO UNIX Maintenance Supplement 4.1.0d
- COMPAQ Supplement for SCO UNIX
(COMPAQ EFS for SCO UNIX Version 1.4)
- SCO UNIX Development System Release 3.2 Version 4
- ORACLE Relational Database Management System (RDBMS) Version 6.0.33 (includes SQL*Net TCP/IP for UNIX)

NetWare Server

The following list describes the NetWare server components you should have installed before you begin:

- COMPAQ 386 or 486-based server (minimum)
- NE2000 Ethernet (or other suitable NIC)
- NetWare v3.11 from Compaq
(includes SPX/IPX)

In addition, be sure to have a working SPX/IPX connection. The following display is an example of the assumed *autoexec.ncf* file for the NetWare server:

```
file server name NWFS1
ipx internal net 12A34B

bind IPX to ipxlan net=101
```

Windows Workstation

The following list describes the workstation components you should have installed before you begin:

- COMPAQ 386sx-based PC (minimum)
- NE2000 Ethernet (or other suitable NIC)
- MS-DOS 5.0, as published by Compaq, located in the directory, *c:\dos*
- Microsoft Windows 3.1 located in the directory, *c:\windows*
- NetWare 3.11 Workstation Software in the directory, *c:*

In addition, the Windows workstation should be able to validate the SPX/IPX connection by logging in to the NetWare server. The following displays are *examples* of the assumed *autoexec.bat* and *config.sys* files for the Windows workstation:

autoexec.bat

```
c:\windows\smartdrv.exe
prompt $p $g
path c:\windows;c:\dos
temp=c:\windows\temp
c:\ipx.com
c:\netx.com
```

config.sys

```
device=c:\windows\himem.sys
files=20
buffers=30
stacks=9,256
```

Installing the SCO UNIX Database Server

During installation, certain configuration files are altered. The following table lists the files altered during the installation procedures:

Table 2-2
Altered SCO UNIX Database Server Configuration Files

Procedure	File
SPX/IPX configuration	<i>/etc/ipx.d/NPSConfig</i>
ORACLE configuration	<i>\$ORACLE_HOME/.profile</i>

The procedures to install the SCO UNIX database server include:

- Installing the SCO LLI drivers and SCO IPX/SPX with **custom**
- Configuring the LLI chain, the NIC driver, and the protocol stack with **netconfig**
- Configuring a software-configurable NIC
- Validating the NIC installation
- Installing ORACLE SQL*Net SPX/IPX

Complete the procedures in the order presented in the following sections.

Installation Tips

- To verify software versions of ORACLE, enter

```
/u/oracle/install/prtversion.sh -f list
```

Then, view the *list* file.

- To install UNIX software from a 5 1/4-inch drive 1 using **custom**, enter

```
custom -m /dev/rfd196ds15
```

Installing SCO LLI Drivers and SCO IPX/SPX

The following procedures use the **custom** utility to install both the LLI drivers and SCO IPX/SPX.

SCO LLI Drivers

To install the LLI drivers, complete the following steps:

1. Start the **custom** utility from the UNIX system prompt by entering

```
custom
```
2. In sequence, select *Install* → *A New Product* → *Packages*.
3. After inserting the SCO LLI Drivers diskette at the prompt, press **ENTER**.
4. Use the space bar to select the NIC you are using. For example, if you want to install the SMC/Western Digital driver, select *wdn* and press **ENTER**.
5. When prompted for the diskette (already in place), press **ENTER**.
6. After reading the **netconfig** prompt, press **ENTER**.



IMPORTANT: You cannot use **netconfig** to configure the driver until after you install the protocol stack.

SCO IPX/SPX

Continue using the **custom** utility to install SCO IPX/SPX:

1. Select Install → A New Product → Entire Product.
2. After inserting the SCO IPX/SPX diskette at the prompt, press **ENTER**.
3. To continue, press **ENTER**.
4. After reading the **netconfig** prompt, press **ENTER**.
5. Quit **custom** by entering
q
6. Confirm the exit by entering
y

Configuring the LLI Chain, the NIC Driver, and the Protocol Stack

The following procedures use the **netconfig** utility to configure the LLI chain, the NIC driver, and the protocol stack.

LLI Chain

To configure the LLI chain, complete the following steps:

1. At the system prompt, enter
netconfig
 2. Select *1-add a chain*, by entering
1
 3. Select the top level of the chain, *1-sco_ipx*, by entering
1
 4. Select the next level of the chain, *1-wdn0*, by entering
1
 5. To add the chain (*sco_ipx wdn0*), enter
y
-

NIC Driver

Continue using **netconfig** to configure the NIC driver as follows:

1. "IRQ," enter the interrupt number. For example:
2
2. For the "I/O Base Address," enter the appropriate address.
For example:
240
3. For the "RAM Base Address," enter the appropriate address.
For example:
d0000
4. For the "RAM Size in K," enter the appropriate size. For example:
16

Protocol Stack

Continue using **netconfig** to configure the protocol stack as follows:

1. For the "MAX # of NVT LOGINS," enter
16
2. For the "SAP REPLY DELAY," enter
1
3. For the "INTERNAL NETWORK NUMBER," enter the appropriate
number. For example:
0x12A34B
4. For the "LAN TYPE," indicate 802.3 by entering
2
5. For the "PROTOCOL NUMBERS," indicate the default (-2)
by entering
2

6. At the "Do you wish to add pseudo-ttys?" prompt, enter

n

7. Press **ENTER** to continue.

8. Quit **netconfig** by entering

q

9. When asked if you want to relink the kernel now, answer yes
by entering

y

10. When asked if you want this kernel to boot by default, answer yes
by entering

y

11. When asked if you want the kernel environment rebuilt, answer yes
by entering

y

Do not reboot the system yet. Continue to the next procedure,
"Configuring a Software-Configurable NIC."

Configuring a Software-Configurable NIC

With some network interface cards, you can configure the communications parameters with software. This section applies specifically to such hardware and uses SMC/Western Digital NICs as examples. In such cases it is useful to configure the NIC driver before configuring the NIC. (See "Configuring the NIC Driver" earlier in this chapter.) Following this order ensures that UNIX can resolve any hardware conflicts first. Once you configure the driver, use the following procedure to configure software-configurable NICs.

1. in single-user mode by entering
init 1
2. Start the appropriate setup program for your NIC. For example, to configure SMC/Western Digital cards, enter
wdnsetup
3. When asked if you want to change the setup, answer yes by entering
y
4. For the "I/O Base Address," enter the appropriate address.
For example:
240
5. For the "IRQ," enter the interrupt number. For example:
2
6. For the "RAM Base Address," enter the appropriate address.
For example:
0D0000
7. Enable "Link Integrity," by entering
e
8. Disable ROM by entering
y
9. To save the new setup, enter
y

Validating the NIC Installation

To validate the NIC installation, complete the following steps:

1. Reboot the system by entering
`init 6`
2. Examine the Boot Screen. If the 48-bit hardware address displays on the screen with the %wdn line, the NIC is registered properly.
3. Change to multiuser mode by pressing **CTRL + D**.
4. Watch the boot sequence to see that IPX/SPX started properly. You should see the following:

```
Starting IPX/SPX: npsd sapd nvtd xechod
```

Installing ORACLE SQL*Net SPX/IPX

The ORACLE SQL*Net SPX/IPX installation includes:

- Loading the SQL*Net SPX/IPX files into *ORACLE_HOME*
 - Running **oracle.install** as *root*
 - Running **oracle.install** as *oracle*
-

Loading SQL*Net

Use the following procedure to load SQL*Net into *ORACLE_HOME*.

