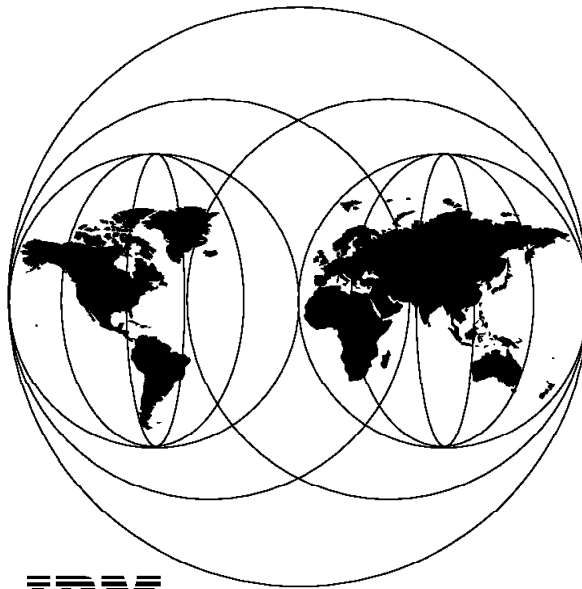# Informix Cluster POWERsolution Guide

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IBM

International Technical Support Organization

Austin Center

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Informix Cluster POWERsolution Guide

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IBM

┌─ **Take Note!** ──┐

Before using this information and the product it supports, be sure to read
the general information in Appendix C, "Special Notices" on page 65.

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Preface

This redbook describes the implementation of the Informix database products in a highly available AIX cluster using HACMP. Its purpose is to provide documentation for a Quick Install Program that automates much of the procedures for configuring an HACMP cluster by creating necessary shared disk areas and installing the Informix database products.

The Quick Install Program supports three types of HACMP cluster configurations with Informix: Mutual Takeover, Rotating Standby and Hot Standby. It assumes that the user has first set up the cluster hardware correctly, including connecting shared disks and connecting network adapters and RS232 cables according to instructions in the HACMP for AIX Installation Guide. It also assumes the user has installed AIX 4.2 or higher and HACMP 4.2 or higher. From there, the Quick Install Program configures network adapters, creates shared volume groups and logical volumes, configures the HACMP cluster, and installs the Informix products.

Some knowledge of AIX, the RISC System/6000, and HACMP for AIX is assumed.

The Team That Wrote This Redbook

This redbook was produced by a team of consultants working at the International Technical Support Organization, Austin Center.

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Chapter 1. HACMP Cluster Configurations

This chapter describes the HACMP with Informix configurations that are available using the Quick Install Program included with this redbook. The levels of software that have been tested with the program are:

- AIX 4.2 and 4.2.1

- HACMP 4.2 and 4.2.1

- Informix-Online Dynamic Server 7.23

In each case, the cluster consists of two nodes. The cluster configurations available are fhe following:

- Rotating Standby

- Hot Standby

- Mutual Takeover

In each case, the configuration pictured uses the default settings in the Quick Install Program for network addresses and labels, shared volume groups, and so on. These items are modifiable by the user.

1.1 Rotating Standby Configuration

This cluster configuration, consisting of two nodes, is set up in a rotating standby configuration. The cluster is configured as shown in Figure 1 on page 2.
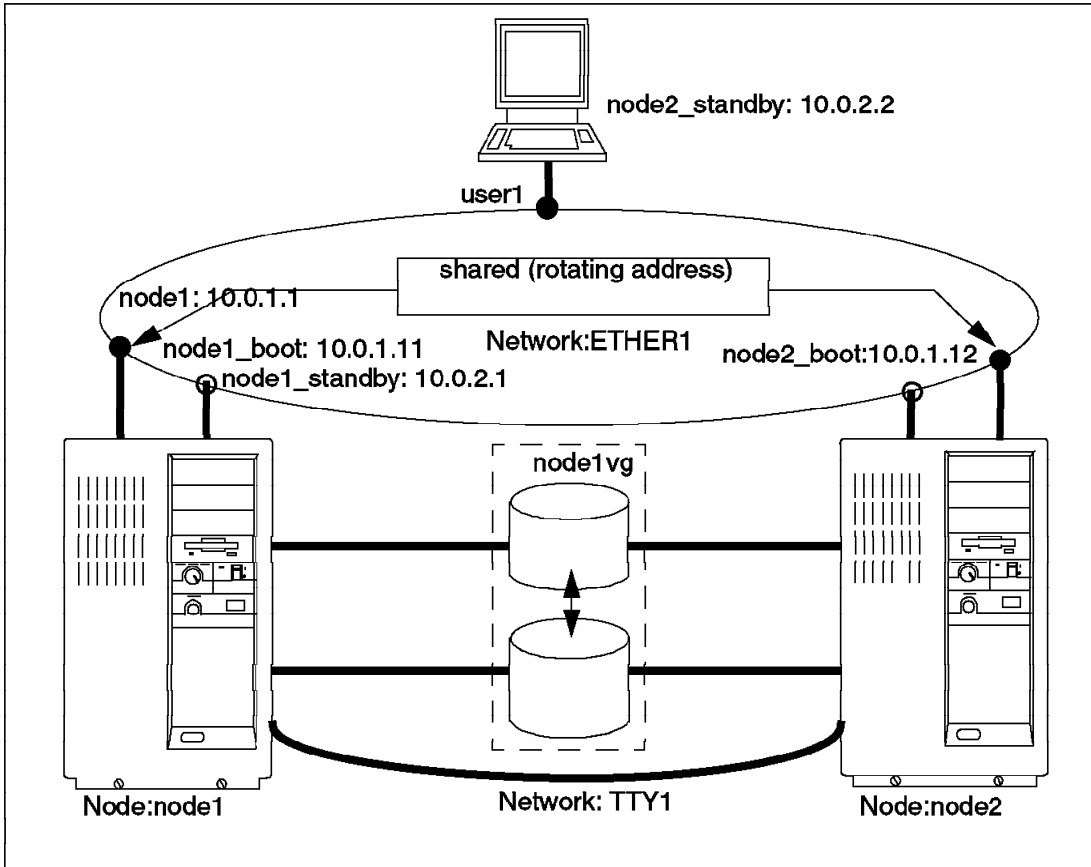
Figure 1. Cluster Configuration for Rotating Standby

The Rotating Standby cluster has a single resource group and application
server. A "shared" adapter (we call it shared, although in the actual
HACMP configuration panels it is called a service adapter) is configured for
both nodes. The resource group containing the Informix database is
acquired and started by the first node to enter the cluster (start HACMP).
On failure of the node that is serving the resources, the other node acquires
the resources and will not release them unless it fails or leaves the cluster
using the "graceful with takeover" option. If a node leaves the cluster
(gracefully or because of failure), and then rejoins, it assumes the backup
role until the other node leaves the cluster.

1.2 Hot Standby Configuration

This cluster, consisting of two nodes, is set up in a Hot Standby configuration. The cluster is configured as shown in Figure 2.
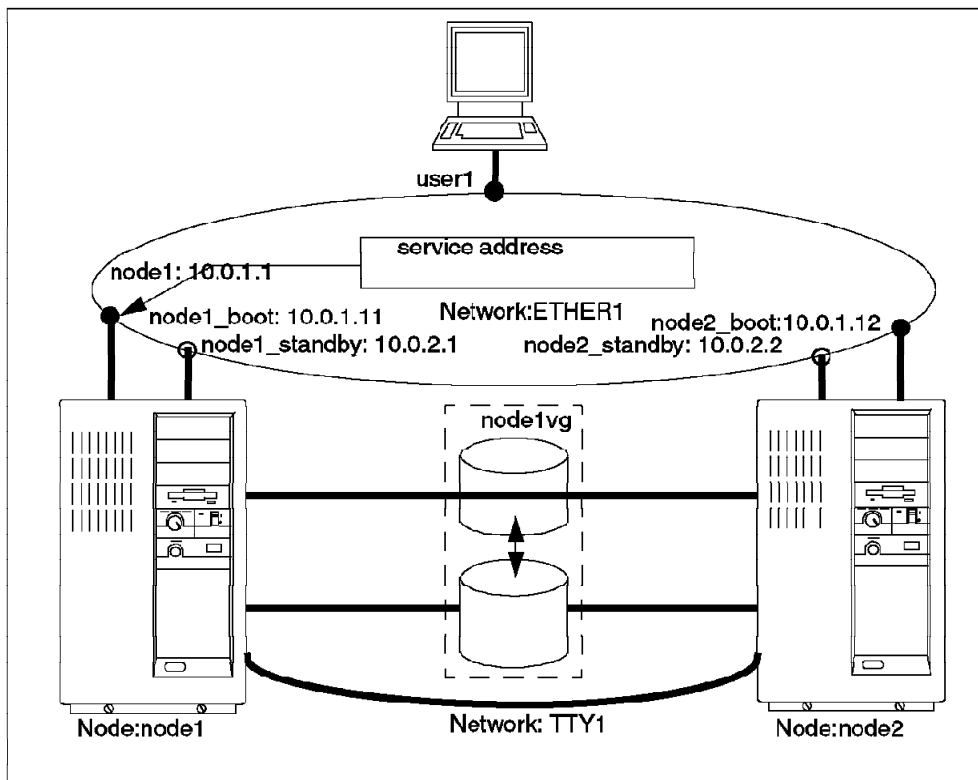
Figure 2. Cluster Configuration for Hot Standby

1.2.1 Hot Standby Cluster Description

The Hot Standby cluster has a single resource group and application server. The node1vg volume group contains a single Informix database. By default, node 1 is assigned the high priority (server) role, and node2 is assigned the low priority (backup) role. Whenever node1 joins the cluster, it acquires the resources and starts the Informix database. If node1 fails, the database is taken over by node2. When node1 rejoins the cluster, it reacquires the resources from node2.

1.3 Mutual Takeover Configuration

This cluster, consisting of two nodes, is set up in what is traditionally called a Mutual Takeover configuration. The cluster is configured as shown in Figure 3.
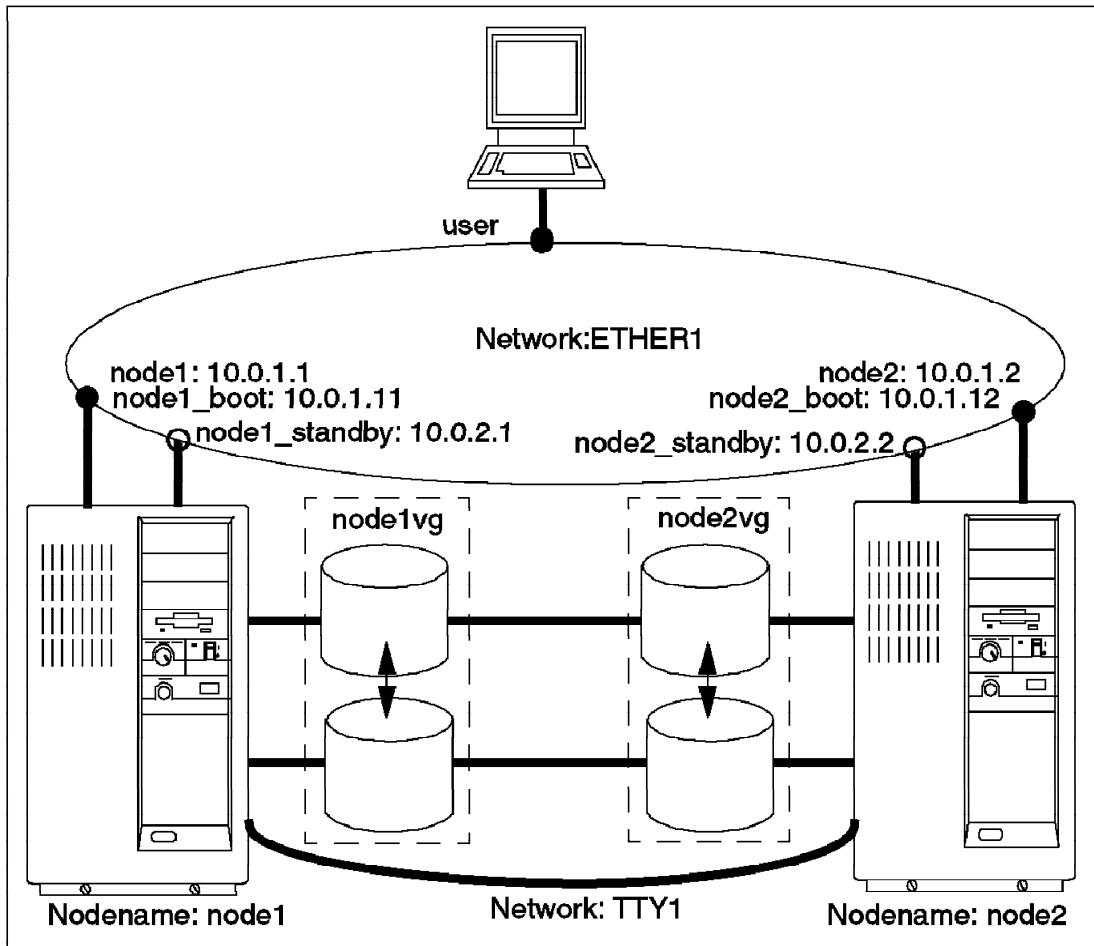
Figure 3. Cluster Configuration for Mutual Takeover

Mutual Takeover is a form of cascading configuration where both nodes have their own resource groups and application servers. There are two Informix databases in the cluster, one contained in volume group node1vg and the other in volume group node2vg. Node1 is the high-priority node for the database in node1vg, and node2 is the backup. For the database in

node2vg, node2 is the high-priority node, and node1 is the backup. In the event that either node fails, the opposite node acquires its resources. When the failed node reintegrates, its resources are returned to it.

