IBM® DB2® Universal Database™ Enterprise - Extended Edition with Query Patroller for AIX® and HACMP/ES

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Abstract

IBM® DB2® Universal Database™ (UDB) is the industry's first multimedia, Web-ready relational database management system, powerful enough to meet the demands of large corporations and flexible enough to serve medium-sized and small e-businesses. DB2 Universal Database combines integrated power for business intelligence, content management, and e-business with industry-leading performance and reliability. This, coupled with High Availability Clustered Multi-Processing (HACMP), strengthens the solution by providing a highly available computing environment.

DB2 Query Patroller is an installable component of IBM® DB2® UDB that allows the system administrator to:

- Manage and monitor queries that enter the data warehouse
- Manage resources within their data warehouse
- Track usage patterns in DB2® UDB within their data warehouse

HACMP for AIX® provides a highly available computing environment. This facilitates the automatic switching of users, applications, and data from one system to another in the cluster after a hardware or software failure.

A complete High Availability (HA) setup includes many parts, one of which is the HACMP software. Other parts of an HA solution come from AIX and the logical volume manager (LVM). As well as tangible items such as hardware and software, a good HA solution includes planning, design, customizing, and change control. An HA solution reduces the amount of time that an application is unavailable by removing single points of failure.

The purpose of this document is to outline the steps required to install, configure DB2 Query Patroller server and agent components and integrate them into an HACMP/ES environment. There are also some hints and tips in the troubleshooting chapter to assist with some situations that may occur.

This document assumes that DB2 UDB Enterprise - Extended Edition (EEE) V7.2 and HACMP/ES 4.3 are installed and running as documented in the technical report *IBM DB2 Universal Database Enterprise - Extended Edition for AIX and HACMP/ES (TR-74.174)*.

ITIRC keywords

- HA
- DB2
- UDB
- DQP
- DB2 QP
- QP
- Query Patroller
- AIX
- HACMP

- HACMP/ES
- Availability

Conventions

Boldface indicates commands or graphical user interface (GUI) controls such as names of fields, folders, icons or menu choices.

Italics indicates variables that you should replace with your own value. It is also used to indicate book titles and to emphasize words.

`Monospacing` indicates file names, directory paths and examples of text you enter exactly as shown.

DB2 Query Patroller is also referred to as “DB2 QP” or “QP”.

About the authors

Gene Thomas has been with IBM for over 28 years. For the last six years, he has worked as an AIX Systems Programmer/Administrator supporting the DB2 UDB Function in the IBM Toronto Laboratory. He was instrumental in bringing HACMP into the Laboratory. Gene has had formal training from the company that created and supports HACMP, Clam and Associates (now known as Availant), located in Cambridge, Massachusetts. His primary tasks in support of HACMP in the Laboratory have been: setting up the hardware configuration for the HACMP cluster; installation and setup of the AIX operating system; and installation and setup of the HACMP cluster for DB2 UDB testing. He has recently joined the UDB System Verification Test Department and is testing HACMP and DB2 UDB.

Lidia Widjojo has been with IBM for over 3 years and is certified in DB2 UDB Database Administration and DB2 UDB Database Application Development. In the past year, she has been working in the DB2 Tools Development team as a DB2 Query Patroller developer. She has designed, developed, and tested the way DB2 Query Patroller works with HACMP. She has also assisted customers in setting up and troubleshooting DB2 Query Patroller. Recently, she prepared an IBM internal course for DB2 Query Patroller, and participated in teaching the course. During the previous two years, Lidia was in the System Verification Test department, where she was responsible for testing DB2 UDB Enterprise Edition (EE) and DB2 Query Patroller.

Darrin Woodard has been with IBM for over 11 years. He is certified in DB2 UDB Database Administration and DB2 UDB Database Application Development, is an Advanced Technical Expert in DB2 for Clusters, an IBM Certified Specialist in AIX System Support, and an IBM Certified Specialist in AIX HACMP. For the last five years, he has worked in the DB2 UDB System Verification Test Department. Here Darrin was responsible for testing DB2 UDB EE and DB2 UDB EEE in an HACMP environment. During the previous five years, Darrin was an AIX Systems Administrator supporting the DB2 UDB Function in the IBM Toronto Laboratory, where he was responsible for the installation and setup of the AIX operating system.