1. Log in to the SCO UNIX database server as the user, *oracle*.
2. Enter the appropriate password. For example:

```
oraclepwd
```
3. Insert the SQL*Net SPX/IPX V 1.0 diskette in the diskette drive.
4. Enter one of the following:
 - ❑ To install from a 3 1/2-inch diskette in drive 0, enter

```
cpio -icBvd < /dev/fd0135ds18
```
 - ❑ To install from a 5 1/4-inch diskette in drive 0, enter

```
cpio -icBvd < /dev/fd096ds15
```

Installing as Root

After loading SQL*Net you must run **oracle.install** as *root*. The following procedure provides instructions:

1. Log in as *root*.
 2. Change directories to *\$ORACLE_HOME/install* by entering
`cd /u/oracle/install`
 3. Run **oracle.install** by entering:
`./oracle.install`
 4. Continue by pressing **ENTER**.
 5. Accept the default *\$ORACLE_HOME* directory (*/u/oracle*) by pressing **ENTER**.
 6. Accept the default owner of the ORACLE database (*oracle*) by pressing **ENTER**.
 7. Enter your operating system choice:
 - For SCO UNIX, enter
1
 - For SCO UNIX with MPX, enter
2
 8. Accept the default (*orac*) as the ORACLE system identifier by pressing **ENTER**.
 9. When asked if you want to save install output, answer yes by entering
y
 10. Accept the default name of the log file (*/u/oracle/install/install.log*) by pressing **ENTER**.
 11. When asked if you want to overwrite, answer yes by entering
y
 12. Select Fresh Install from Scratch by entering
1
-

13. Answer yes to "Run Root install" by entering

y

14. Accept the default local bin directory (*/usr/bin*) by pressing **ENTER**.

15. Answer yes to "Install oracle man pages" by entering

y

16. At "Install SQL*Net TCP/IP," quit **oracle.install** by entering

q

Installing as Oracle

After running **oracle.install** as *root*, you must run **oracle.install** as the user, *oracle*. To do so, complete the following steps:

1. Log in as *oracle*.

2. Change directories to *\$ORACLE_HOME/install* by entering

cd install

3. Run **oracle.install** to install the SPX package by entering

./oracle.install spx

4. Press **ENTER** to continue.

5. Accept the default *\$ORACLE_HOME* directory (*/u/oracle*) by pressing **ENTER**.

6. Accept the default owner of the ORACLE database (*oracle*) by pressing **ENTER**.

7. Enter your operating system choice:

For SCO UNIX, enter

1

For SCO UNIX with MPX, enter

2

8. Accept the default (*orac*) as the ORACLE system identifier by pressing **ENTER**.

9. When asked if you want to save install output, answer yes by entering
y

10. Accept the default name of the logfile (*/u/oracle/install/install.log*) by pressing **ENTER**.

11. When asked if you want to overwrite, answer yes by entering
y

12. Select *Fresh Install from Scratch* by entering
1

13. Answer no to "Relink ORACLE executables?" by entering
n

14. Answer yes to "Bring down database to add SQL*Net drivers"
by entering
y

NOTE: At this point the ORACLE executables are relinked (regardless of the previous questions).

15. To complete the SQL*Net SPX/IPX installation, log out and log back in as *oracle*.

Installing the Windows Workstation

The following table lists the configuration files altered during the installation procedures:

Table 2-3
Altered Windows Workstation
Configuration Files

Procedure	File
SPX/IPX configuration	<i>c:\autoexec.bat</i>
ORACLE configuration	<i>\$ORACLE_HOME\config.ora</i>

The procedures for installing the Windows workstation include:

- Installing SCO IPX/SPX DOS Component
- Validating the network connection
- Installing SQL*Net SPX/IPX
- Configuring SQL*Net SPX/IPX
- Validating the database connection
- Installing PowerBuilder
- Validating the PowerBuilder connection
- Installing Forest & Trees
- Validating the Forest & Trees connection

The following sections describe these procedures.

Installing SCO IPX/SPX DOS Component

To install SCO IPX/SPX DOS Component on the Windows workstation, complete the following steps:

1. Insert the DOS Component Disk in drive A.
2. Copy **nvt.exe** to the hard disk by entering the following command at the system prompt:

```
copy a:nvt.exe c:\
```

Validating the Network Connection

Use the following procedure to validate the network connection:

1. Boot the SCO UNIX database server in multiuser mode.
2. From the Windows workstation, start **nvt.exe** by entering

```
nvt
```

3. To validate the IPX/SPX connection from the Windows workstation, press **ALT + T**.
If a popup window appears, IPX/SPX is loaded. If UNXSERV displays in that window, the network (IPX/SPX) connection is working.
4. To quit, press **ESC**.

Installing ORACLE SQL*Net SPX/IPX for DOS

The procedures for installing SQL*Net SPX/IPX include:

- Installing the DOS Install diskette
- Installing the DOS Required Support Files
- Installing the DOS Utilities
- Installing the SQL*Net SPX/IPX software

The following sections describe these procedures.

Installing the DOS Install Diskette

To install the DOS Install diskette, complete the following steps:

1. Insert the DOS Install Disk diskette into the diskette drive of the Windows workstation.
2. Enter the following command preceded by the drive designator.
For example:

```
a:orainst
```
3. At the prompt to continue, enter

```
c
```
4. When prompted for the drive from which you are installing, enter the appropriate drive letter. For example:

```
a
```

5. When prompted for the drive and path where you want to install ORACLE, accept the default (*c:\oracle6*) by pressing **ENTER**.
 6. When prompted for the drive from which you boot your computer, accept the default (drive c) by pressing **ENTER**.
 7. When asked if you want *config.sys* changed automatically, accept the default (yes) by pressing **ENTER**.
 8. When asked if you want *autoexec.bat* changed automatically, accept the default (yes) by pressing **ENTER**.
 9. Remove the diskette and reboot the Windows workstation.
 10. Again insert the DOS Install diskette into the diskette drive.
 11. From the MS-DOS system prompt, execute **orainst** by entering
orainst
 12. At the prompt to continue, enter
c
 13. When prompted for the drive from which you are installing, accept the default (drive A) by pressing **ENTER**.
 14. When prompted for the drive and path where you want to install ORACLE, accept the default (*c:\oracle6*) by pressing **ENTER**.
-

Installing the DOS Required Support Files

To install the DOS Required Support Files, complete the following steps:

1. Insert the DOS Required Support Files diskette into the diskette drive.
2. Select *Install Product* by pressing **ENTER**.
3. At the prompt to continue, enter
c
4. Select *compaq* and press **ENTER**.
5. Select the machine type (or a machine type that has the same processor).
6. Confirm the machine type, by pressing **ENTER**.
7. Return to the Installation main menu, by pressing **ENTER**.

Installing the DOS Utilities

To install the DOS Utilities, complete the following steps:

1. Insert the DOS Utilities Disk 1 diskette into the diskette drive.
2. Select *Install Product* by pressing **ENTER**.
3. At the prompt to continue, enter
c
4. Select *Protected Mode Only* by pressing **ENTER**.
5. At the prompt to continue, enter
c
6. Replace the DOS Utilities Disk 1 diskette with the DOS Utilities Disk 2 diskette.
7. At the prompt to continue, enter
c
8. Replace the DOS Utilities Disk 2 diskette with the DOS Utilities Disk 3 diskette.
9. At the prompt to continue, enter
c

Install SQL*Net SPX/IPX for DOS

To install SQL*Net SPX/IPX for DOS, complete the following steps:

1. Insert the SQL*Net SPX diskette into the diskette drive.
 2. Select *Install Product* by pressing **ENTER**.
 3. At the prompt to continue, enter
c
 4. When complete, exit by pressing **F10**.
-

Configuring SQL*Net SPX/IPX for DOS

Configuring SQL*Net involves editing the *config.ora* and *autoexec.bat* files. The following sections provide instructions for editing those files.



IMPORTANT: After editing the files, reboot the computer for the changes to take effect.