Chapter 2. Quick Install Program Preparation

This chapter covers the necessary preparation steps before running the Quick Install Program.

2.1 Choosing Informix Products to Install

The minimum set of Informix products selected for installation on the Rotating, Hot Standby, and Mutual Takeover configurations are listed below:

1. Informix Connectivity Product:

    - INFORMIX-Connect

2. Informix Engine:

    - INFORMIX-OnLine Dynamic Server

    - INFORMIX-OnLine Dynamic Server Runtime Facility

You may add other products to this as fits your requirement.

2.2 Installation Worksheet

Make a copy of the worksheet from Appendix A, "Quick Install Program Worksheets" on page 47 that is appropriate for your configuration type. Fill out the information on this worksheet as we go along, and keep it on hand. Much of the installation is dependent on information from this worksheet.

2.3 Disk Space Sizing for Selected Informix Products

After selecting the products listed above (or any you choose), we now must calculate the disk space required for both logical and physical storage.

The sizes used as defaults in the following examples, as well as in the Quick Install program, are based on a user base of 32 users. Please adjust these totals to fit your company, with guidance from your Informix representative. To make adjustments, follow the disk sizing guidelines and worksheets below.

2.3.1 Consider Your Priorities

As you prepare to install and configure your database server, keep in mind the following questions:

- What is the highest priority, transaction speed, or safety of the data?

- Will the database handle short transactions, or fewer long transactions?

- Will this OnLine instance be used by applications on other computers?

- What is the maximum number of users you can expect?

- Are you limited by resources for space? CPU?

2.3.2 Consider Your Resources

Before you start, it is important to gather all of the necessary information. Some of this information will be kept on the Quick Install worksheet located in Appendix A, "Quick Install Program Worksheets" on page 47.

- How many disk drives are available? Which are faster?

  This is important in determining where on the disk, and on which disks, you keep essential data. Obviously, we want to put data that is used more often on the fastest part of the fastest disk. This will include the database, the physical log, and the temporary workspace. In addition to the guidelines discussed later in this chapter, the management of disk space is discussed in the chapter "Managing Disk Space" of the *INFORMIX-OnLine Dynamic Server Administrator's Guide*

- How many tape drives are available? What are their device names?

  You need to plan an archiving strategy. This may include adjustment of the logical logs, and tape devices. When do you want to change tapes? The information to help you with this can be found in the *INFORMIX-OnLine Dynamic Server Archive and Backup Guide.*

- How much shared memory is available? How much of it will be dedicated to Informix?

- What are the network names and addresses of the computers on your network? How many network adapters are you using?

  Your Network Administrator should be able to help you with this information.

2.3.3 INFORMIXDIR Directory

This filesystem is created by the Quick Install program to hold all INFORMIX-OnLine Dynamic Server files and scripts. The filesystem mount point is pointed to by the environment variable INFORMIXDIR. With Quick Install, this filesystem is created and mounted at /usr/informix. The filesystem is located in your rootvg volume group, and is 200 MB in size. Please make sure you have this much disk space available in rootvg. The products break down as follows:

- INFORMIX-OnLine Connectivity Products - 25 MB

- INFORMIX-OnLine Dynamic Server Engine - 115 MB

NOTE: If you plan to add any Informix tools or other products, remember that the files and scripts will need to be stored in this filesystem, so you will need to provide additional space.

2.3.4 Determining Disk Space Requirements

An efficient database is dependent on a proper configuration. A good initial configuration can save you from major overhauls once the database server is up and running. However, it is important to monitor the server during ongoing operations, and to make minor adjustments as needed.

Although the size of the database itself will depend on the requirements of each installation, some of the essential pieces use sizing formulas. Follow the steps below, in order. Try to supply the most accurate information possible, in order to install and configure efficiently.

2.3.4.1 Users

Determine the maximum number of users accessing the server.

2.3.4.2 Userthreads

Userthreads equal four times the number of expected users.

2.3.4.3 Physical Log Size

Physical logging is the process of storing the pages that the Informix-OnLine Dynamic Server is going to change before these changed pages are actually written to the database on disk. This practice ensures that the unmodified pages are available in case the database server fails or the archiving procedure needs them to provide an accurate snapshot of OnLine data.

Considerations:

The key question when deciding on the size of the physical log is, "How much updating of data does OnLine perform?" If the applications using your database server do not do much updating, you might not need a very big physical log. A good example of this would be a library system, where the reads will greatly outnumber the writes. However, in the case of an airline ticketing system, where entries are made constantly, a larger physical log is essential.

A general or average sizing for the Physical Log can be determined by using the following formula.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│                                                                               │
│   PHYSICAL LOG SIZE = userthreads * max_log_pages_per_critical_section*4*4     │
│                                                                               │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 4. Physical Log Size Formula

NOTE: The userthreads were already determined in 2.3.4.2, "Userthreads" on page 9. The max_log_pages_per_critical_section is five as determined by Informix. The page size is four KB.

Informix runs a checkpoint on the Physical Log when it reaches 75% of its capacity. Therefore the first three parts of the formula above must fit into 25% of the Physical Log Size in case of an overflow. We multiply the formula by four to get the total Physical Log Size.

For example, our calculation was based on 32 users:

```
┌─────────────────────────────────────────────────────────────────────────────┐
│                                                                               │
│   Physical Log Size = 32 Users * 4 Userthreads per user * 5 * 4 * 4 = 10240 Kb │
│                                                                               │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 5. Example Calculation of Physical Log Size

This is why the Quick Install has the Physical Log dbspace defaulted to 11 MB. Decide the size necessary for your Physical Log and enter this information on your Quick Install worksheet. For more information, consult the ″WHAT IS PHYSICAL LOGGING?″ chapter of the *INFORMIX-OnLine Dynamic Server Administrator's Guide*.

2.3.4.4 Number of Logical Logs and Sizes.

OnLine keeps a history of database and database server changes since the time of the last archive in the logical log. The logical log is made up of several logical-log files. At any time, the combination of OnLine archive tapes plus the logical-log files contain a complete copy of your data.

Considerations:

For a given level of system activity, the less logical log space is allocated, the sooner the logical log fills up, and the greater the chance that user activity is blocked due to logical log backups or checkpoints.

It is difficult to determine how much log space your system will require until the system is actually in use. Three log files is the minimum number allowed. The minimum total space that should be configured can be determined by the following formula:

> **Logical Log Space = (3 logs) * (Userthreads) * (2 log pages) * (page size)**

Figure 6. Minimum Logical Log Space Formula

Again, the formula above gives you the minimum logical log space.
Quick Install creates 6 logs at 1200 KB per log, as a default. This size is
appropriate for the majority of configurations. The following is the
calculation of this default for our 32 user example.

> **Logical Log Space = (6 logs) * (32 Users) * (4 userthreads per user) * (2 pages) * 4Kb = 61**

Figure 7. Example Calculation for Logical Log Space

This is why we default the area to 8 MB (Allowing space for future
growth). Decide the size necessary for your Logical Log and enter this
information on your Quick Install worksheet. For more information,
consult the "WHAT IS THE LOGICAL LOG?" chapter of the
INFORMIX-OnLine Dynamic Server Administrator's Guide.

2.3.4.5 Temporary Disk Space

Temporary disk space holds the temporary tables. This area and these
tables are used anytime a statement is sent to the database server that
does not require recording. Consider it to be OnLine's work area.
Anytime a query is asked for, or statements use auto-index joins, the
work is done in the temporary disk space. The work done in this space,
and the temporary tables created are cleared when the application
terminates.

Consideration:

There is no standard method for estimating this space. Just consider
the number of users on the server, and allow an adequate "work space"
for each one. In our 32 user scenario, we have allocated 250 MB of
temporary disk space.

2.3.4.6 Database Disk Space

This is where all the data is stored. Answering the question of "How
much?" is really a two step process. First, you need to make a rough
estimate based on the number of users and the type of data being
stored. You must also remember to allow for overhead and growth.
Second, you evaluate the server after it has run for a while and allocate

space accordingly. Informix has made it easy to manage the OnLine server in this capacity.

2.3.4.7 Allowing for Mirroring

Mirroring is basically making a copy of the raw space for data protection. If you choose to use multiple physical disks for the creation of the raw disk space (your shared volume groups), we suggest mirroring the logical volumes. You will be prompted about mirroring during the Quick Install. If you do choose mirroring, obviously, double the disk space is needed for your capacity requirement.

2.4 Assigning Network Adapters

If your network addresses are not already established, you need to assign and name all of the network adapters you will be using in the cluster. Each adapter has a label and an IP address (as seen on your worksheet). For more information on this step please contact your network administrator. Enter this information on your worksheet.

2.5 Updating /.rhosts and /etc/hosts Files

These files control communication between adapters on different nodes. They allow for name resolution as well as remote copy permission needed by the Quick Install Program during initial configuration. When the configuration is completed, the /.rhosts files can be removed from each of the cluster node machines. The IP labels used in these examples are the defaults used by the Quick Install Program.

2.5.1 Update .rhosts on Both Nodes

As the root user, edit the .rhosts file adding the names of all adapters involved in cluster communication as well as the level of user allowed

```
# .rhosts file

node1_service
node1_standby
node1_boot
node2_service
node2_standby
node2_boot
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
```

Figure 8. /.rhosts File from Node 1

2.5.2 Update /etc/hosts on Both Nodes.

As the root user, edit the /etc/hosts file adding the names and IP addresses of all adapters involved in the cluster.

```
# /etc/hosts

# This file contains the hostnames and their address for hosts in the
# network.  This file is used to resolve a hostname into an Internet
# address.
#
# At minimum, this file must contain the name and address for each
# device defined for TCP in your /etc/net file.  It may also contain
# entries for well-known (reserved) names such as timeserver
# and printserver as well as any other host name and address.