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Chapter 1. Target configuration

This chapter documents the physical and logical configuration of the HACMP clusters used throughout the rest of this paper

The HACMP configuration described in this document involves a six-partition DB2 database and two clusters, each with mutual takeover and cascading resource groups. It uses HACMP/ES 4.3 and DB2 UDB EEE V7.2 plus Fix Pack 4 running on AIX 4.3.3.

The DB2 Query Patroller configuration described in this document involves the four physical database nodes:

- bf01n013 is the DB2 Query Patroller server system
- bf01n014 is a DB2 Query Patroller agent system
- bf01n015 is a DB2 Query Patroller agent system
- bf01n016 is a DB2 Query Patroller agent system

The clusters being defined are named cl1314 and cl1516 with cluster IDs 1314 and 1516 respectively. We arbitrarily selected these numbers because we are using SP nodes 13,14,15 and 16. The cl1314 cluster has:

- two nodes, bf01n013 and bf01n014
- two cluster node names, clnode13 and clnode14
- two resource groups, rg1314 and rg1413
- two application servers, as1314 and as1413

The cl1516 cluster has:

- two nodes, bf01n015 and bf01n016
- two cluster node names, clnode15 and clnode16
- two resource groups, rg1516 and rg1615
- two application servers, as1516 and as1615

Each of these nodes will have one SP switch and one ethernet adapter.

The nodes within a cluster will have a shared external disk. The cl1314 cluster will have access to two volume groups, *havg1314* and *havg1413*. The cl1516 cluster will have access to two volume groups, *havg1516* and *havg1615*.

Table 1. Volume groups and filesystems.

Cluster	Resource group	Volume group	File system
cl1314	rg1314	havg1314	/homehalocal
			/db1ha/svtha1/NODE0130
			/db1ha/svtha1/NODE0131
	rg1413	havg1413	/db1ha/svtha1/NODE0140
cl1516	rg1516	havg1516	/db1ha/svtha1/NODE0150
	rg1615	havg1615	/db1ha/svtha1/NODE0160
			/db1ha/svtha1/NODE0161

In the initial target configuration the db2nodes.cfg will have the following entries:

```
130 b_sw_013 0 b_sw_013
131 b_sw_013 1 b_sw_013
140 b_sw_014 0 b_sw_014
150 b_sw_015 0 b_sw_015
160 b_sw_016 0 b_sw_016
161 b_sw_016 1 b_sw_016
```

In the initial target configuration the dqpnodes.cfg will have the following entries:

```
130 bf01n013 server
140 bf01n014 agent
150 bf01n015 agent
160 bf01n016 agent
```

The initial target configuration is illustrated in Figure 1 on page 3.