Editing CONFIG.ORA

Using the editor of your choice, add the following lines to the *config.ora* file:

```
local=x:hostname:oracle_sid
```

For example:

```
x:unxserv:orac
```



IMPORTANT: Be sure to enter this first line with all lower case letters.

```
dynamic_memory=1000
```

NOTE: This entry reserves 1 megabyte of system memory for ORACLE products and leaves the remainder for Microsoft Windows to manage.

When finished, *config.ora* should contain the following lines:

```
local=x:unxserv:orac
dynamic_memory=1000
```

Editing AUTOEXEC.BAT

Using the editor of your choice, add the following lines to the *autoexec.bat* file:

```
c:\oracle6\bin\sqlpme.exe  
c:\oracle6\bin\sqlspx.exe
```

These lines add the SQL*Net Protected Memory Manager and SQL*Net SPX/IPX for DOS. When finished, *autoexec.bat* should contain the following lines:

```
@echo off  
prompt $p $g  
break on  
path c:\oracle6\pbin;c:\oracle6\bin;c:\windows;c:\dos  
set config=c:\oracle6\config.ora  
set temp=c:\windows\temp  
c:\ipx.com  
c:\netx.com  
c:\oracle6\bin\sqlpme.exe  
c:\oracle6\bin\sqlspx.exe
```

Verifying CONFIG.SYS

Verify that the *config.sys* file contains the following lines. If not, use the editor of your choice and modify the file.

```
device=c:\windows\himem.sys  
files=40  
buffers=30  
stacks=9,256  
break=on
```

Validating the Database Connection

Validating the database connection involves starting ORACLE on the UNIX database server and connecting with the **sqldba** utility from the Windows workstation. The following section provides the validating procedures using the demonstration database provided by ORACLE. For this sample database, the ORACLE ID is **scott** and the password for accessing the database is **tiger**.

UNIX Database Server

To begin validation, complete the following steps from the UNIX database server:

1. Boot the UNIX database server in multiuser mode.
2. Log in as the user, *oracle*, by entering the user name:

`oracle`

3. Enter the password. For example:

`oraclepswd`

4. Start the RDBMS by entering

`sqldba startup`

Windows Workstation

To continue with the validation, complete the following steps from the Windows workstation:

1. Start the Windows workstation, but do not start Microsoft Windows.

2. At the system prompt, enter

```
sqldba
```

3. Once connected, enter the ORACLE ID:

```
scott
```

4. Enter the password

```
tiger
```

If the connection is successful, the following displays on the screen:

```
connected
```

5. Enter the following SQL statement

```
select table_name from user_tables;
```

The following displays on the screen:

```
BONUS  
DEPT  
DUMMY  
EMP  
IAPXTB  
SALGRADE  
rows selected
```

6. Quit the **sqldba** utility by entering

```
exit
```

Installing PowerBuilder

The steps for installing PowerBuilder include:

- Installing the PowerBuilder software
- Creating a PowerBuilder icon
- Installing the ORACLE Interface

If you are not installing Forest and Trees, you must also download a file named *ora6win.dll* from the PowerSoft Bulletin Board. See the "Downloading ORA6WIN.DLL" section later in this chapter for instructions.

Installing the PowerBuilder Software

To install the PowerBuilder software, complete the following steps:

1. Insert the Disk 1 diskette into the diskette drive.
2. Start Microsoft Windows from the system prompt by entering
win
3. From the menu bar, select *File* *Run*.
4. In the Command Line field, enter the following command preceded by the drive designator for the diskette drive containing the Disk 1 diskette. For example:
a:setup
5. For the destination directory, select the default (*c:\pb*) by pressing **ENTER**.
6. When prompted to create the directory, answer yes by pressing **ENTER**.
7. At the "Space Available" prompt, continue by pressing **ENTER**.

8. When prompted, replace the Disk 1 diskette with the Disk 2 diskette and press **ENTER**.
9. When prompted, replace the Disk 2 diskette with the Disk 3 diskette and press **ENTER**.

Creating a PowerBuilder Icon

To create a PowerBuilder Icon, complete the following steps:

1. Open the group where you want the PowerBuilder icon.
2. From the menu bar, select *File* → *New*.
3. From the dialog box, select *Item* → *OK*.
4. For the description, enter
PowerBuilder
5. In the Command Line field, enter
c:\pb\pb020.exe
6. Press **ENTER** to select *OK*.

Installing the ORACLE Interface

To install the ORACLE interface, complete the following steps:

1. Insert the ORACLE Interface Disk diskette into the diskette drive.
 2. From the menu bar, select *File* → *Run*.
 3. In the Command Line field, enter the following command preceded by the drive designator. For example:
a:setup
-

Downloading ORA6WIN.DLL

If you are installing Forest & Trees, you can skip this section as the *ora6win.dll* file comes with that package. If you are not installing Forest & Trees, you must acquire the *ora6win.dll* file and copy it to the hard disk. The following steps outline that procedure:

1. Using the connection software of your choice, connect to the PowerSoft Bulletin Board. The phone number is (617) 229-9735. The connection parameters are 2400 baud, 8 bit, no parity, 1 stop bit.
2. Download *oracle.zip*.
3. Download **pkunzip.exe** if necessary. You use this program to extract *ora6win.dll* from the compressed *oracle.zip* file.
4. Extract *ora6win.dll* from *oracle.zip* by entering

```
pkunzip oracle.zip
```
5. Copy the file to *c:\oracle6\bin* by entering

```
copy a:\ora6win.dll c:\oracle6\bin
```

Validating the PowerBuilder Connection

The following sections provide procedures for validating the PowerBuilder and ORACLE database connection. These procedures include:

- Starting PowerBuilder
- Creating a Unique Index on the EMP database table
- Viewing EMP table data
- Closing PowerBuilder

Starting PowerBuilder

To start PowerBuilder and set the ORACLE parameters, complete the following steps:

! **IMPORTANT:** You must log in as *system/manager* for only the first connection using PowerBuilder. This procedure allows PowerBuilder to create its ORACLE system tables. Later, log in as *scott/tiger*.

1. To start Microsoft Windows, enter the following from the system prompt:
 win
2. Start the PowerBuilder Power Panel by double-clicking on the PowerBuilder icon.
3. From the Power Panel, double-click on the Preferences icon.
4. From the Preference window, double-click on the Database icon.
5. Enter the parameters according to the following table:

Table 2-4
PowerBuilder Parameters for ORACLE

Parameter	Selection/entry
Vendor	Oracle
DBMS	Oracle
LogId	system
LogPassword	manager
ServerName	@x:unxserv:orac

NOTE: You do not need to set the rest of the parameters for ORACLE.

6. Select *OK* to return to the Power Panel.

7. From the Power Panel, double-click on the Database Painter icon.

It takes a few moments to establish the connection. During this first connection PowerBuilder builds the PowerBuilder/ORACLE system tables.

To see the icon names on the left side of the Database Painter screen, hold the left mouse button down and drag the mouse pointer over the icons. The names appear under each icon.

8. From the menu bar, select *File* → *Change Login*.

9. In the "User Name:" field, enter

scott

10. In the "Enter Password:" field, enter

tiger

11. Select *OK*.

Creating a Unique Index on the EMP Table

To create an index on the EMP table, complete the following steps:

1. Select *emp* → *Open*. The EMP table opens.
2. Maximize the table by clicking on the maximize arrow.
3. Click on the key icon (Index) on the left column.
4. For the "Enter Create Index Name:" field, enter
empno
6. Click on *empno* in the column list at the lower left.
7. To finish, select *OK*.

Viewing the EMP Data

To view data on the EMP table, complete the following steps:

1. Click on the Tabular Data Window icon. (The Tabular Data Window icon looks like two slender rectangles and is located in the middle of the left column.)
2. Select *Retrieve* to view the data.

Closing PowerBuilder

To close PowerBuilder, complete the following steps:

1. Close the Tabular Data Window by clicking on *Close*.
2. Close the Database Painter by selecting *File* → *Close*.
3. Exit PowerBuilder by selecting *File* → *Exit PowerBuilder*.