# HACMP cluster, ethernet interfaces (stnd ethernet vsn 2)


10.1.1.1        node1_service    # en0
10.1.1.10       node1_boot       # en0 at boot with IPAT
10.2.1.1        node1_standby    # en1


10.1.1.2        node2_service    # en0
10.1.1.20       node2_boot       # en0 at boot with IPAT
10.2.1.2        node2_standby    # en1

~
```

Figure 9. /etc/hosts File from Node1

NOTE: Once you have entered these two files, you must check your adapters. After shutting down the system, and logging back in, type host followed by the adapter name. In Figure 10 on page 14, we tested node1_standby:

```
# host node1_standby
node1_standby is 10.2.1.1
# ping node1_standby
PING node1_standby (10.2.1.1): 56 data bytes
64 bytes from 10.2.1.1: icmp_seq=0 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=1 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=2 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=3 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=4 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=5 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=6 ttl=255 time=0 ms
64 bytes from 10.2.1.1: icmp_seq=7 ttl=255 time=0 ms
^C
--- node1_standby ping statistics ---
8 packets transmitted, 8 packets received, 0% packet loss
round-trip min/avg/max = 0/0/0 ms
# _
```

Figure 10. Adapter Test on node1_standby

You need to test every adapter in this way, and check that the IP address returned is the address expected. If not, you have a name resolution conflict on your network, and need to contact your network administrator.

If you have already configured your adapters with IP addresses using the AIX TCP/IP panels, also use the ping command on each of the address labels, to test that basic TCP/IP communications is working correctly.

2.6 Finding Available Group & User ID Numbers

You need to find an available user ID number and an available group ID number to use for the "informix" user. These numbers must be available on both nodes. Make sure you have these before continuing. The user ID number can be any one above 200 and the group ID number must also be greater than 200. To check these, simply enter smit user or smit group at the command prompt, and enter List All at the menu. Choose numbers for

your group and ID that are unused on both nodes. When you have done so, enter this information on your worksheet.

2.7 Sizing the Logical Volumes

These raw logical volumes will store your database. They are automatically created by the Quick Install program, but you are given the opportunity to adjust the default sizes. When you have decided upon the sizes for your logical volumes, enter them on your worksheet. Remember, if you are using a Mutual Takeover configuration, you will have a set of logical volumes for each database. Therefore, you must pick the sizes for both sets of logical volumes. It is a good idea, if it fits your application requirements, to keep these sizes the same for both nodes.

Logical Volume Name	Description of contents	File Name	Suggested LV size (MB)
informix1dbslv	database	/dev/rinformix1dbslv	700
temp1dbslb	temporary tables	/dev/rtemp1dbslv	250
plog1dbslv	physical log	/dev/rplog1dbslv	12
llog1dbslv	logical log	/dev/rllog1dbslv	8

Figure 11. Logical Volumes for Informix Storage

The sizes given for the logical volumes are the default sizes used in the Quick Install program. You should have used the formulas above to adjust these sizes, if desired. Please enter the sizes on the worksheet.

Chapter 3. Running the Quick Install Program

This chapter outlines the steps involved in installing INFORMIX-OnLine Dynamic Server on a highly available cluster.

Now that you have the necessary information to begin installation, follow these steps, and let the Quick Install program lead the way. You will run the program on each node, first on node 1 and next on node 2. If you will be running a Hot Standby configuration, the convention used is that node 1 is the main server, and node 2 is the backup. The steps shown are for node 1. Any changes for node 2 are specified along the way.

NOTE: If you choose to leave the Quick Install program, or are forced out due to an error, running the script called /tmp/hascripts/cleanup and then shutting down the node will prepare the machine for the installation process again. You must pass this script a numeric parameter representing the configuration type when calling it, as follows:

- 1 = Mutual Takeover
- 2 = Rotating Standby
- 3 = Hot Standby

Example: cleanup 2 will clean up after a failed Rotating Standy configuration.

3.1 Restoring Files from Diskette

Take the diskette provided with this redbook, and put it in the floppy diskette drive of your system. While signed on as the root user, enter the following command:

```
# tar -xvf/dev/rfd0
```

The files on the diskette will be restored into the directory /tmp/hascripts.

3.2 Starting the Quick Install Program

After you have restored the diskette contents, enter the following commands as the root user to start the Quick Install Program:

```
# cd /tmp/hascripts
# ./setup
```

The Quick Install Program will start and take you to the first prompt.

3.3 Declaring Node Number

This first prompt asks you to enter the node on which you are currently working. If you are working on node 1, enter **1**. If you are working on node 2, enter **2**.

```
******************************************************
*        HACMP MACHINE NUMBER SELECTION        *
******************************************************


          1) Machine/Node #1
          2) Machine/Node #2

          Select Machine Number: 1_
```
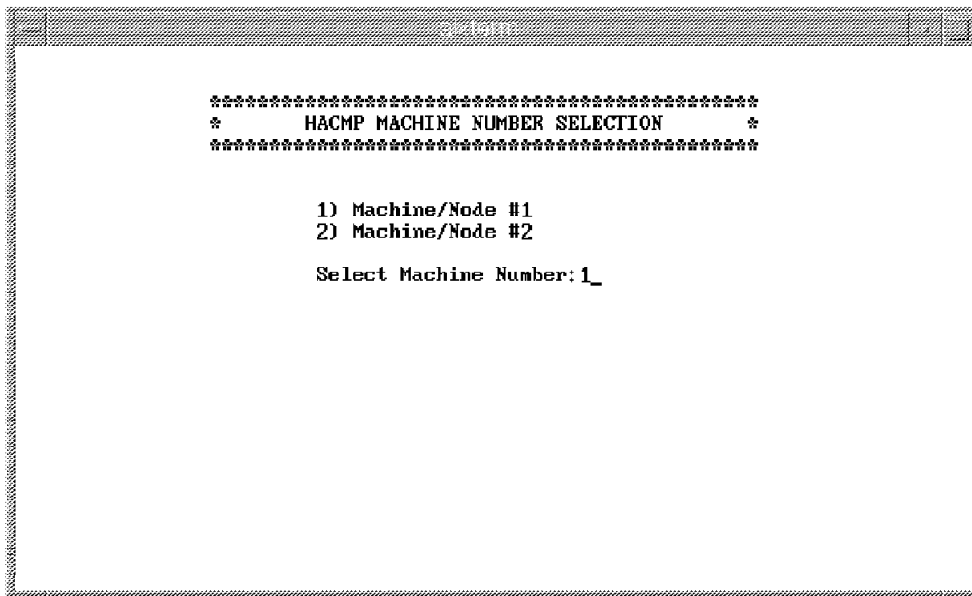
Figure 12. Specifying HACMP Node Number

3.4 Declaring Failover Type

You should have already chosen which failover type you wish to use for this cluster configuration. If you want a Mutual Takeover configuration, enter **1**; for Rotating Standby, enter **2**, and for Hot Standby, enter **3**.

```
*****************************************************
*         HACMP FALLOVER TYPE SELECTION            *
*****************************************************


              1) Mutual Takeover
              2) Rotating
              3) Hot Standby

              Select Fallover Type:_
```
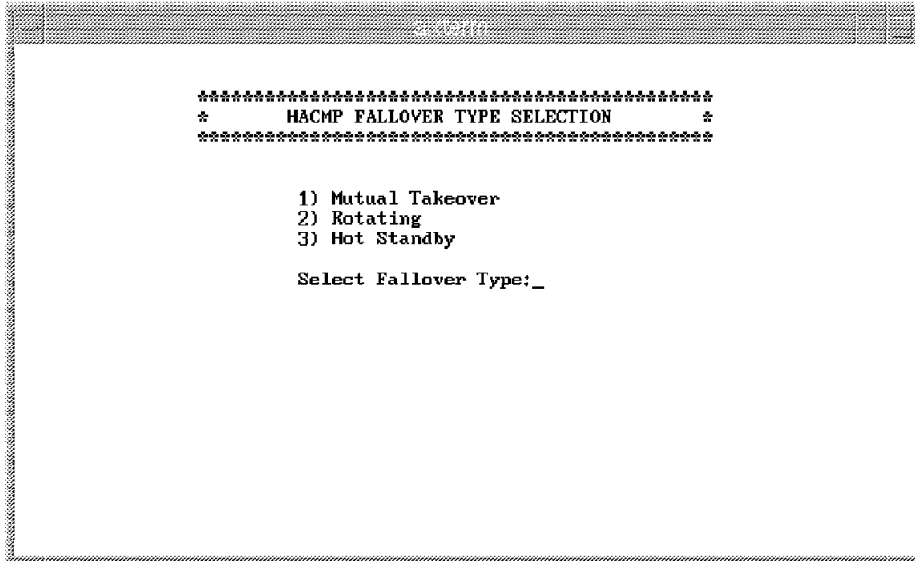
Figure 13. Declaring Failover Type

3.5 Choosing TTY Port

The available TTY lines are presented to you. This line supports the
non-TCP/IP "heartbeat" between the nodes in the cluster. During the
physical setup of the machines, you should have connected a serial null
modem cable between serial ports on your machines, and created a TTY
device. The existing TTYs will be presented on this prompt. Please select
the appropriate choice for your machine:

```
**********************************************
*        HACMP TTY HEARTBEAT CABLE DEVICE       *
**********************************************


          TTY DEVICE       PORT     STATUS
          ----------       ----     ------
     1)   tty0             s1       Available
     2)   tty1             s2       Available

          Select TTY Device: 2_
```
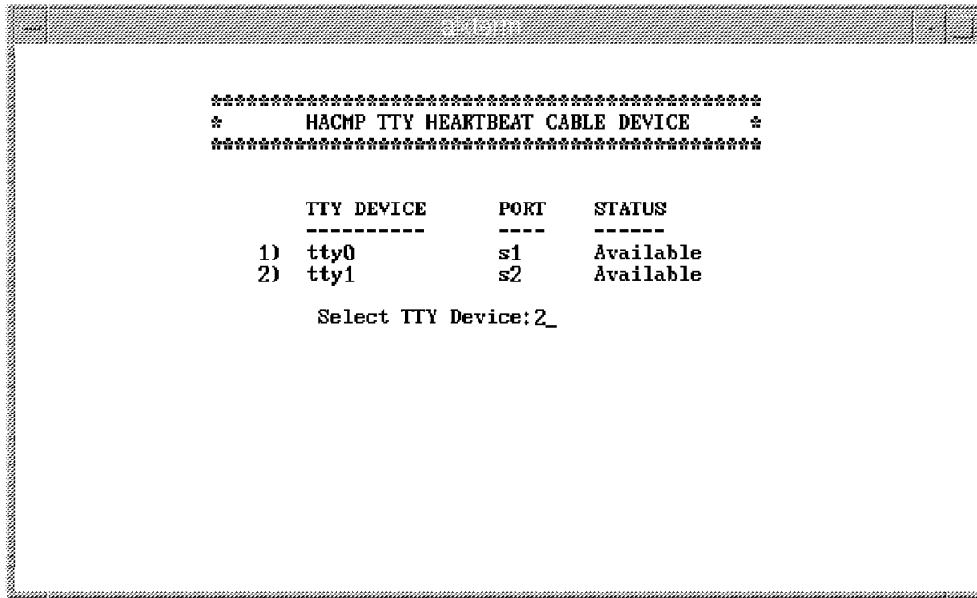
Figure 14. Choosing TTY Port

3.6 Selecting the Network Type

Select **1** if your network is using Ethernet connections, or select **2** if your network is using token-ring connections.

```
****************************************************
*          HACMP NETWORK TYPE SELECTION            *
****************************************************


             1) Ethernet
             2) Token Ring

             Select Network Type: 1_
```
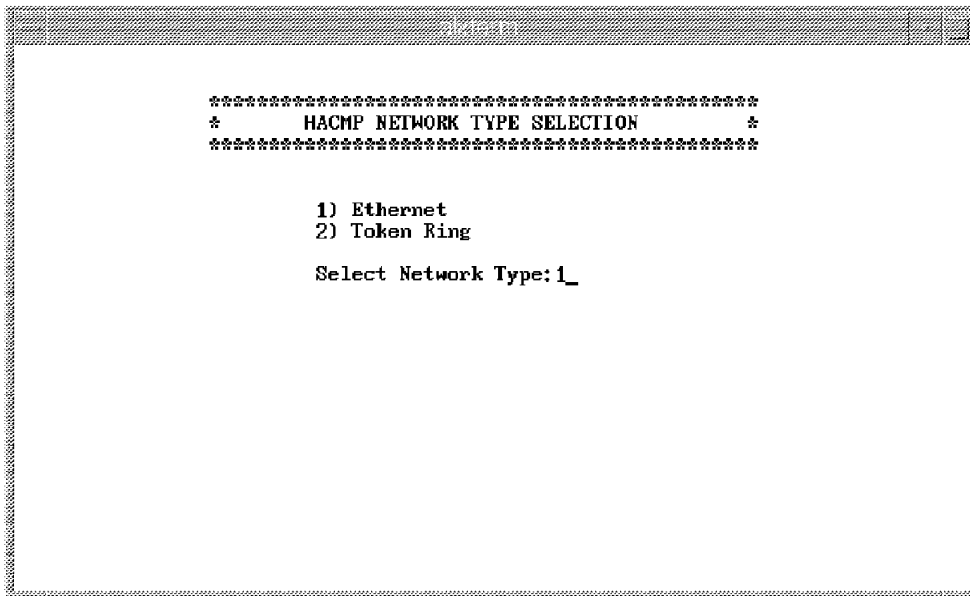
Figure 15. Selecting Network Type

3.7 Adapter Configuration Screen

The next screen does all the adapter configuration for you. You must enter all the appropriate information. You should have gathered this information while completing the configuration worksheet. If you have an existing network, and are using IP addresses from that network, the Quick Install Program will discover these definitions, and present them on the screen for confirmation. If you do not have an existing network, this screen will come up with the default IP addresses and labels. Either way, consult your worksheet for the proper adapter information and make any changes on this screen.

To make any changes to the label, address, mask, or slot position of the adapters, just follow these instructions:

- To enter/change an adapter label, enter L and a number (Example: L0, L1).

- To enter/change an IP Address, just enter A and a number (Example: A0,A2).

- To enter/change the subnet mask for an adapter just enter M and a number (Example: M0,M1).

- To swap the position of two adapters, just enter S followed by the numbers you want switched (Example: S12).

When you have filled in all the appropriate information enter C to move on.

Below, we will display the screens of node1 and node2 for all three configurations, as they are all unique. Make sure you are using the appropriate information for your configuration.

Mutual Takeover Node 1:

```
 ******************************************
 *        HACMP ADAPTER CONFIGURATION        *
 *              Mutual Takeover              *
 ******************************************


    HATYPE  IP LABEL        IP ADDR        IP MASK         ADAPTER SLOT
    ------  --------        -------        -------         ------- ----
0)  service node1           10.0.1.1       255.255.255.0   N/A
1)  boot    node1_boot      10.0.1.11      255.255.255.0   ent0     4
2)  standby node1_standby   10.0.2.1       255.255.255.0   ent1     6

            A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

Mutual Takeover Node 2:

```
****************************************************
*          HACMP ADAPTER CONFIGURATION             *
*                 Mutual Takeover                  *
****************************************************


     HATYPE   IP_LABEL        IP_ADDR         IP_MASK          ADAPTER SLOT
     ------   --------        -------         -------          ------- ----
0)   service  node2           10.0.1.2        255.255.255.0    N/A
1)   boot     node2_boot      10.0.1.12       255.255.255.0    ent0    4
2)   standby  node2 standby   10.0.2.2        255.255.255.0    ent1    6

            A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

Rotating Standby Node 1:

```
****************************************************
*          HACMP ADAPTER CONFIGURATION             *
*                 Rotating                         *
****************************************************


     HATYPE   IP_LABEL        IP_ADDR         IP_MASK          ADAPTER SLOT
     ------   --------        -------         -------          ------- ----
0)   shared   node1           10.0.1.1        255.255.255.0    N/A
1)   boot     node1 boot      10.0.1.11       255.255.255.0    ent0    4
2)   standby  node1 standby   10.0.2.1        255.255.255.0    ent1    6

            A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

Rotating Standby Node 2:

```
*****************************************************
*          HACMP ADAPTER CONFIGURATION              *
*                  Rotating                         *
*****************************************************


     HATYPE  IP_LABEL       IP_ADDR        IP_MASK        ADAPTER SLOT
     ------  --------       -------        -------        ------- ----
0)   shared  node1          10.0.1.1       255.255.255.0  N/A
1)   boot    node2_boot     10.0.1.12      255.255.255.0  ent0    4
2)   standby node2_standby  10.0.2.2       255.255.255.0  ent1    6

          A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

Hot Standby Node 1:

```
*****************************************************
*          HACMP ADAPTER CONFIGURATION              *
*                  Hot Standby                      *
*****************************************************


     HATYPE  IP_LABEL       IP_ADDR        IP_MASK        ADAPTER SLOT
     ------  --------       -------        -------        ------- ----
0)   service node1          10.0.1.1       255.255.255.0  N/A
1)   boot    node1_boot     10.0.1.11      255.255.255.0  ent0    4
2)   standby node1_standby  10.0.2.1       255.255.255.0  ent1    6

          A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

Hot Standby Node 2:

```
*************************************************
*         HACMP ADAPTER CONFIGURATION           *
*                  Hot Standby                  *
*************************************************


     HATYPE   IP_LABEL        IP_ADDR          IP_MASK          ADAPTER SLOT
     ------   --------        -------          -------          ------- ----
 1)  service  node2           10.0.1.2         255.255.255.0    ent0    4
 2)  standby  node2_standby   10.0.2.2         255.255.255.0    ent1    6

              A)ddress L)abel M)ask S)wap adapter C)ontinue: _
```

NOTE: On node 2, after the adapters are configured, you will be prompted for the label of node 1's boot adapter. This information is necessary for communication between the nodes during install.

```
*************************************************
*         HACMP NODE1 BOOT LABEL ENTRY          *
*************************************************


    Enter Node #1 Boot Adapter Label (ex. node1_boot): _
```

3.8 Informix Group and User Setup

You are now entering the Informix portion of the installation.

The members of the "informix" group control database access. This group should be restricted to superusers only. On the next screen, you will be prompted for a group ID # for this "informix" group. This ID # must be unique to the node, but the same on both nodes in the cluster. You should have already decided this number, and have it written on your worksheet.

```
*************************************************************
*  INFORMIX PRODUCTS USE THE GROUP "informix" INTERNALLY *
*  TO CONTROL DATABASE ACCESS. THE MEMBERSHIP OF THIS     *
*  GROUP SHOULD BE RESTRICTED TO SUPERUSERS ONLY. ADDING  *
*  REGULAR USERS TO THIS GROUP CAN CAUSE UNINTENDED AND   *
*  UNCONTROLLED DATABASE ACCESS. THIS GROUP WILL BE       *
*  CREATED NOW.                                           *
*************************************************************
```
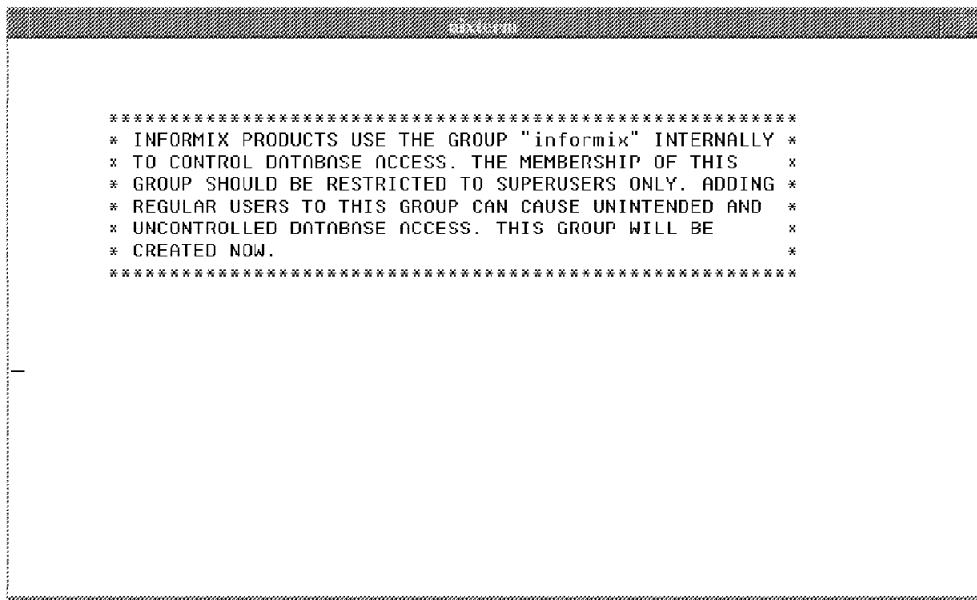
Figure 16. Informix Group Information Screen

Enter the ID #, and hit **Enter** to continue.

```
****************************************************
            CREATING THE informix GROUP
****************************************************




    THIS GROUP MUST BE GIVEN AN ID # UNIQUE TO THE NODE.
    THIS ID # MUST BE THE SAME ON BOTH NODES OF THE
    CLUSTER. FINALLY, THIS ID # MUST BE ABOVE 100.
    CHECK BOTH NODES FOR A VALID ID # AND CONTINUE.



        informix GROUP ID # (EX. 201)? _
```

Figure 17. Informix Group ID # Prompt

The "informix" user is the superuser for INFORMIX-OnLine Dynamic Server.
This user has access and permissions to all sections of the server. The
"informix" user is the sole member of the "informix" group. We recommend
that no other users be given these same permissions. In the next screen
you will be prompted for a user ID # for this "informix" user. This ID # must
be unique to the node, but the same on both nodes in the cluster. You
should have already decided this number, and have it wriiten on your
worksheet.

```
*****************************************************************
* THE USER "informix" IS THE DATABASE EQUIVALENT OF THE   *
* UNIX ROOT ACCOUNT, SO ANYONE LOGGED IN AS "informix"    *
* CAN COMPLETELY ACCESS ANY OF THE INFORMIX PRODUCTS AND  *
* DATABASES.  MAKE SURE THAT YOU KEEP THE PASSWORD FOR    *
* THIS USER CONFIDENTIAL. THIS USER WILL BE CREATED NOW.  *
*****************************************************************
```

Figure 18. Informix User Information Screen

Enter the ID #, and hit **Enter** to continue.

```
***********************************************************
                  CREATE USER informix
***********************************************************




     THIS USER MUST BE GIVEN AN ID # UNIQUE TO THE NODE.
     THIS ID # MUST BE THE SAME ON BOTH NODES OF THE
     CLUSTER. FINALLY, THIS ID # MUST BE ABOVE 100.
     CHECK BOTH NODES FOR A VALID ID # AND CONTINUE.


          informix USER ID # (EX. 210)?
```
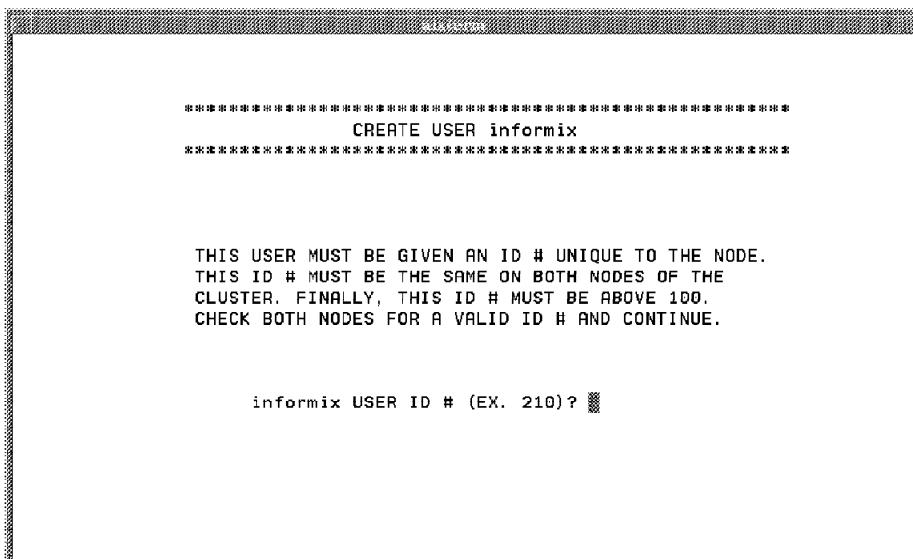
Figure 19. Informix User ID Prompt

You must enter a password for the newly created ″informix″ user. This
password will be changed again at initial login.

```
****************************************************
*                  SETTING PASSWORD                *
****************************************************




     THE PASSWORD FOR informix MUST NOW BE TEMPORARILY
     SET.  PLEASE ENTER A PASSWORD WHEN PROMPTED, THEN
     ENTER IT AGAIN FOR CONFORMATION.




Changing password for "informix"
informix's New password:_
```
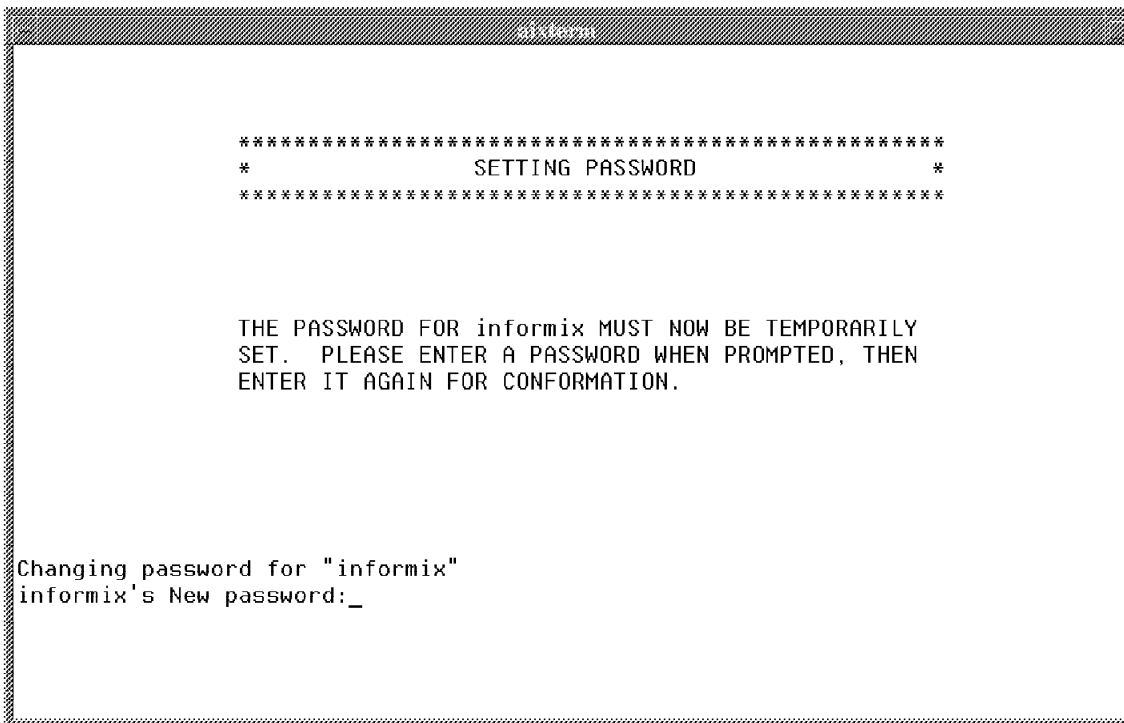
Figure 20. New User Password Prompt