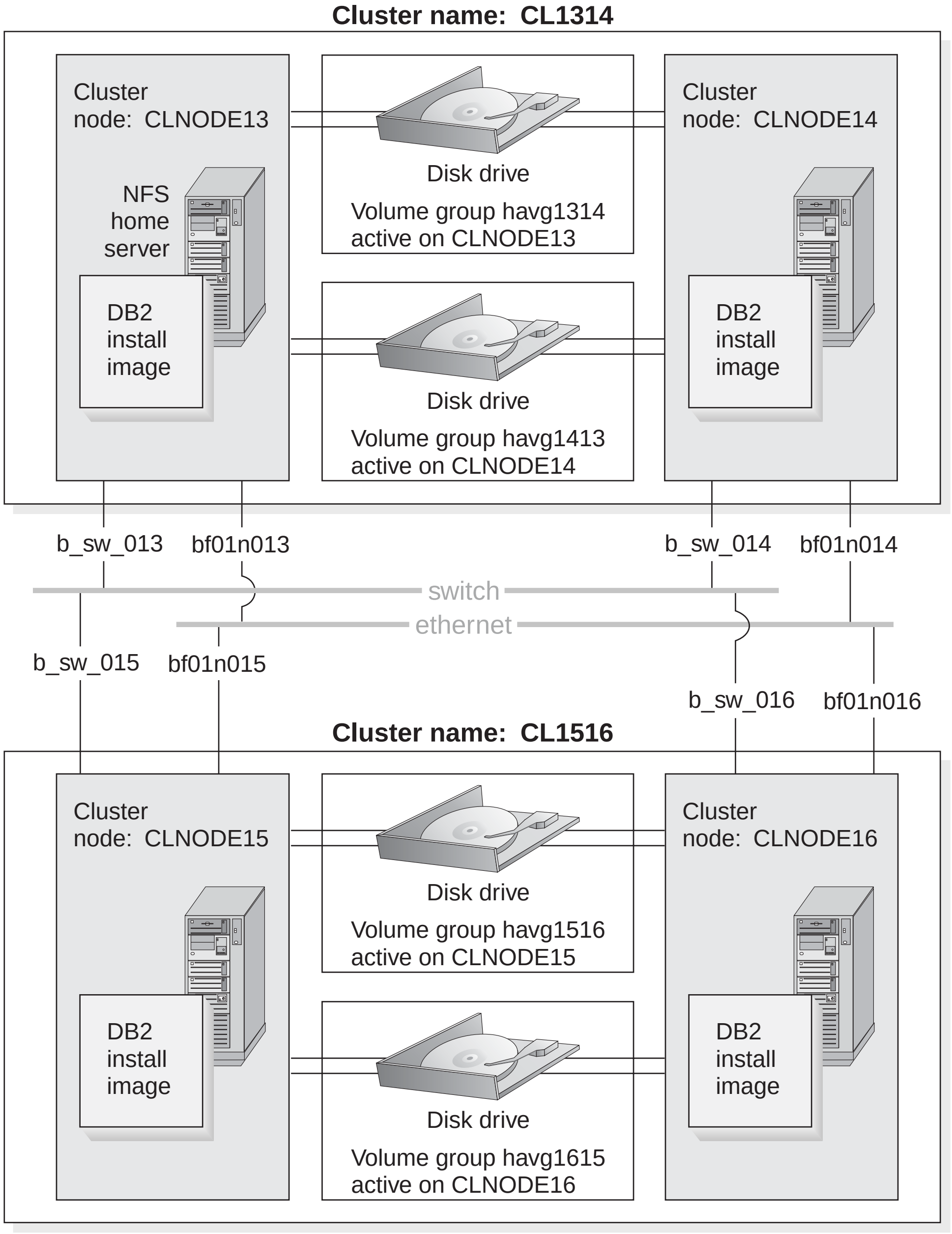


Figure 1. HACMP running on the initial target configuration.

If one of the two nodes within the cluster (for example, cl1314) has a failure, the other node in the cluster will acquire the resources that are defined in the resource group. The application server is then started on the node that has taken over the resource group. In our case, the application server that is started is DB2 UDB EEE V7.2 for the instance svtha1.

In our example of a failover, DB2 UDB EEE V7.2 is running on a node clnode13; it has a NFS mounted home directory and a database located on the /db1ha/svtha1/NODE0130 and /db1ha/svtha1/NODE131 file systems. This file system is in a volume group called *havg1314*. The clnode14 node is currently running DB2 for partition 140 and is ready to take over from the clnode13 node, if necessary. Suppose someone unplugs the clnode13 node. The clnode14 node detects this event and begins taking over resources from the clnode13 node. These resources include the *havg1314* volume group, the file system, and the hostname swserv13. Once the resources are available on the clnode14 node, the application server start script runs. The instance ID can log on to the clnode14 node (now with an additional hostname swserv13) and can connect to the database. Remote clients can also connect to the database, because the hostname swserv13 is now located on the clnode14 node. This example is illustrated in Figure 2 on page 4.