Installing Forest & Trees

To Install Forest and Trees, complete the following steps:

1. Start Microsoft Windows.
 2. Insert the Disk 1 of 3 diskette into the diskette drive.
 3. From the menu bar, select *File* → *Run*.
 4. In the "Command Line:" field, enter the following command preceded by the drive designator. For example:

```
a:install
```
 5. Select the default directory (*c:\ftw*) by pressing **ENTER**.
 6. In the "User:" field, enter the user name for this workstation.
 7. In the "Company:" field, enter your company name.
 8. In the "Serial Number:" field, enter the serial number that came with this product.
-

9. Under "Client Server Providers," select: *Oracle*.
10. Use the space bar to deselect *SQL Server*, *SQL Base*, and *NetWare SQL*.
11. At the prompt to continue, press **ENTER**.
12. Replace the Disk 1 of 3 diskette with the Disk 2 of 3 diskette.
13. To continue, press **ENTER**.
14. Replace the Disk 2 of 3 diskette with the Disk 3 of 3 diskette.
15. To continue, press **ENTER**.
16. When complete, select *OK* by pressing **ENTER**.

Validating the Forest & Trees Connection

To validate the Forest & Trees connection, complete the following steps:

1. Start Forest & Trees from Windows by double-clicking on the FTW icon.
2. From the menu bar, select *View → New*.
3. In the "Name:" field enter
test
4. In the "Provider:" field, enter
oracle
5. For "Data Type:" select *Automatic*.
6. Select *OK*.
7. Double-click on the Database icon.
8. For the "Database Name:" field, enter
x:unxserv:orac
9. For the "Username:" field, enter
scott

10. For the "Password:" field, enter
tiger
 11. Select *OK*.
 12. Double-click on the Query icon.
 13. Click on *Query Assist*.
 14. At the "Table:" field, click on the **DOWN** arrow.
 15. Select *SCOTT.EMP*.
 16. In the "Columns:" field, select *EMPNO* → *Select* → *Add*.
 17. Select *ENAME* → *Select* → *Add*.
 18. Select *JOB* → *Select* → *Add*.
 19. Select *OK*.
 20. Click on *Test Query*: Rows display on the screen.
 21. To exit Forest & Trees, select *Exit* → *Query Results*.
 22. At "Exit Edit Query:" select *CANCEL*.
 23. From the menu bar, select *File* → *Exit*.
 24. At "Save Changes:" select *NO*.
-

Operating the SPX/IPX Platform

The following sections provide instructions for starting and stopping the SPX/IPX Platform.

Starting the SCO UNIX Database Server

To start the SCO UNIX database server, complete the following steps:

1. Boot the system in multiuser mode.
2. To log in as the user *oracle*, enter
oracle
3. Then enter the password. For example:
oraclepswd
4. Start SQL*Net SPX/IPX for UNIX by entering
spxctl start
5. Start the ORACLE administrator utility, **sqldba**, by entering
sqldba
6. Start the ORACLE RDBMS by entering
startup
7. To exit the **sqldba** utility, enter
exit

Starting the NetWare Server

To start the NetWare server, complete the following steps:

1. Boot the NetWare server.
2. Change directories to the directory where you copied your installation files. For example:

```
cd \netware
```

3. Then enter

```
server
```

Starting the Windows Workstation

To start the workstation, complete the following steps:

1. Boot the workstation.
2. Start Microsoft Windows by entering

```
win
```

Stopping the SCO UNIX Database Server

To stop the SCO UNIX database server, complete the following steps:

1. As the user, *oracle*, start the ORACLE administrator utility, **sqldba** by entering

```
sqldba
```

2. Stop the ORACLE RDBMS by entering

```
shutdown
```

3. Exit the **sqldba** utility by entering

```
exit
```

4. Log in as *root* by entering
root
5. Enter the *root* password. For example:
rootpswd
6. Stop the SCO UNIX server by entering
shutdown -g0 -y

Stopping The NetWare Server

To stop the NetWare server, complete the following steps:

1. From the server console, enter
down
2. Exit by entering
exit

Stopping the Windows Workstation

To exit from Microsoft Windows select *File* → *Exit* from the menu bar.

Chapter 3

TCP/IP Platform

Using the information in this chapter you can reproduce the TCP/IP model. The following sections describe the TCP/IP Platform and provide installation instructions.

Platform Components

The following figure illustrates the entire TCP/IP Platform:

- ORACLE Access via TCP/IP
- NetWare Access via SPX/IPX
- UNIX Access via TCP/IP (ie. TELNET, FTP)
- File Transfer via Windows

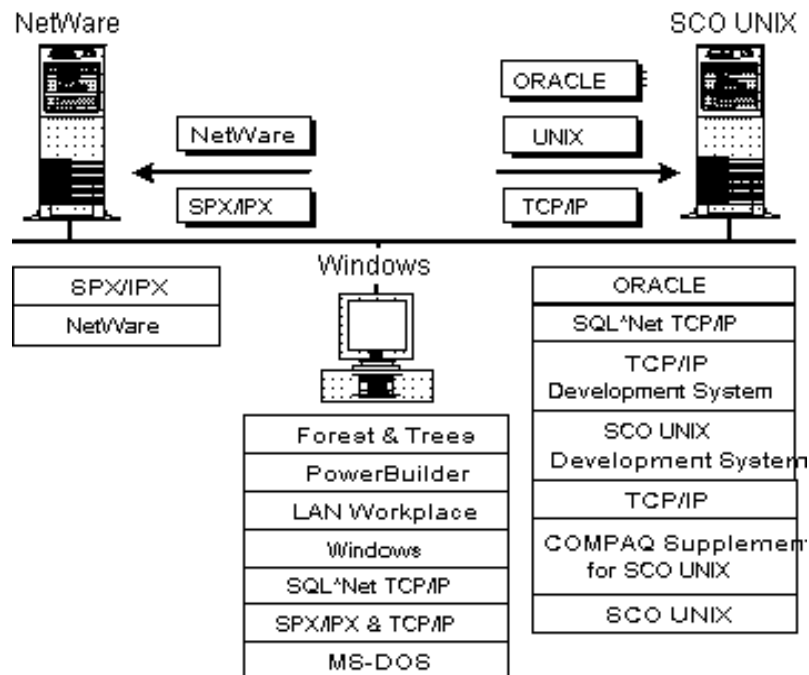


Figure 3-1. TCP/IP Platform

The following table lists the components you will install on the NetWare server, the Windows workstation, and the UNIX database server using this TechNote:

**Table 1-1
Software Components to Install**

NetWare Server	MS-DOS Workstation	SCO UNIX Server
none	SQL*Net TCP/IP 1.1	none
	LAN WorkPlace for DOS 4.01	
	PowerBuilder 2.0	
	Forest & Trees 2.0c	

Platform Concepts

It is important to understand some of the basic concepts used in this platform. The following sections explain TCP/IP network addressing, operating system transparency, and multiple protocol stacks in Windows workstations.

TCP/IP Network Addressing

TCP/IP network addressing depends on three numbers: hardware network interface card (NIC) addresses, internet (network and machine) addresses, and port numbers (internal application addresses).

Hardware addresses are usually determined by the manufacturer and are read automatically by the NIC driver.

The network administrator assigns internet addresses. The local number is mapped to the NIC at boot time. Usually, a translation table of hostnames and their respective internet addresses used to communicate with other UNIX hosts are maintained in a file called *hosts*.

Each machine is configured with a unique internet address. The internet address has four octets (8-bit bytes) identified by numbers (for example: 131.168.147.100). This internet address consists of two parts: the network part and the machine part. These addresses are used in network transmissions to route packets across multiple network segments and finally to the destination machines.

Port numbers are used in establishing a communications session between a client and a server. In the case of ORACLE, the port number that clients call in on is usually 1525. Once the initial connection is established, a new port number is assigned for the duration of the session. The initial port number is usually defined in a file called *services*.