3.9 Create Storage Filesystem

To store all of INFORMIX-OnLine's scripts and files, we create a filesystem
mounted at ″/usr/informix″ in rootvg. This filesystem is 200 MB large, has
permissions se0 to 660, and is owned by the ″informix″ user and group.
This filesystem is set to always mount automatically at system startup.

```
****************************************************************
*  THIS QUICK INSTALL PROGRAM WILL CREATE A FILESYSTEM FOR  *
*  STORING THE INFORMIX ONLINE SCRIPTS.  THIS DIRECTORY,    *
*  "/usr/informix" WILL HAVE PERMISSIONS SET TO "770" AND   *
*  WILL BE OWNED BY THE "informix" USER AND THE "informix"  *
*  GROUP.                                                   *
****************************************************************


        CREATING FILESYSTEM TO BE MOUNTED AT /usr/informix


                    Please Wait...
```

Figure 21. /usr/informix Filesystem Creation

3.10 Setting up CD-ROM

The INFORMIX-OnLine Dynamic Server CD-ROM install disk must be placed in the CD-ROM drive. Quick Install will detect your CD-ROM filesystem if it exists, or create it for you if it doesn't exist.

```
**************************************************
* YOU MUST NOW PUT THE CD-ROM NAMED:            *
* "INFORMIX ONLINE DYNAMIC SERVER v.7.23"       *
* IN THE CD-ROM DRIVE. CONTINUE WHEN READY.     *
**************************************************




       ENTER "y" TO CONTINUE, OR "exit" TO LEAVE SCRIPT:_
```
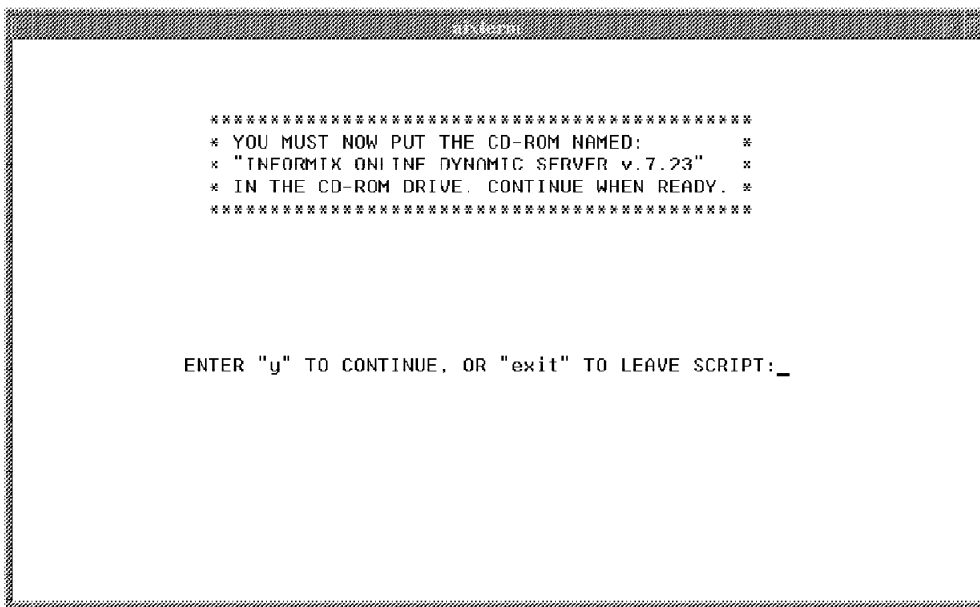
Figure 22. CD-ROM Prompt

3.11 Setting Environment Variables

INFORMIX-OnLine uses four environment variables that are set for you by Quick Install. These variables appear in the /etc/environment file. The four variables with their settings are as follows:

- INFORMIXDIR = /usr/informix
- INFORMIXSERVER = node1srv
- ONCONFIG = onconfig.node1
- PATH = $PATH:$INFORMIXDIR/bin

NOTE: In a mutual takeover configuration, the following different settings are made for node 2:

- INFORMIXSERVER = node2srv
- ONCONFIG = onconfig.node2

3.12 Copying and Installing Files from CD-ROM

After the storage filesystem is created, Quick Install begins to unload the files from the INFORMIX-OnLine Dynamic Server CD-ROM. The two products, OnLine connectivity and the OnLine engine, are copied and installed one after the other. Depending on the speed of your system, this may take up to ten minutes for each product. This estimate includes both copy and install time.

```
******************************************************************
* THE SPECIFIC FILES FOR EACH PRODUCT OF INFORMIX ONLINE *
* SERVER WILL NOW BE COPIED FROM THE CD-ROM TO THE NEWLY *
* CREATED /usr/informix DIRECTORY, THEN INSTALLED.       *
******************************************************************


    Each product may take up to 10 minutes.   Please Wait...
```
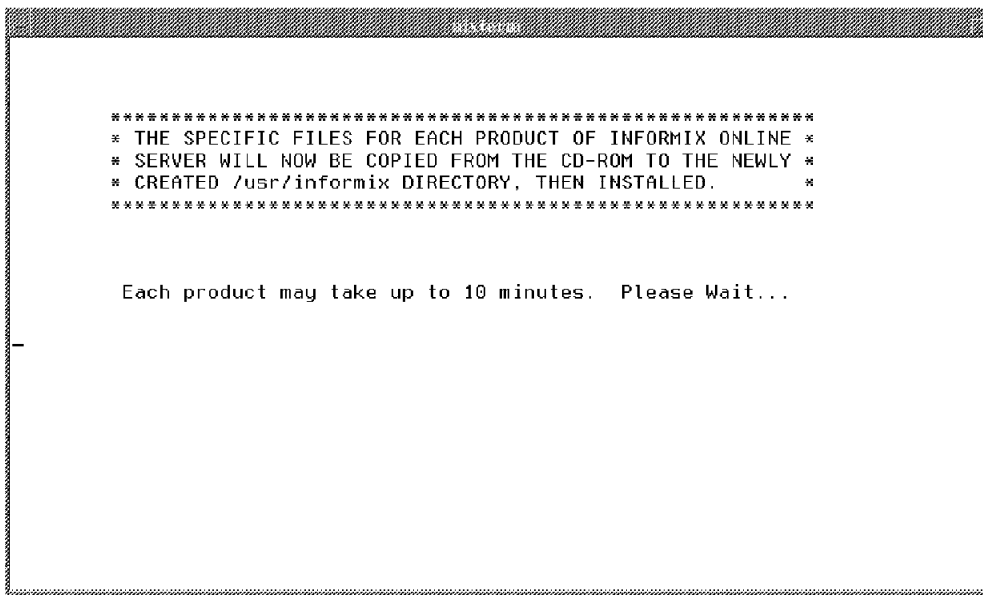
Figure 23. Copying Files

When all the files for the first product are copied, you will be prompted for the License Serial Number and Key located on the card enclosed with your Informix documentation. These values will be the same for both products.

```
INFORMIX-Connect Version 7.23.UC1
Copyright (C) 1984-1997 Informix Software, Inc.


Installation Script

This installation procedure must be run by root (super-user).
It will change the owner, group, and mode of all files of this
package in this directory.  There must be a user "informix" and a
group "informix" known to the system.


Press RETURN to continue,
or the interrupt key (usually CTRL-C or DEL) to abort.


Enter your serial number (for example, INF#X999999) >
```

Figure 24. License # and Key Prompt for Install

3.13 Creating Physical Storage Space

Depending on your failover type, either one or two volume groups will now
be created to hold the raw storage space for OnLine Server. If you are
configuring Rotating Standby or Hot Standby, there will be one volume
group called node1vg. If you are configuring Mutual Takeover, there will be
two volume groups, node1vg and node2vg.

This part of the Quick Install Program will check the name of the volume
group to be created and see if it already exists. If so, it will check it for
sufficient disk space and continue on. If the volume group does not exist,
you are asked to create it, and you are shown a list of available disks.
Select a disk by entering its line number:

```
**********************************************
       CHECKING FOR GROUP node1vg
**********************************************



***THE VOLUME GROUP YOU SPECIFIED DOES NOT EXIST!***
***********IT WILL NOW HAVE TO BE CREATED***********



       THE FOLLOWING DISKS ARE AVAILABLE:

 1) hdisk2 is attached to the adapter in slot  03
 2) hdisk3 is attached to the adapter in slot  03
 3) hdisk4 is attached to the adapter in slot  03
 4) hdisk5 is attached to the adapter in slot  03
 5) hdisk6 is attached to the adapter in slot  07
 6) hdisk7 is attached to the adapter in slot  07


       PLEASE MAKE A SELECTION NOW : _
```

Figure 25. Creating Volume Group

Once you have selected a disk, you are shown the disk you have already chosen and asked if you would like to add another disk to the volume group.

```
*************************************************
* BECAUSE YOU HAVE SELECTED MULTIPLE DISKS FOR  *
* THE CREATION OF THIS VOLUME GROUP YOU HAVE    *
* THE OPTION OF MIRRORING YOUR LOGICAL VOLUMES. *
*************************************************

WOULD YOU LIKE LOGICAL VOLUMES MIRRORED? (y/n) █
```
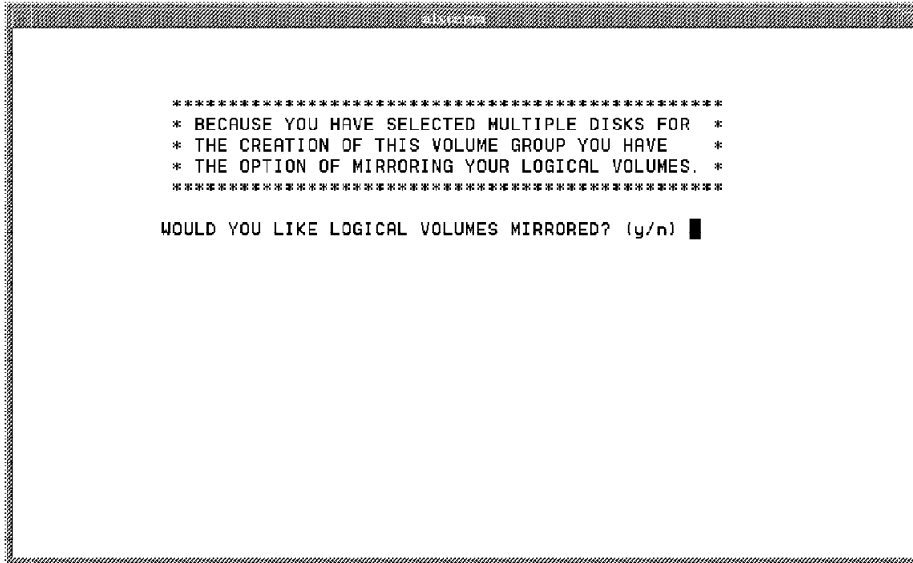
Figure 26. Multiple Disk Prompt

If you select no (**n**), the volume group will be created. If you select yes (**y**), you are shown the available disks again and asked to choose. When you have selected all the disks you need, select **no**, and the volume group will be created.