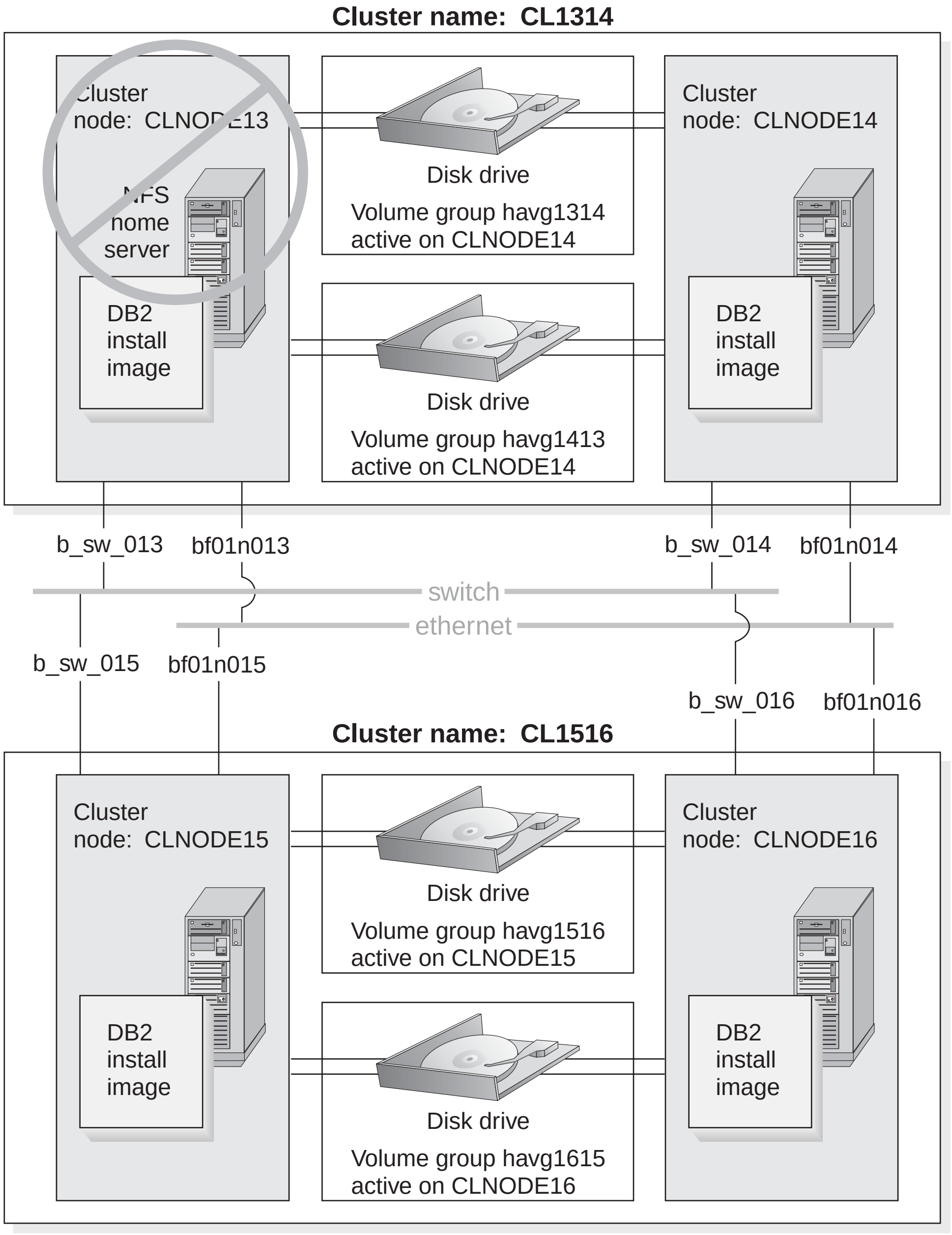


Figure 2. HACMP after failure of node13.

Chapter 2. DB2 Query Patroller installation and configuration

For an overview of the DB2 Query Patroller product, please refer to the “DB2 Query Patroller Overview” section of the *DB2 Query Patroller Installation Guide*.

This chapter describes how to install the DB2 Query Patroller product on the target configuration defined in Chapter 1, “Target configuration” on page 1, using the db2setup utility. The db2setup utility works with the C, bash, Bourne, and Korn shells.

When installing DB2 Query Patroller on a server that is running DB2 Enterprise - Extended Edition, you must first install the DB2 Query Patroller Server on one database partition server, and then optionally install the DB2 Query Patroller Agent on the remaining database partition servers that participate in the instance. This will balance the database workload across all partitions.

We recommend that you use the db2setup utility to install any DB2 products on UNIX™-based servers. This utility leads you through the installation and configuration using a simple text-based interface that includes online help. Default values are generated for all required installation parameters, but you can also enter your own values.