Operating System Transparency and ORACLE Connect Strings

To establish a session with an ORACLE database server, the client must send a connect string to the server along with an ORACLE login ID and an ORACLE password. The connect string usually contains three fields of information: the protocol abbreviation, the server name, and the database identifier. For example, to log in via TCP/IP to a UNIX server named *unxserv* where an ORACLE database identified as *orac* is running, you would use the following connect string:

```
t:unxserv:orac
```

The only change needed to log in to the same server and database via SPX/IPX is to replace the letter "t" in the connect string with the letter "x."

```
x:unxserv:orac
```

The connect string is nearly identical for connecting to a NetWare and ORACLE server. For example:

```
t:nwserv:orasrv  
x:orasrv
```

The result is that the end user need not know whether the data source is an ORACLE server running on UNIX or running on NetWare.

Multiple Protocol Stacks in Windows Workstations

The TCP/IP Platform is a "dual-protocol" platform. Dual protocol means that two protocol stacks are used with a single NIC. In this platform, SPX/IPX is used for NetWare services and TCP/IP is used for UNIX services as well as ORACLE database services. The three most common specifications for implementing dual protocol stacks in an MS-DOS workstation are:

- Open Data Link Interface (ODI) from Novell
- Network Driver Interface Specification (NDIS) from Microsoft
- Packet Driver Interface (PDI) from Clarkson University and FTP

Each of these technologies employs a protocol manager that directs incoming packets to the correct protocol stack (in this case, either SPX/IPX or TCP/IP). LAN WorkPlace for DOS by Novell supplies both protocol stacks as well as Microsoft Windows-based applications for file transfer and for terminal emulation to communicate with UNIX hosts.

Pre-Installation Assumptions

This TechNote assumes two existing conditions:

- A NetWare server and Windows workstation are physically connected to an Ethernet network.
 - A COMPAQ SYSTEMPRO running SCO UNIX and ORACLE as a database server is physically connected on the same network, and is operational with TCP/IP support.
-

The following figure illustrates the configuration you should have in place before beginning this installation:

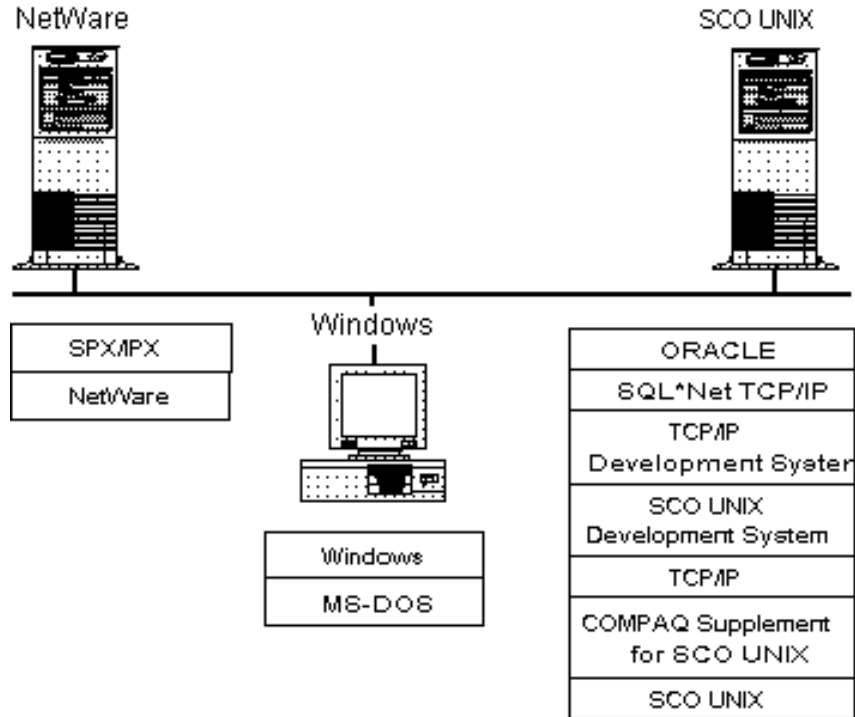


Figure 3-2. Pre-installed Software

If you have not completed this type of installation, you can refer to the *Compaq and Novell Integration ToolKit* and the *Compaq and SCO Client-Server ToolKit*, both published by Compaq Computer Corporation.

NOTE: Both TCP/IP Version 1.1.3 and Version 1.2 from SCO were tested successfully in this environment.

SCO UNIX Database Server

The following list describes the database server components you should have installed before you begin:

- COMPAQ SYSTEMPRO installed as a server
- Appropriate Ethernet network interface card (NIC) and cable
- SCO UNIX System V/386 Release 3.2 Version 4
- SCO UNIX Maintenance Supplement Version 4.0.1d
(if using SCO TCP/IP Release 1.2)
- SCO LLI Drivers Version 3.0 or later
- SCO TCP/IP Release 1.1.3 or 1.2
- SCO UNIX Development System Release 3.2 Version 4
- SCO TCP/IP Development System Release 1.1.3 or 1.2
(This version must match the SCO TCP/IP version used.)
- COMPAQ Supplement for SCO UNIX
(COMPAQ EFS for SCO UNIX Version 1.4)
- ORACLE Relational Database Management System (RDBMS) Version
6.0.33 (includes SQL*Net TCP/IP for UNIX)

In addition, be sure to have a working TCP/IP connection.

NetWare Server

The following list describes the NetWare server components you should have installed before you begin:

- COMPAQ 386 or 486-based server (minimum)
 - NE2000 Ethernet (or other suitable NIC)
 - NetWare v3.11 from Compaq
(includes SPX/IPX)
-

The following display is an example of the assumed *autoexec.ncf* file for the NetWare server:

```
file server name NWFS1
ipx internal net 12A34B

bind IPX to ipxlan net=101
```

Windows Workstation

The following list describes the workstation components you should have installed before you begin:

- COMPAQ 386sx-based PC (minimum)
- NE2000 Ethernet NIC (or other suitable NIC)
- MS-DOS 5.0, as published by Compaq, located in the directory, *c:\dos*
- Microsoft Windows 3.1 located in the directory, *c:\windows*

The following displays are *examples* of the assumed *autoexec.bat* and *config.sys* files for the Windows workstation:

autoexec.bat

```
c:\windows\smartdrv.exe
prompt $p $g
path c:\windows;c:\dos
temp=c:\windows\temp
c:\ipx.com
c:\netx.com
```

config.sys

```
device=c:\windows\himem.sys
files=20
buffers=30
stacks=9,256
```

Installing the Windows Workstation

The following table lists the configuration files altered during the installation procedures:

Procedure	File
SPX/IPX Configuration	<i>c:\autoexec.bat</i>
TCP/IP Configuration	<i>c:\autoexec.bat</i> <i>c:\net.cfg</i> <i>c:\xln\tcp\hosts</i> <i>c:\xln\tcp\service</i>
ORACLE Configuration	<i>\$ORACLE_HOME\config.ora</i>

The procedures for installing the Windows workstation include:

- Installing the MS-DOS ODI drivers
- Installing LAN WorkPlace for DOS
- Installing SQL*Net TCP/IP for DOS
- Configuring SQL*Net TCP/IP for DOS
- Validating the database connection
- Installing PowerBuilder
- Validating the PowerBuilder connection
- Installing Forest & Trees
- Validating the Forest & Trees connection

The following sections describe these procedures.