As the volume group is being created, the filesystem to store the Informix control scripts for the database is also being created.

If there is only one disk available, it will automatically be chosen and used to create the volume group.

NOTE: It is a good idea when using two or more disks to create a volume group to select disks attached to adapters in different slots to allow for the most effective mirroring. Mirroring will make two copies of the logical volumes on the volume group, making the cluster even more secure against failure. You will be prompted after creation as to whether or not you want mirroring.

NOTE: For mutual takeover, you will go through this section again. On node 2, the volume groups are imported from node 1, and this section is not seen.

3.14 Creation of Logical Volumes

The list of default logical volumes now appears.

```
*************************************************************
* THE FOLLOWING INFORMIX SPECIFIC LOGICAL VOLUMES WILL    *
* BE CREATED FOR ONLINE SERVER STORAGE.  THE SIZES SHOWN  *
* ARE BASED ON A COMPANY WITH 32 USERS.  PLEASE           *
* CONSULT THE ACCOMPANYING RED BOOK, AS WELL AS THE       *
* INFORMIX DOCUMENTATION AND ADJUST ACCORDINGLY.          *
*************************************************************


   LOGICAL VOLUME         DESCRIPTION           SIZE(Mb)
   ----------------------------------------------------------
 1) informixdbslv     database storage           700
 2)   tempdbslv       temporary workspace        250
 3)   plogdbslv       physical log storage       12
 4)   llogdbslv       logical log storage        8

 5)  CONTINUE ON AND CREATE LOGICAL VOLUMES
 6)  EXIT THE PROGRAM

         PLEASE MAKE A SELECTION:█
```

Figure 27. Logical Volume Sizing

You will notice that this list matches the list from your worksheet. Match up the sizes with those you have chosen for your database (the defaults are shown). If you have any changes, just select the line number of the logical volume you wish to change. If you want to continue enter **5**, and if you want to exit at this point, enter **6**.

When you continue on, you will see each logical volume being created one by one. Each logical volume will prompt you to specify its location on the disk. The closer to the center of the disk, the faster the data can be manipulated. Therefore, an efficient database has its lesser used information on the outside of the disk.

```
 ******NOW CREATING THE FOLLOWING LOGICAL VOLUME:******

                ****informix1dbslv****



   The following list allows you to choose disk placement:

                 1) middle        4) outer-middle
                 2) center        5) inner-edge
                 3) inner-middle 6) outer-edge

   Where on the disk would you like this logical volume placed?  █
```

Figure 28. Logical Volume Placement

When all the logical volumes have been created, the permissions will be set to 660, and ownership to "informix" user and group.

NOTE: If you chose a Mutual Takeover Configuration, you have two databases. You therefore must have two volume groups, and two filesystems for storage. You will now be taken back to the Create Volume Group prompt for a second time through.

NOTE: On node 2, the volume groups and logical volumes will be imported from node 1.

3.15 Editing the onconfig File

The rest of the install will require no user specified information. It will start with copying and editing the "onconfig.std" file located in the "/usr/informix/etc" directory. This file contains all of the information unique to your installation of INFORMIX-OnLine.

The onconfig.node1 or onconfig.node2 (mutual takeover) will be the new configuration files. An example of these files can be found in the *INFORMIX-OnLine Dynamic Server Administrator's Guide.*

```
*****************************************************************
* EDITING THE ONCONFIG.STD FILE AND MOVING IT TO ONCONFIG.NODE1 *
*****************************************************************
```
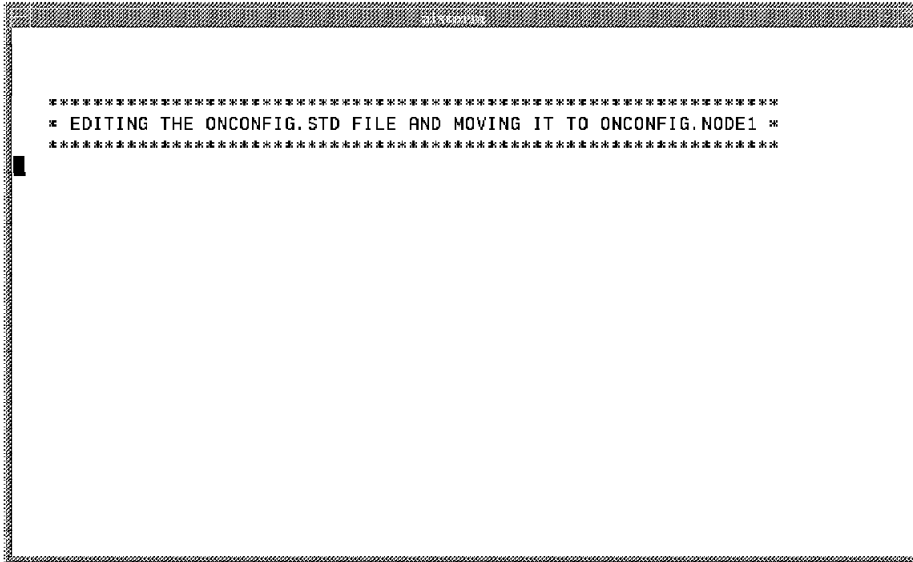
Figure 29. Editing the onconfig File

3.16 Editing the sqlhosts File

The next section will update the connectivity file ″sqlhosts″, located in the
/usr/informix/etc directory. This file correlates the OnLine server name with
the service port and hostname of the node. An example of this file can be
seen in B.3, "sqlhosts File" on page 58.

```
******************************************************************
* EDITING THE SQLHOSTS FILE IN THE /usr/informix/bin DIRECTORY. *
******************************************************************
```
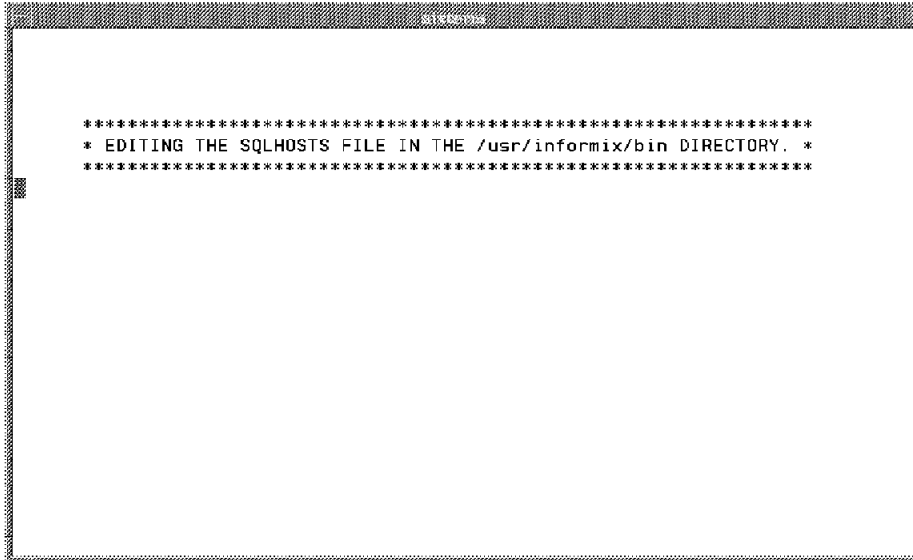
Figure 30. Editing the sqlhosts File

3.17 Editing the /etc/services File

Quick Install will now add service port information to the /etc/services file. The ports used by Informix are 1526 and 1527 (mutual takeover).

An example of this file can also be seen in B.1, "/etc/services file" on page 57.

```
*********************************************************************
* NOW EDITING THE /etc/services FILE, AND ADDING INFORMIX ENTRIES *
*********************************************************************
```
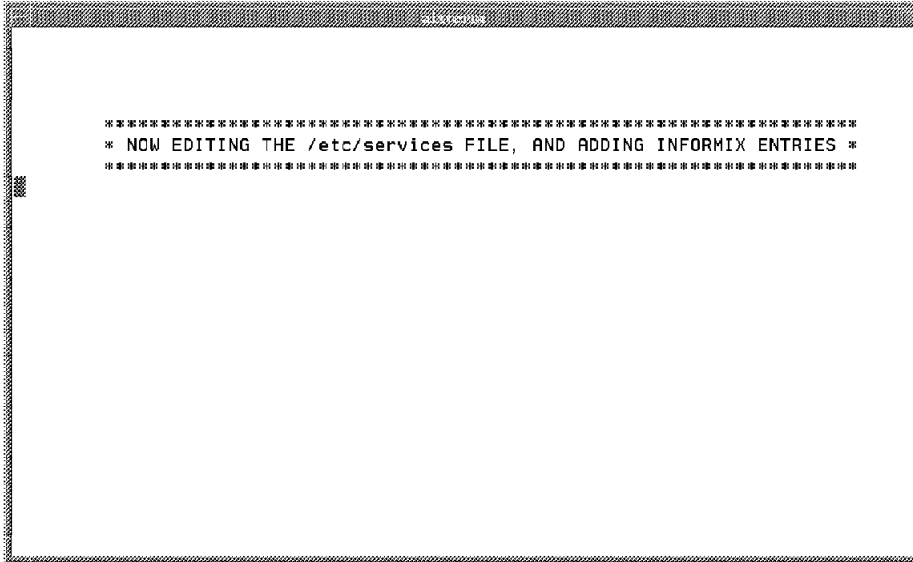
Figure 31. Editing the /etc/services File

3.18 INFORMIX-OnLine Setup

This section may take a few minutes. The operations are done in four phases, and the status of some of the operations will be shown on the screen so that you may follow along.

```
****************************************************************
* THE INFORMIX ONLINE SERVER MUST NOW BE INITIALIZED.        *
* AFTERWARDS, QUICK INSTALL WILL PERFORM SOME MAINTENANCE *
* ON THE INFORMIX INSTANCE.                                  *
****************************************************************

         THIS WILL TAKE A FEW MINUTES! PLEASE WAIT....
```
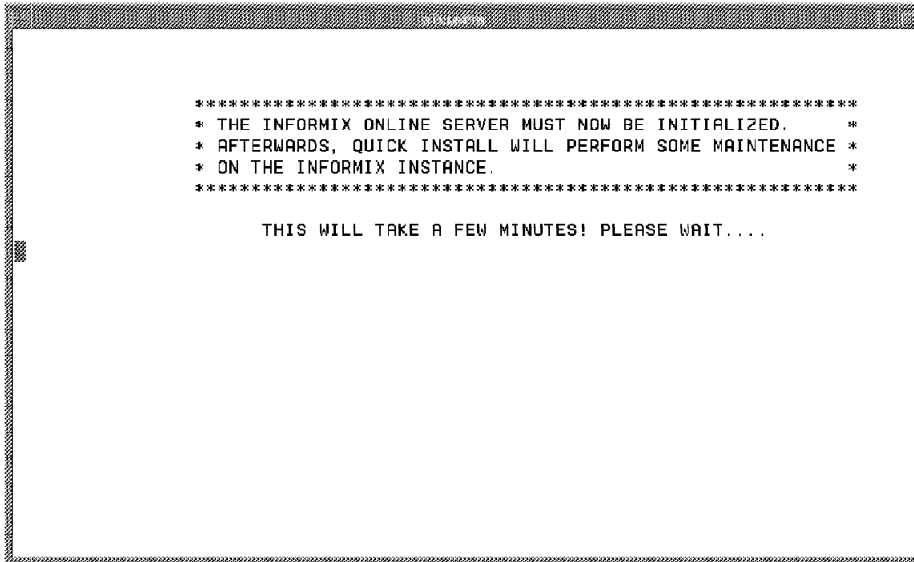
Figure 32. OnLine Instance Configuration

Phase 1- Initialize the instance of INFORMIX-Online, and create the logical storage units to correspond with the physical units created earlier in Quick Install.

Phase 2 - Move the physical log out of the rootdbs and into its own storage space to increase performance.

Phase 3 - Move the logical log out of the rootdbs and into its own storage space to increase performance.

Phase 4 - Reinitialize the instance so changes take effect. Bring the instance down.

3.19 Copying and Linking Necessary Files

Finally, the directory /usr/informix/hascripts is created and the start/stop scripts are placed there. These scripts are used by HACMP to bring OnLine Server up and down during HACMP startups and failovers. A copy of these files can be seen in B.4, "Start/Stop Scripts" on page 59.