The following sections of this chapter define the steps required for a successful installation of DB2 Query Patroller.

1. Before you begin
2. Installing the DB2 Query Patroller server
3. Installing the DB2 Query Patroller agent
4. Setting up the DB2 Query Patroller server on the DB2 instance

2.1 Before You Begin

To ensure that **db2setup** completes the installation of DB2 Query Patroller properly:

- Read the “Before You Begin” section in the *DB2 Query Patroller Installation Guide.*
- Review the following list and ensure you have covered each item.

1. Make sure that you understand the following:
   a. DB2 Query Patroller Version 7 can only manage one DB2 UDB database per system at a time. The DB2 instance where this database resides must be set up to use DB2 Query Patroller.
   b. Once DB2 Query Patroller Server is set up on one DB2 instance, it cannot be used to manage a database which resides on a different DB2 instance. In other words, DB2 Query Patroller cannot manage a database which resides on a DB2 instance other than the one it is set up on.
   c. To have DB2 Query Patroller Version 7 manage a different database than the one it is currently managing, specific steps need to be

performed. These steps can be found in Chapter 9 of the *DB2 Query Patroller Administration Guide*. Once these steps are completed, DB2 Query Patroller Server can no longer manage the previous database. This is what we mean by DB2 Query Patroller being able to manage only one database at a time.

2. Make sure that the DB2 UDB database whose queries you want to manage using DB2 Query Patroller already exists. If not, please create it before you proceed with the setup.

> **Note:**
> DB2 does not support databases which reside on an NFS mounted file system.

3. Make sure that a single nodenode group has been created on the database whose queries you want to manage using DB2 Query Patroller Server. A single node nodegroup means that the nodegroup does not span more than one database partition. This nodegroup will be used for the DB2 Query Patroller control information tablespace which needs to be created as defined in the next step.
4. Make sure that the following two tablespaces are created for the database whose queries you want to manage using DB2 Query Patroller:
   a. An SMS or DMS tablespace to store the DB2 Query Patroller meta data (i.e. control tables). If you are installing DB2 Query Patroller on a server that is running DB2 Enterprise - Extended Edition, this tablespace MUST reside on the single node nodegroup defined in step 3.
   b. An SMS or DMS tablespace to store the DB2 Query Patroller result tables. The result tables are used to store the result of the queries managed by the DB2 Query Patroller. (This tablespace can reside on a single or multiple node nodegroup.) Ensure that this tablespace resides on a file system or device that is large enough to accommodate all the result tables for as long as you wish to retain them. Please refer to the *DB2 Query Patroller Administration Guide* for more detail.

Table 2. A sample of required information for DB2 Query Patroller installation

Item	**Name**
Instance user name	svtha1
Database	db2db
Node group	SNG130
Node number	130
Tablespace	dqpcontrol
Tablespace path	/db1ha/svtha1
Result tablespace	dqpresults

The above table is a sample of the required information needed prior to the actual installation of DB2 Query Patroller.

> **Note:**
> You will need the names of the above nodegroup and tablespaces during the installation. Make sure you record the names you define for use during future steps in this paper.

5. Make sure that the environment/registry variable DB2NODE is not set on the instance.
6. The user id *iwm* will be created by the **db2setup** utility. However, you may create it manually. The **db2setup** utility will detect it if it already exists. When installing DB2 Query Patroller on a server that is running DB2 Enterprise - Extended Edition, the *iwm* user must have a home directory on a filesystem which is shared across all the physical nodes. There are three options for the *iwm* home directory:
   - A sub-directory of the instance home directory
   - A local directory on each DB2 Query Patroller server and agent
   - A directory on an HACMP NFS mounted filesystem
7. The user id *iwm* must also have a complete `.rhosts` file as detailed in *DB2 Enterprise - Extended Edition for UNIX Quick Beginnings*.

2.2 Installing and settiing up DB2 Query Patroller

Before you begin the installation, please read section Section 2.1, “Before You Begin” on page 5. Make sure that you have all the items listed.