Installing the MS-DOS ODI Drivers

To install the MS-DOS ODI drivers that come with NetWare, complete the following steps:

1. Insert the DOS ODI Driver diskette into the diskette drive.
2. Copy the Link Support Layer protocol manager to the root directory of drive C. For example, if the DOS ODI Driver diskette is in drive A, enter:

```
copy a:\lsl.com c:\
```

3. Copy the MLID network interface driver to the root directory of drive C. For example, if the DOS ODI Driver diskette is in drive A, enter:

```
copy a:\ne2000.com c:\
```

4. Change to drive C by entering

```
c:
```

5. Make a directory called *odi* for the **nw_shell** program by entering

```
md c:\odi
```

6. Change to the *odi* directory by entering

```
cd c:\odi
```

7. Copy *nw_shell* to the new directory. For example, if the DOS ODI Driver diskette is in drive A, enter:

```
copy a:\nw_shell.exe c:\odi\nw_shell.exe
```

8. Expand *nw_shell.exe* by executing it. Enter

```
nw_shell.exe
```

9. Copy the IPX protocol stack to the root directory of drive C by entering

```
copy c:\odi\ipxodi.com c:\
```


10. Copy the NetWare redirector to the root directory of drive C by entering

```
copy c:\odi\netx.com c:\
```

11. To configure the ODI drivers, use the editor of your choice and add the following lines to the *autoexec.bat* file:

```
c:\lsl.com  
c:\ne2000.com  
c:\ipxodi.com  
c:\netx.com
```

12. If the default settings on the network interface card were changed, create *net.cfg* as instructed in the *ODI for DOS User's Guide*. (See the "Viewing Configuration File Changes" section later in this chapter for an example file.)
13. With a NetWare server running, reboot the computer to test the installation. If successful, the workstation connects to the server.

Installing LAN WorkPlace for DOS

Installation procedures for LAN WorkPlace for DOS include:

- Installing the LAN WorkPlace software
- Viewing configuration file changes
- Validating the SPX/IPX and TCP/IP protocol stacks
- Configuring LAN WorkPlace for DOS
- Validating the LAN WorkPlace for DOS installation

The following sections describe those procedures.

Installing LAN WorkPlace

To install LAN WorkPlace for DOS, complete the following steps:

1. From drive C, enter the following command preceded by the designator of the drive from which you will install. For example:

```
a:install
```

2. Select *Install Drive*.
3. To select the default drive (C), press **ENTER**.
4. At the "Do you wish to install the LAN WorkPlace Windows Applications?" prompt, respond yes by pressing **ENTER**.
5. At the "Will a RARP server provide your IP address?" prompt, respond no by pressing **ENTER**.
6. Enter the IP address you obtained from your network administrator. For example:

```
132.147.160.21
```
7. At the "Is your network partitioned into subnets?" prompt, respond no by pressing **ENTER**.
8. At the "Does your network have an IP router?" prompt, respond no by pressing **ENTER**.
9. At the "Do you want to use the default TCP/IP configuration parameters?" prompt, respond yes by pressing **ENTER**.

10. At the "Does your network have a domain name server?" prompt, respond no by pressing **ENTER**.
11. At the "Do you want to load RFC NetBIOS during system boot?" prompt, respond no by pressing **ENTER**.
12. At the "Will you be using applications written for LAN WorkPlace for DOS v3.5?" prompt, enter

yes

! **IMPORTANT:** Answering yes at this prompt is critical for SQL*Net TCP/IP for DOS to function properly with the **sqldba** utility.

13. When prompted, enter your user name. For example:

nw1

14. At the "Do you want your system files updated?" prompt, respond yes by pressing **ENTER**.
15. Install the remaining disks as prompted.

Viewing Configuration File Changes

The following file displays show how the configuration files changed after installing LAN WorkPlace:

autoexec.bat - Added Lines

```
set include=c:\xln\toolkit\include
set lib=c:\xln\toolkit\lib
c:\xln\bin40\tcpip
c:\xln\bin40\convert
c:\xln\bin40\telapi
set name=nw1
set excelan=c:\xln
```

config.sys

```
device=c:\windows\himem.sys
files=40
buffers=30
stacks=9,256
break=on
```

net.cfg - Significant Sections

```
Link Support
    Buffers 8 1500
    MemPool 4096

Link Driver NE2000
    INT #1 3
    PORT #1 300

    Protocol IPX 0 Ethernet_802.3

Protocol TCPIP

    132.147.160.21
    0.0.0.0
    255.255.0.0
    sions
    nb_domain
```

8
8
1
4
8
0

Note that *net.cfg* was added to the root directory. Examine the section on the NE2000 card. This section provides support for both 802.3 packets for SPX/IPX and Ethernet II packets for TCP/IP communications. Also, TCP/IP information is in the Protocol TCPIP section of this file.



IMPORTANT: The address for the subnet mask (*ip_netmask*) must match the subnet mask on the SCO UNIX database server.

Validating the SPX/IPX and TCP/IP Connections

To validate the protocol stack installation, complete the following steps:

1. Reboot the workstation.
2. Change to drive F by entering
f:
3. Log in to the NetWare server.
4. If the login is successful, SPX/IPX is working
5. Change to drive C by entering
c:
5. Use **ping** to test the TCP/IP connection by issuing the command with the host (*unxserv*) IP address you obtained from your network administrator. For example:
ping 132.147.160.1
6. Look at the first line after the command entry. If the network connection is working properly, the message reads:

```
host responding time = xx ms
```

Configuring LAN WorkPlace for DOS

To configure LAN WorkPlace for DOS, complete the following steps:

1. Start Microsoft Windows by entering the following at the system prompt:
win
2. Using the Windows accessory, Notepad, create a *hosts* file in *c:\xln\tcp* with the following syntax:

```
ip address hostname
```

For example:

```
132.147.160.1 unxserv  
132.147.160.2 nwserv
```

3. Select *Save As*.
4. In the filename field enter
c:\ln\tcp\hosts.
Be sure to include the period after "hosts" when using Notepad.

Validating LAN WorkPlace for DOS

The procedure for validating LAN WorkPlace for DOS includes:

- Starting File Express
- Changing drives to the NetWare Server
- Copying UNIX */etc/hosts* to NetWare *f:\hosts*
- Deleting *f:\hosts*

To validate LAN WorkPlace for DOS, complete the following steps:

1. Open the LAN WorkPlace for DOS Group.
 2. Double click on the File Express Icon.
 3. Enter the hostname and press **TAB**.
 4. Enter
root
and press **TAB**.
 5. Enter the *root* password.
 6. In the MS-DOS window, click on *C:*
 7. Enter
f:\
 8. In the UNIX window, double click on *etc*.
-

9. Scroll to the right until *hosts* is visible.
10. Click on *hosts* to select it.
11. Click on *Copy* at the right side of the screen.
Note that *hosts* is in the root directory of the NetWare server.
12. In the NetWare window, click on *hosts*.
13. Click on *Delete*.
14. Click on *yes* to confirm.
15. Exit LAN WorkPlace for DOS.
16. Exit Windows.

Installing SQL*Net TCP/IP for DOS

The procedures for installing SQL*Net TCP/IP include:

- Installing the initial installation files
- Installing the Required Support files
- Installing the DOS Utilities
- Installing SQL*Net TCP/IP

Installing the DOS Install Diskette

To install the DOS Install Disk diskette, complete the following steps:

1. Insert the DOS Install Disk diskette into the diskette drive of the Windows workstation.
2. Enter the following command preceded by the drive designator.
For example:

```
a:orainst
```
3. At the prompt to continue, enter

```
c
```
4. When prompted for the drive from which you are installing, enter the appropriate drive letter. For example:

```
a
```
5. When prompted for the drive and path where you want to install ORACLE, accept the default (*c:\oracle6*) by pressing **ENTER**.
6. When prompted for the drive from which you boot your computer, accept the default (drive c) by pressing **ENTER**.
7. When asked if you want *config.sys* changed automatically, accept the default (yes) by pressing **ENTER**.
8. When asked if you want *autoexec.bat* changed automatically, accept the default (yes) by pressing **ENTER**.
9. Remove the diskette and reboot the Windows workstation.
10. Again insert the DOS Install diskette into the diskette drive.
11. From the MS-DOS system prompt, execute **orainst** by entering

```
orainst
```

12. At the prompt to continue, enter

c

13. When prompted for the drive from which you are installing, accept the default (drive A) by pressing **ENTER**.

14. When prompted for the drive and path where you want to install ORACLE, accept the default (*c:\oracle6*) by pressing **ENTER**.