After the copying of necessary files between nodes, you are finished with the setup of the first node of the cluster. You must now shut down the machine. At the prompt enter:

shutdown -Fr

```
*************************************************
*          THE INSTALLATION HAS COMPLETED!      *
* PLEASE REBOOT THE SYSTEM BEFORE CONTINUING.   *
*************************************************
#
```

Figure 33. Tool Completion Screen

You have now finished with the Quick Install Program. If you have just completed it with Node 1, go now to Node 2, make sure the program has been restored from the diskette, and run it again there, making the appropriate responses for Node 2. When you have completed on Node 2, and rebooted it also, you should be able to start HACMP on each node, and see it control Informix as an application.
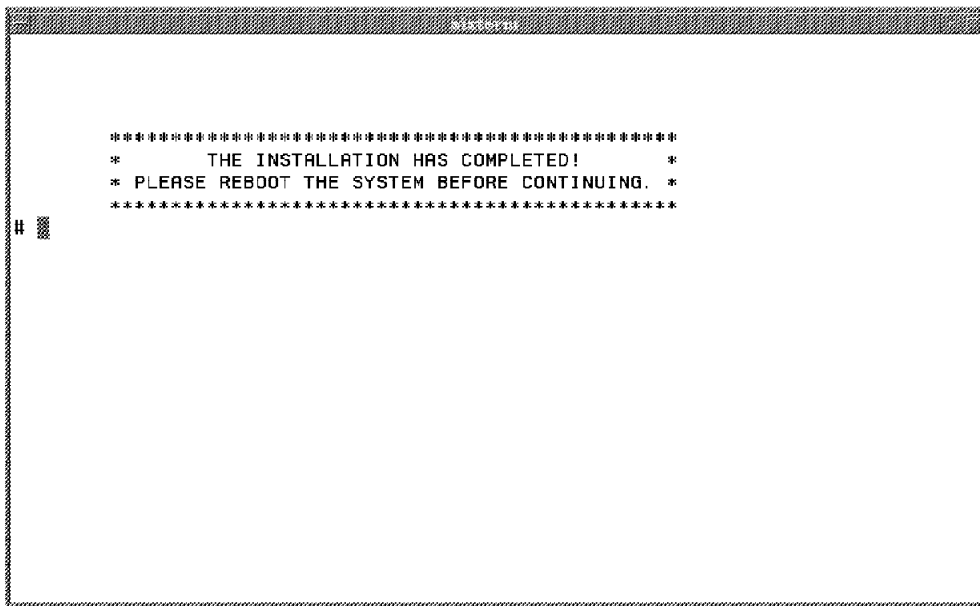
Chapter 4. Post-Installation Tasks for Informix

When you are done with the Quick Install, you are ready to test.This section will take you through the steps in testing an HACMP fallover and making sure the database is started.

4.1 Testing Cluster Synchronization

Testing the HACMP portion of the install can be done with HACMP's cluster verification utility. To get to this utility, enter `smit hacmp` from the command prompt.

```
                              HACMP for AIX

Move cursor to desired item and press Enter.

    Cluster Configuration
    Cluster Services
    Cluster System Management
    Cluster Recovery Aids
    RAS Support














F1 Help              F2 Refresh          F3 Cancel          F8 Image
F9 Shell             F10 Exit            Enter Do
```
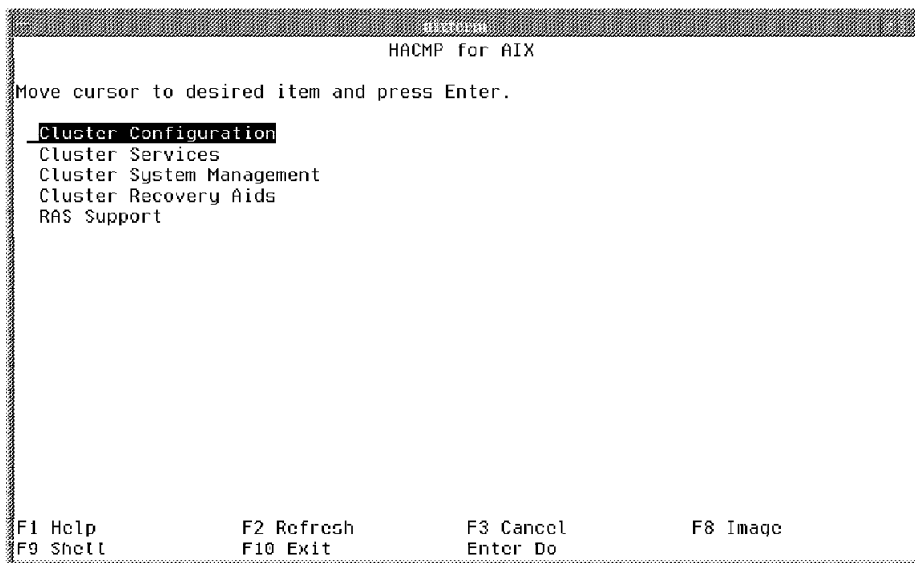
Select **Cluster Configuration**. From the next menu, select **Cluster Verification.** At the prompt, just press **Enter** until the process begins. Run this tool on both nodes of the cluster.

4.2 Testing HACMP Cluster Services

When are ready to begin failover testing, you must first start the HACMP services on both nodes. One node at a time, from the command prompt, enter `smit hacmp`. Select **Cluster Services**. The next menu will allow you to either start, stop, or check on the cluster services.

After selecting **Start Cluster Services**, press **Enter** until the process begins. When the process is finished, and you get the **OK** prompt, you can exit out of SMIT by pressing the **F10** key.

To see the progress of the HACMP startup, from the command prompt, type:

```
# tail -f /tmp/hacmp.out
```

This will monitor the progress of the startup. When you want exit out of this, press **Ctrl-C.**

When you are done, bring up the second node in the same way. To check if the database is running, type:

```
# ps -eaf |grep oninit
```

You should see many oninit entries running. If so your database is up.

To test a failover, simply run the Stop Cluster Services SMIT screen and select the **graceful with takeover** option, or power off the machine running the database. With Rotating or Hot Standby, this will be one of the nodes in the cluster. With Mutual Takeover, you can power off either machine because each is serving its own database. On the machine in the cluster that is still running, execute the following command to watch the takeover activity:

```
tail -f /tmp/hacmp.out
```

Appendix A. Quick Install Program Worksheets

This Appendix provides worksheets to fill out in preparation for running the Quick Install Program.

A.1 Mutual Takeover Worksheet

This worksheet is to help you gather the necessary information to smoothly complete the installation of the Informix database on a highly available cluster using the Quick Install Program. This worksheet is for the Mutual Takeover configuration. Please write the information in the areas provided, and keep it with you during the installation and setup process.

A.1.1 Adapter Information

The following tables hold the adapter information for the cluster. In the Mutual Takeover configuration, each cluster has a service, standby and boot adapter. Please fill in the labels and IP addresses for each adapter. As an example, the boot adapter for node 1 in our sample configuration would have a label of node1_boot and an IP address of 10.0.1.11.

Table 1. Node1 Adapters for Mutual Takeover Configuration

Node1 Adapters	Adapter Label	Adapter Address
Boot Adapter		
Service Adapter		
Standby Adapter		

Table 2. Node 2 Adapters for Mutual Takeover Configuration

Node2 Adapters	Adapter Label	Adapter Address
Boot Adapter		
Service Adapter		
Standby Adapter		

A.1.2 Disk Space Sizing

The following information is necessary for the sizing of INFORMIX-OnLine Dynamic Server. Ideally, we want the initial configuration to be perfect, but that is not possible. If we configure wisely, then little changes made after the server is running are simple tasks.

NOTE: Keep in mind that mirroring requires double the space. Sizes are in MB.

Enter the number of expected users, and the number of userthreads, assuming a four userthreads to one user ratio.

Users and Userthreads:

# of Expected Users _____

# of Userthreads _____

Figure 34. Users and Userthreads

Physical Log Size:

PHYSICAL LOG SIZE = userthreads * max_log_pages_per_critical_section*4*4

Physical Log Size _____

Figure 35. Physical Log Size

Logical Log Size:

Logical Log Space = (3 logs) * (Userthreads) * (2 log pages) * (page size)

Logical Log Size _____

Figure 36. Logical Log Size

Temporary and Database Disk Space

```
         ┌─────────────────────────────────────────────────────────┐
         │                                                         │
         │        Temporary Disk Space  _____   │
         │                                                         │
         │        Informix DB Space        _____    │
         │                                                         │
         └─────────────────────────────────────────────────────────┘
```

Figure 37. Temporary and Database Disk Space

A.1.3 Group and User Information

You need to find an available Group ID and User ID for both node1 and node2. These ID #'s must be the same on both machines. The defaults used in our sample configuration are Group #201, and User #210. To find this information, enter smit group or smit user, and choose the **list** option.

```
┌───────────────────────────────────────────────────────────────────┐
│                                                                   │
│        Available Group ID #  _____              │
│                                                                   │
│                                                                   │
│        Available User ID #      _____             │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
```

A.1.4 Logical Volume Creation Information

The following tables represent the raw logical volumes necessary for Informix database storage. Please consult the sizing information you decided upon above.

Logical Volume Name	Disk Location	Planned Size	Suggested LV size (MB)
informix1dbslv	center		700
temp1dbslb	inner-middle		250
plog1dbslv	inner-middle		12
llog1dbslv	inner-edge		8
root1dbslv	outer-middle	N/A	N/A

Logical Volume Name	Disk Location	Planned Size	Suggested LV size (MB)
informix2dbslv	center		700
temp2dbslb	inner-middle		250
plog2dbslv	inner-middle		12
llog2dbslv	inner-edge		8
root2dbslv	outer-middle	N/A	N/A

A.2 Rotating Standby Worksheet

This worksheet is to help you in gathering the necessary information to smoothly complete the installation of the Informix database on a highly available cluster using the Quick Install Program. This worksheet is for the Rotating configuration. Please write the information in the areas provided, and keep it with you during the installation and setup process.

A.2.1 Adapter Information

The following tables hold the adapter information for the cluster. In the Rotating configuration, each cluster has a standby and boot adapter, and a single service adapter (address and label) is shared between the two nodes. Please fill in the labels and IP addresses for each adapter. As an example, the boot adapter for node 1 in our sample configuration would have a label of node1_boot and an IP address of 10.0.1.11.

Table 3. Node1 Adapters for Rotating Configuration

Node1 Adapters	Adapter Label	Adapter Address
Boot Adapter		
Service Adapter		
Standby Adapter		

Table 4. Node2 Adapters for Rotating Configuration

Node2 Adapters	Adapter Label	Adapter Address
Boot Adapter		
Service Adapter	Node 1 Service Adapter	Node 1 Service Adapter
Standby Adapter		

A.2.2 Disk Space Sizing

The following information is necessary for the sizing of INFORMIX-OnLine Dynamic Server. Ideally, we want the initial configuration to be perfect, but that is not possible. If we configure wisely, then little changes made after the server is running are simple tasks.

NOTE: Keep in mind that mirroring requires double the space. Sizes are in MB.

Enter the number of expected users, and the number of userthreads assuming a four userthreads to one user ratio.

Users and Userthreads:

```
           # of Expected Users   _____

           # of Userthreads      _____
```

Figure 38. Users and Userthreads

Physical Log Size:

PHYSICAL LOG SIZE = userthreads * max_log_pages_per_critical_section*4*4

```
        Physical Log Size      _____
```

Figure 39. Physical Log Size

Logical Log Size:

Logical Log Space = (3 logs) * (Userthreads) * (2 log pages) * (page size)

Logical Log Size _____

Figure 40. Logical Log Size

Temporary and Database Disk Space:

Temporary Disk Space _____

Informix DB Space _____

Figure 41. Temporary and Database Disk Space

A.2.3 Group and User Information

You need to find an available Group ID and User ID for both node1 and node2. These ID #'s must be the same on both machines. The defaults used in our sample configuration are Group #201, and User #210. To find this information, enter `smit group` or `smit user`, and choose the **list** option.

Available Group ID # _____

Available User ID # _____

A.2.4 Logical Volume Creation Information

The following tables represent the raw logical volumes necessary for Informix database storage. Please consult the sizing information you decided upon above.

Logical Volume Name	Disk Location	Planned Size	Suggested LV size (MB)
informix1dbslv	center		700
temp1dbslb	inner-middle		250
plog1dbslv	inner-middle		12
llog1dbslv	inner-edge		8
root1dbslv	outer-middle	N/A	N/A

A.3 Hot Standby Worksheet

This worksheet is to help you in gathering the necessary information to smoothly complete the installation of the Informix Database on a highly available cluster using the Quick Install Program. This worksheet is for the Hot Standby Configuration. Please write the information in the areas provided, and keep it with you during the installation and setup process.