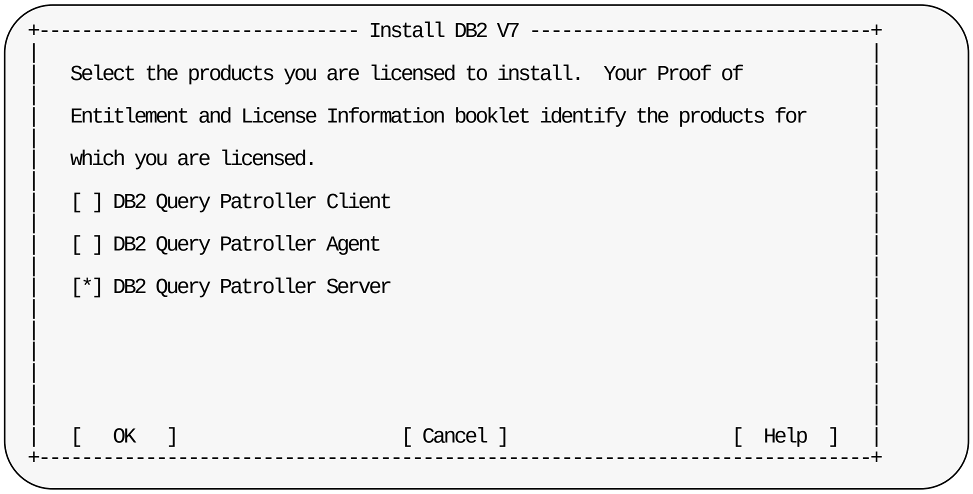
2.2.1 Installing and setting up the DB2 Query Patroller server

If the DB2 Query Patroller server files have already been installed you can skip this section an go to section “Setting up the DB2 Query Patroller server on the DB2 instance” on page 13

Follow these steps to install and set up the DB2 Query Patroller server:

1. Log on to your workstation as a user with root authority.
2. Insert and mount your product’s CD-ROM. If you are not sure how to mount the CD-ROM drive on your operating system, refer to the “Basic Task Knowledge” appendix in your DB2 server’s *Quick Beginnings* manual.
3. Change to the directory where the CD-ROM is mounted.
4. Enter the **./db2setup** command. The following panel will appear. Select “DB2 Query Patroller Server” and then select **OK**. Note that the “DB2

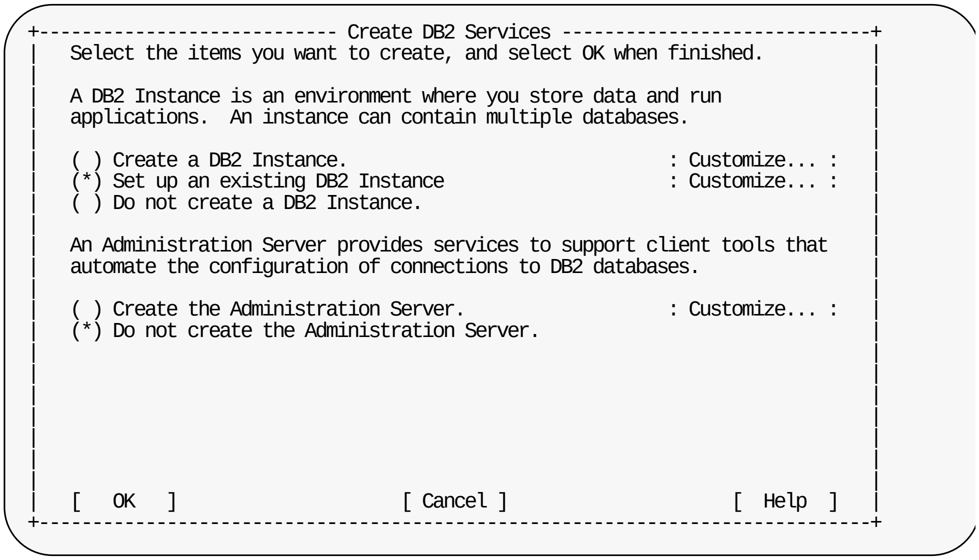
Query Patroller Agent” option will only appear if DB2 Query Patroller is installed on a server that is running DB2 Enterprise - Extended Edition.



```
+----------------------------- Install DB2 V7 -------------------------------+
|                                                                            |
|   Select the products you are licensed to install.  Your Proof of          |
|                                                                            |
|   Entitlement and License Information booklet identify the products for    |
|                                                                            |
|   which you are licensed.                                                  |
|                                                                            |
|   [ ] DB2 Query Patroller Client                                           |
|                                                                            |
|   [ ] DB2 Query Patroller Agent                                            |
|                                                                            |
|   [*] DB2 Query Patroller Server                                           |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                  [ Cancel ]                 [  Help  ]        |
+----------------------------------------------------------------------------+
```