NOTE: There are two changes to *autoexec.bat*:

- Path includes *c:\oracle6\pbin; c:\oracle6\bin*
- Variable *config=c:\oracle6\config.ora*

There are no changes to *config.sys*.

Installing the DOS Required Support Files

To install the DOS Required Support Files, complete the following steps:

1. Insert the DOS Required Support Files diskette into the diskette drive.
2. Select *Install Product* by pressing **ENTER**.
3. At the prompt to continue, enter
c
4. Select *compaq* and press **ENTER**.
5. Select the machine type (or a machine type that has the same processor).
6. Confirm the machine type, by pressing **ENTER**.
7. Return to the Installation main menu, by pressing **ENTER**.

Installing the DOS Utilities

To install the DOS Utilities, complete the following steps:

1. Insert the DOS Utilities Disk 1 diskette into the diskette drive.
 2. Select *Install Product* by pressing **ENTER**.
 3. At the prompt to continue, enter
c
 4. Select *Protected Mode Only* by pressing **ENTER**.
 5. At the prompt to continue, enter
c
 6. Replace the DOS Utilities Disk 1 diskette with the DOS Utilities Disk 2 diskette.
 7. At the prompt to continue, enter
c
 8. Replace the DOS Utilities Disk 2 diskette with the DOS Utilities Disk 3 diskette.
 9. At the prompt to continue, enter
c
-

Installing SQL*Net TCP/IP

To install SQL*Net TCP/IP, complete the following steps:

1. Insert the SQL*Net TCP/IP diskette into the diskette drive.
2. To continue the installation, enter
c
3. Select *Install Product* by pressing **ENTER**.
4. When prompted for the vendor from which you purchased your TCP/IP, select *Excelan*.
5. When prompted for the path and filename of your TCP/IP *hosts* file, accept the default (*c:\xln\tcp\hosts*) by pressing **ENTER**.
6. When prompted for the path and filename of your TCP/IP *services* file, accept the default (*c:\xln\tcp\services*) by pressing **ENTER**.
7. When asked if you wish to update *c:\oracle6\config.ora* automatically, accept the default (yes) by pressing **ENTER**.
8. At the prompt to continue, enter
c
9. Quit the installation by selecting *Exit install*.

NOTE: You do not have to install LOADER files which are used with Lotus 123 and dBASE III Plus.

Configuring SQL*Net TCP/IP for DOS

Configuring SQL*Net involves editing the *config.ora*, *services*, and *autoexec.bat* files. The following sections provide instructions for editing those files.

Editing CONFIG.ORA

Using the editor of your choice, add the following lines to the *config.ora* file:

```
local=t:hostname:oracle_sid
```

For example:

```
t:unxserv:orac
```



IMPORTANT: Be sure to enter this first line with all lower case letters.

```
dynamic_memory=1000
```

NOTE: This entry reserves 1 megabyte of system memory for ORACLE products and leaves the remainder for Microsoft Windows to manage.

When finished, *config.ora* should contain the following lines:

```
local=t:unxserv:orac  
dynamic_memory=1000
```

Editing SERVICES in C:\XLN\TCP

Using the editor of your choice, add the following lines to the *services* file:

```
orasrv1525/tcp
```



IMPORTANT: If the *services* file is not in *c:\xln\tcp*, copy it from *c:\xln\sample*.

Editing AUTOEXEC.BAT

Using the editor of your choice, add the following lines to the *autoexec.bat* file:

```
c:\oracle6\bin\sqlpme.exe
c:\oracle6\bin\sqltcp.exe
```

These lines add the SQL*Net Protected Memory Manager and SQL*Net TCP/IP for DOS. When finished, *autoexec.bat* should contain the following lines:

```
@echo off
prompt $p $g
break on
path c:\oracle6\pbin;c:\oracle6\bin;c:\windows;c:\dos;c:\xln\bin40
set config=c:\oracle6\config.ora
set include=c:\xln\toolkit\include
set lib=c:\xln\toolkit\lib
set name=nw1
set excelan=c:\xln
c:\config\tcp\lsl.com
c:\config\tcp\ne2000.com
c:\config\tcp\ipxodi.com
c:\config\tcp\netx.com
c:\xln\bin40\tcpip
c:\xln\bin40\convert
c:\xln\bin40\telapi
c:\oratcp\bin\sqlpme.exe
c:\oratcp\bin\sqltcp.exe
```

Verifying CONFIG.SYS

Verify that the *config.sys* file contains the following lines. If not, use the editor of your choice and modify the file.

```
device=c:\windows\himem.sys
files=40
buffers=30
stacks=9,256
break=on
```

Verifying NET.CFG

Verify that the *net.cfg* file contains the following lines. If not, use the editor of your choice and modify the file.

```
Link Support
    Buffers 8 1500
    MemPool 4096
Link Driver NE2000
    INT #1 3
    PORT #1 300

    Protocol IPX 0 Ethernet_802.3
Protocol TCPIP

    132.147.160.21
    0.0.0.0
    255.255.0.0
    8
    8
    1
    4
    8
    0
    nb_domain
```

Validating the Database Connection

Validating the database connection involves starting ORACLE on the UNIX database server and connecting with the **sqldba** utility from the Windows workstation. The following section provides the validating procedures using the demonstration database provided by ORACLE. For this sample database, the ORACLE ID is **scott** and the password for accessing the database is **tiger**.

UNIX Database Server

To begin validation, complete the following steps from the UNIX database server:

1. Boot the UNIX database server in multiuser mode.
2. Log in as the user, *oracle*, by entering the user name:

`oracle`

3. Enter the password, for example:

`oraclepswd`

4. Start the RDBMS by entering

`sqldba startup`

Windows Workstation

To continue with the validation, complete the following steps from the Windows workstation:

1. Start the Windows workstation, but do not start Microsoft Windows.
2. At the system prompt, enter
sqldba
3. Once connected, enter the ORACLE ID:
scott
4. Enter the password:
tiger

If the connection is successful, the following displays on the screen:

```
connected
```

5. Enter the following SQL statement:

```
select table_name from user_tables;
```

The following displays on the screen:

```
BONUS  
DEPT  
DUMMY  
EMP  
IAPXTB  
SALGRADE  
rows selected
```

6. Quit the **sqldba** utility by entering

```
exit
```

Installing PowerBuilder

The steps for installing PowerBuilder include:

- Installing the PowerBuilder software
- Creating a PowerBuilder icon
- Installing the ORACLE Interface

If you are not installing Forest and Trees, you must also download a file named *ora6win.dll* from the PowerSoft Bulletin Board. See the *Downloading ORA6WIN.DLL* section later in this chapter for instructions.

Installing the PowerBuilder Software

To install the PowerBuilder software, complete the following steps:

1. Insert the Disk 1 diskette into the diskette drive.
2. Start Microsoft Windows.
3. From the menu bar, select *File* → *Run*.
4. In the Command Line field, enter the following command preceded by the drive designator. For example:

```
a:setup
```
5. For the destination directory, select the default (*c:\pb*) by pressing **ENTER**.
6. When prompted to create the directory, answer yes by pressing **ENTER**.
7. At the "Space Available" prompt, continue by pressing **ENTER**.
8. When prompted, replace the Disk 1 diskette with the Disk 2 diskette and press **ENTER** when finished.
9. When prompted, replace the Disk 2 diskette with the Disk 3 diskette and press **ENTER** when finished.