A.3.1 Adapter Information:

The following tables hold the adapter information for the cluster. In the Hot Standby configuration each cluster has a service and standby adapter, but only node 1 has a boot adapter. Please fill in the labels and IP addresses for each adapter. As an example, the standby adapter for node 1 in our sample configuration would have a label of node1_standby and an IP address of 10.0.2.1.

Table 5. Node1 Adapters for Hot Standby Configuration

Node 1 Adapters	Adapter Label	Adapter Address
Boot Adapter		
Service Adapter		
Standby Adapter		

Table 6. Node2 Adapters for Hot Standby Configuration

Node 2 Adapters	Adapter Label	Adapter Address
Service Adapter		
Standby Adapter		

A.3.2 Disk Space Sizing

The following information is necessary for the sizing of INFORMIX-OnLine Dynamic Server. Ideally, we want the initial configuration to be perfect, but that is not possible. If we configure wisely, then little changes made after the server is running are simple tasks.

NOTE: Keep in mind mirroring requires double the space. Sizes are in MB.

Enter the number of expected users, and the number of userthreads assuming a four userthreads to one user ratio.

Users and Userthreads:

# of Expected Users _____

# of Userthreads _____

Figure 42. Users and Userthreads

Physical Log Size:

PHYSICAL LOG SIZE = userthreads *
max_log_pages_per_critical_section*4*4

Physical Log Size _____

Figure 43. Physical Log Size

Logical Log Size:

Logical Log Space = (3 logs) * (Userthreads) * (2 log pages) * (page size)

```
            Logical Log Size        _____
```

Figure 44. Logical Log Size

Temporary and Database Disk Space:

```
            Temporary Disk Space  _____
            Informix DB Space      _____
```

Figure 45. Temporary and Database Disk Space:

A.3.3 Group and User Information

You need to find an available Group ID and User ID for both node1 and node
2. These ID #'s must be the same on both machines. The defaults used in
our sample configuration are Group #201, and User #210. To find this
information, enter smit group or smit user, and choose the **list** option.

```
            Available Group ID #  _____


            Available User ID #    _____
```

A.3.4 Logical Volume Creation Information

The following tables represent the raw logical volumes necessary for
Informix database storage. Please consult the sizing information you
decided upon above.

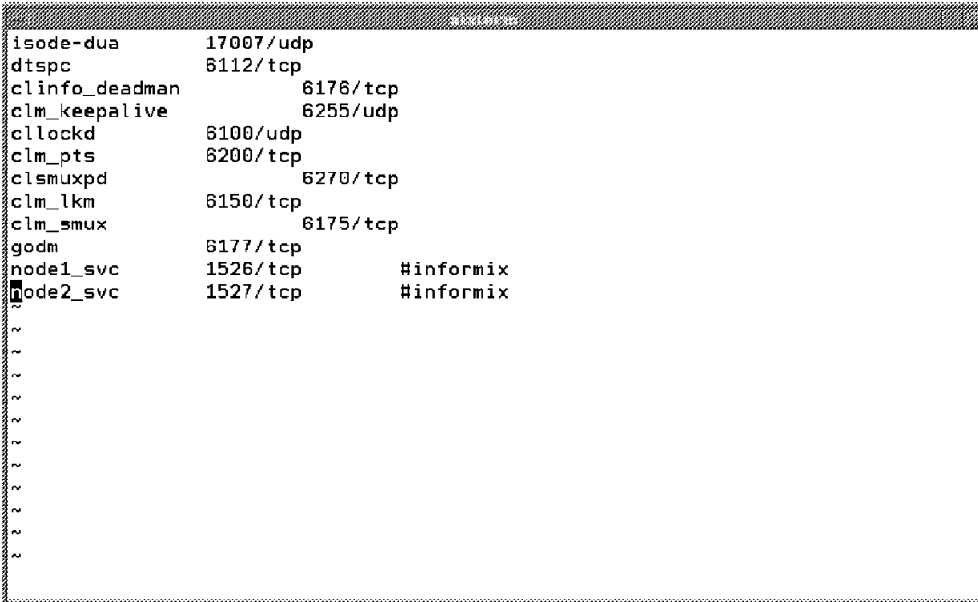| Logical Volume Name	Disk Location	Planned Size	Suggested LV size (MB)
informix1dbslv	center		700
temp1dbslb	inner-middle		250
plog1dbslv	inner-middle		12
llog1dbslv	inner-edge		8
root1dbslv	outer-middle	N/A	N/A

Appendix B. Informix Configuration Files

This appendix provides listings of the various configuration files that are updated by the Quick Install Program.

B.1 /etc/services file

This listing ot the /etc/services file show the ports added for Informix at the bottom:

```
isode-dua       17007/udp
dtspc           6112/tcp
clinfo_deadman          6176/tcp
clm_keepalive           6255/udp
cllockd         6100/udp
clm_pts         6200/tcp
clsmuxpd                6270/tcp
clm_lkm         6150/tcp
clm_smux                6175/tcp
godm            6177/tcp
node1_svc       1526/tcp        #informix
node2_svc       1527/tcp        #informix
~
~
~
~
~
~
~
~
~
~
~
~
```

Figure 46. /etc/services File

B.2 /etc/environment file

This is a listing of the /etc/environment file, after the running of the Quick Install Program:

57

```
#
# Searching the current directory last is usually a BIG time saver.
# If /usr/ucb is at the beginning of the PATH the BSD version of commands will
# be found.
#
PATH=/usr/informix/bin:.:/usr/bin:/etc:/usr/sbin:/usr/ucb:/usr/bin/X11:/sbin:/us
r/sbin/cluster:/usr/sbin/cluster/diag:/usr/sbin/cluster/utilities:/usr/sbin/clus
ter/sbin:/usr/local/bin
█
INFORMIXDIR=/usr/informix
ONCONFIG=onconfig.node1
INFORMIXSERVER=node1srv
~
~
~
~
~
~
~
~
~
~
~
~
```

Figure 47. /etc/environment File

B.3 sqlhosts File

This listing shows the sqlhosts file after the running of the Quick Install
Program:

```
#                   INFORMIX SOFTWARE, INC.
#
#                      PROPRIETARY DATA
#
#    THIS DOCUMENT CONTAINS TRADE SECRET DATA WHICH IS THE PROPERTY OF
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#
#
#    Title:      sqlhosts.demo
#    Sccsid:     @(#)sqlhosts.demo       9.2      7/15/93  15:20:45
#    Description:
#                Default sqlhosts file for running demos.
#
#**********************************************************************
node1srv        onsoctcp        node1_service   1526
node2srv        onsoctcp        node2_service   1527
~
```

Figure 48. sqlhosts File

B.4 Start/Stop Scripts

The following scripts are put in place and configured into the HACMP application servers to automatically start and stop the Informix database engines at the correct times.

This is the script provided with the Quck Install Program that starts up the first database.

```
#######################################################################
#                              DECEMBER 1997
#                              J. SCOTT BRUDNER
#THIS PROGRAM HANDLES THE STARTUP PROCEDURES FOR THE INFORMIX ONLINE DYNAMIC
#SERVER ON NODE1.   NOTHING PASSED IN, NOTHING PASSED OUT.
#######################################################################
export INFORMIXDIR=/usr/informix
export INFORMIXSERVER=node1srv
export PATH=$PATH:$INFORMIXDIR/bin
export ONCONFIG=onconfig.node1
chvg -a'n' node1vg
chmod 660 /dev/*dbslv
chown informix.informix /dev/*dbslv
oninit
sleep 10
~
~
~
~
~
~
~
~
~
"start_D1" 15 lines, 616 characters
```

Figure 49. Start_D1 Script

This script starts up the second database. It is used in the Mutual Takeover configuration.

```
###############################################################################
#                           DECEMBER 1997
#                           J. SCOTT BRUDNER
#THIS PROGRAM HANDLES THE STARTUP PROCEDURES FOR THE INFORMIX ONLINE DYNAMIC
#SERVER ON NODE 2.   NOTHING PASSED IN, NOTHING PASSED OUT.
###############################################################################
export INFORMIXDIR=/usr/informix
export INFORMIXSERVER=node2srv
export PATH=$PATH:$INFORMIXDIR/bin
export ONCONFIG=onconfig.node2
chvg -a'n' node2vg
chmod 660 /dev/*dbslv
chown informix.informix /dev/*dbslv
oninit
sleep 10
~
~
~
~
~
~
~
~
"start_D2" 15 lines, 617 characters
```

Figure 50. Start_D2 Script

This script is used to do a graceful stop of the first database.

```
########################################################################
#                          DECEMBER 1997
#                          J. SCOTT BRUDNER
#THIS PROGRAM HANDLES THE SHUTDOWN PROCEDURES FOR THE INFORMIX ONLINE DYNAMIC
#SERVER ON NODE1.  NOTHING PASSED IN, NOTHING PASSED OUT.
########################################################################
export INFORMIXDIR=/usr/informix
export INFORMIXSERVER=node1srv
export PATH=$PATH:$INFORMIXDIR/bin
export ONCONFIG=onconfig.node1
onmode -ky
~
~
~
~
~
~
~
~
~
~
~
~
~
~
"stop_D1" 11 lines, 535 characters
```

Figure 51. Stop_D1 Script

This script is used to do a graceful stop on the second database. It is used in the Mutual Takeover configuration only.

```
#############################################################################
#                              DECEMBER 1997
#                           J. SCOTT BRUDNER
#THIS PROGRAM HANDLES THE SHUTDOWN PROCEDURES FOR THE INFORMIX ONLINE DYNAMIC
#SERVER ON NODE 2.  NOTHING PASSED IN, NOTHING PASSED OUT.
#############################################################################
export INFORMIXDIR=/usr/informix
export INFORMIXSERVER=node2srv
export PATH=$PATH:$INFORMIXDIR/bin
export ONCONFIG=onconfig.node2
onmode -ky
~
~
~
~
~
~
~
~
~
~
~
~
~
"stop_D2" 11 lines, 536 characters
```

Figure 52. Stop_D2 Script

Appendix C. Special Notices

This publication is intended to help cluster administrators or service providers to quickly and easily set up a two node HACMP cluster with the Informix database as the application. The information in this publication is not intended as the specification of any programming interfaces that are provided by HACMP for AIX or the Informix Database products. See the PUBLICATIONS section of the IBM Programming Announcement for HACMP for AIX for more information about what publications are considered to be product documentation.

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Appendix D. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

D.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see "How to Get ITSO Redbooks" on page 69.

- *High Availability on the RISC System/6000 Family,* SG24-4551
- *An HACMP Cookbook,* SG24-4553
- *Disaster Recovery with HAGEO: An Installer's Companion,* SG24-2018
- *Oracle Cluster POWERsolution Guide,* SG24-2019

D.2 Redbooks on CD-ROMs

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D.3 Other Publications

These publications are also relevant as further information sources:

- *HACMP for AIX, Version 4.2.1: Concepts and Facilities,* SC23-1938
- *HACMP for AIX, Version 4.2.1: Planning Guide,* SC23-1939
- *HACMP for AIX, Version 4.2.1: Installation Guide,* SC23-1940
- *HACMP for AIX, Version 4.2.1: Administration Guide,* SC23-1941
- *HACMP for AIX, Version 4.2.1: Troubleshooting Guide,* SC23-1942
- *HACMP for AIX, Version 4.2.1: Programming Locking Applications,* SC23-1943
- *HACMP for AIX, Version 4.2.1: Programming Client Applications,* SC23-1944
- *HACMP for AIX, Version 4.2.1: Master Index and Glossary,* SC23-1945

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List of Abbreviations

ANSI American National Standards Institute

APA All Points Addressable

ASCII American Standard Code for Information Interchange

AS/400 Application System/400

CASE Computer Assisted Software Engineering

DNS Domain Name Server

DSMIT Distributed System Management Interface Tool

GODM Global Object Data Manager

HACMP High Availability Cluster Multi-Processing

HANFS High Availability Network File System

IBM International Business Machines Corporation

ITSO International Technical Support Organization

ODM Object Data Manager

OLTP On Line Transaction Processing

PROFS Professional Office System

SMIT System Management Interface Tool

VGDA Volume Group Descriptor Area

VGSA Volume Group Status Area

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