Creating a PowerBuilder Icon

To create a PowerBuilder Icon, complete the following steps:

1. Open the group where you want the PowerBuilder icon.
2. From the menu bar, select *File* → *New*.
3. From the dialog box, select *Item* → *OK*.
4. For the description, enter

PowerBuilder

5. In the Command Line field, enter

c:\pb\pb020.exe

6. Press **ENTER** to select *OK*.

Installing the ORACLE Interface

To install the ORACLE interface, complete the following steps:

1. Insert the ORACLE Interface Disk diskette into the diskette drive.
2. From the menu bar, select *File* → *Run*.
3. In the Command Line field, enter the following command preceded by the drive designator. For example:

a:setup

Downloading ORA6WIN.DLL

If you are installing Forest & Trees, you can skip this section as the *ora6win.dll* file comes with that package. If you are not installing Forest & Trees, you must acquire the *ora6win.dll* file and copy it to the hard disk. The following steps outline that procedure:

1. Using the connection software of your choice, connect to the PowerSoft Bulletin Board. The phone number is (617) 229-9735. The connection parameters are 2400 baud, 8 bit, no parity, 1 stop bit.
2. Download *oracle.zip*.
3. Download **pkunzip.exe** if necessary. You use this program to extract *ora6win.dll* from the compressed *oracle.zip* file.
4. Extract *ora6win.dll* from *oracle.zip* by entering

```
pkunzip oracle.zip
```
5. Copy the file to *c:\oracle6\bin* by entering

```
copy a:\ora6win.dll c:\oracle6\bin
```

Validating the PowerBuilder Connection

The following sections provide procedures for validating the PowerBuilder and ORACLE database connection. These procedures include:

- Starting PowerBuilder
- Creating a Unique Index on the EMP database table.
- Viewing EMP table data
- Closing PowerBuilder

Starting PowerBuilder

To start PowerBuilder and set the ORACLE parameters, complete the following steps:

! **IMPORTANT:** You must log in as *system/manager* for only the first connection using PowerBuilder. This procedure allows PowerBuilder to create its ORACLE system tables. Later, log in as *scott/tiger*.

1. To start Microsoft Windows, enter the following from the system prompt:
win
2. Start the PowerBuilder Power Panel by double-clicking on the PowerBuilder icon.
3. From the Power Panel, double-click on the Preferences icon.
4. From the Preference window, double-click on the Database icon.
5. Enter the parameters according to the following table:

Table 3-3
PowerBuilder Parameters for ORACLE

Parameter	Selection/entry
Vendor	Oracle
DBMS	Oracle
LogId	system
LogPassword	manager
ServerName	@t:unxserv:orac

NOTE: You do not need to set the rest of the parameters for ORACLE.

6. Select *OK* to return to the Power Panel.
-

7. From the Power Panel, double-click on the Database Painter icon.

It takes a few moments to establish the connection. During this first connection PowerBuilder builds the PowerBuilder/ORACLE system tables.

To see the names of the icons on the left side of the screen in the Database Painter, hold the left mouse button down and drag the mouse pointer over the icons. The names appear under each icon.

8. From the menu bar, select *File* → *Change Login*.

9. In the "User Name:" field, enter

scott

10. In the "Enter Password:" field, enter

tiger

11. Select *OK*.

Creating a Unique Index on the EMP Table

To create an index on the EMP table, complete the following steps:

1. Select *emp* → *Open*. The EMP table opens.
2. Maximize the table by clicking on the maximize arrow.
3. Click on the key icon (Index) on the left column.
4. For the "Enter Create Index Name:" field, enter
empno
6. Click on *empno* in the column list at the lower left.
7. To finish, select *OK*.

Viewing the EMP Data

To view data on the EMP table, complete the following steps:

1. Click on the Tabular Data Window icon. (The Tabular Data Window icon looks like two slender rectangles and is located in the middle of the left column.)
2. Select *Retrieve* to view the data.

Closing PowerBuilder

To close PowerBuilder, complete the following steps:

1. Close the Tabular Data Window by clicking on *Close*.
2. Close Database Painter by selecting *File* → *Close*.
3. Exit PowerBuilder by selecting *File* → *Exit PowerBuilder*.

Installing Forest & Trees

To Install Forest and Trees, complete the following steps:

1. Start Microsoft Windows.
2. Insert the Disk 1 of 3 diskette into the diskette drive.
3. From the menu bar, select *File* → *Run*.
4. In the "Command Line:" field, enter the following command preceded by the drive designator. For example:

```
a:install
```

5. Select the default directory (*c:\ftw*) by pressing **ENTER**.
 6. In the "User:" field, enter the user name for this workstation.
-

7. In the "Company:" field, enter your company name.
8. In the "Serial Number:" field, enter the serial number that came with this product.
9. Under "Client Server Providers," select: *Oracle*.
10. Use the space bar to deselect *SQL Server*, *SQL Base*, and *NetWare SQL*.
11. At the prompt to continue, press **ENTER**.
12. Replace the Disk 1 of 3 diskette with the Disk 2 of 3 diskette.
13. To continue, press **ENTER**.
14. Replace the Disk 2 of 3 diskette with the Disk 3 of 3 diskette.
15. To continue, press **ENTER**.
16. When complete, select *OK* by pressing **ENTER**.

Validating the Forest & Trees Connection

To validate the Forest & Trees connection, complete the following steps:

1. Start Forest & Trees from Windows by double-clicking on the FTW icon.
2. From the menu bar, select *View → New*.
3. In the "Name:" field, enter
test
4. In the "Provider:" field, enter
oracle
5. For "Data Type:" select *Automatic*.
6. Select *OK*.

7. Double-click on the Database icon.
 8. For the "Database Name:" field, enter
t:unxserv:orac
 9. For the "Username:" field, enter
scott
 10. For the "Password:" field, enter
tiger
 11. Select *OK*.
 12. Double-click on the Query icon.
 13. Click on *Query Assist*.
 14. At the "Table:" field, click on the **DOWN** arrow.
 15. Select *SCOTT.EMP*.
 16. In the "Columns:" field, select *EMPNO* → *Select* → *Add*.
 17. Select *ENAME* → *Select* → *Add*.
 18. Select *JOB* → *Select* → *Add*.
 19. Select *OK*.
 20. Click on *Test Query*: Rows display on the screen.
 21. To exit Forest & Trees, select *Exit* → *Query Results*.
 22. At "Exit Edit Query:" select *CANCEL*.
 23. From the menu bar, select *File* → *Exit*.
 24. At "Save Changes:" select *NO*.
-

Operating the TCP/IP Platform

The following sections provide instructions for starting and stopping the TCP/IP Platform.

Starting the SCO UNIX Database Server

To start the SCO UNIX database server, complete the following steps:

1. Boot the system in multiuser mode.
2. To log in as the user *oracle*, enter
oracle
3. Then enter the password, for example:
oraclepswd
4. Start SQL*Net TCP/IP for UNIX by entering
tcpctl start
5. Start the ORACLE administrator utility, **sqldba**, by entering
sqldba
6. Start the ORACLE RDBMS by entering
startup
7. To stop the **sqldba** utility, enter
exit

Starting the NetWare Server

To start the NetWare server, complete the following steps:

1. Boot the NetWare server.
2. Change directories to the directory where you copied your installation files. For example:

```
cd \netware
```

3. Then enter

```
server
```

Starting the Windows Workstation

To start the workstation, complete the following steps:

1. Boot the workstation.
2. Start Microsoft Windows by entering

```
win
```

Stopping the SCO UNIX Database Server

To stop the SCO UNIX database server, complete the following steps:

1. Start the ORACLE administrator utility, **sqldba** by entering
sqldba
2. Stop the ORACLE RDBMS by entering
shutdown
3. Exit the **sqldba** utility by entering
exit
4. Log in as *root* by entering
root
5. Enter the *root* password, for example:
rootpswd
6. Stop the SCO UNIX server by entering
shutdown -g0 -y

Stopping The NetWare Server

To stop the NetWare server, complete the following steps:

1. From the server console, enter
down
2. Exit by entering
exit

Stopping the Windows Workstation

To exit from Microsoft Windows select *File* → *Exit* from the menu bar.

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