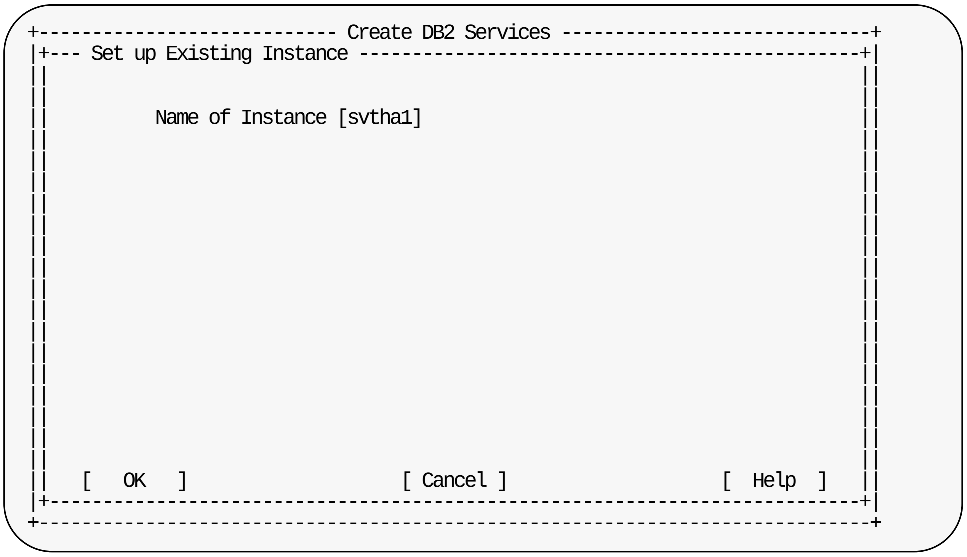
5. The following panel will appear. If you already have a DB2 instance, the **db2setup** utility will detect this and “Set up an existing DB2 Instance” will appear as one of the options. If you have not created a DB2 instance, please exit from the **db2setup** utility and create one.

   Otherwise, select “Set up an existing DB2 Instance”. By selecting this option, you are not initializing a new DB2 instance, you are simply enabling an existing DB2 instance to use DB2 Query Patroller.



```
+--------------------------- Create DB2 Services ----------------------------+
|   Select the items you want to create, and select OK when finished.        |
|                                                                            |
|   A DB2 Instance is an environment where you store data and run            |
|   applications.  An instance can contain multiple databases.               |
|                                                                            |
|   ( ) Create a DB2 Instance.                            : Customize... :   |
|   (*) Set up an existing DB2 Instance                   : Customize... :   |
|   ( ) Do not create a DB2 Instance.                                        |
|                                                                            |
|   An Administration Server provides services to support client tools that  |
|   automate the configuration of connections to DB2 databases.              |
|                                                                            |
|   ( ) Create the Administration Server.                 : Customize... :   |
|   (*) Do not create the Administration Server.                             |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                  [ Cancel ]                 [  Help  ]        |
+----------------------------------------------------------------------------+
```

6. The following panel will appear. Enter the name of the DB2 instance where the database which you want to manage using DB2 Query Patroller resides. Select **OK** when you are done.



```
+---------------------------- Create DB2 Services ----------------------------+
|+--- Set up Existing Instance --------------------------------------------+|
||                                                                         ||
||                                                                         ||
||        Name of Instance [svtha1]                                        ||
||                                                                         ||
||                                                                         ||
||                                                                         ||
||                                                                         ||
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||                                                                         ||
||                                                                         ||
||                                                                         ||
||   [   OK   ]                  [ Cancel ]                  [  Help  ]   ||
|+-------------------------------------------------------------------------+|
+---------------------------------------------------------------------------+
```
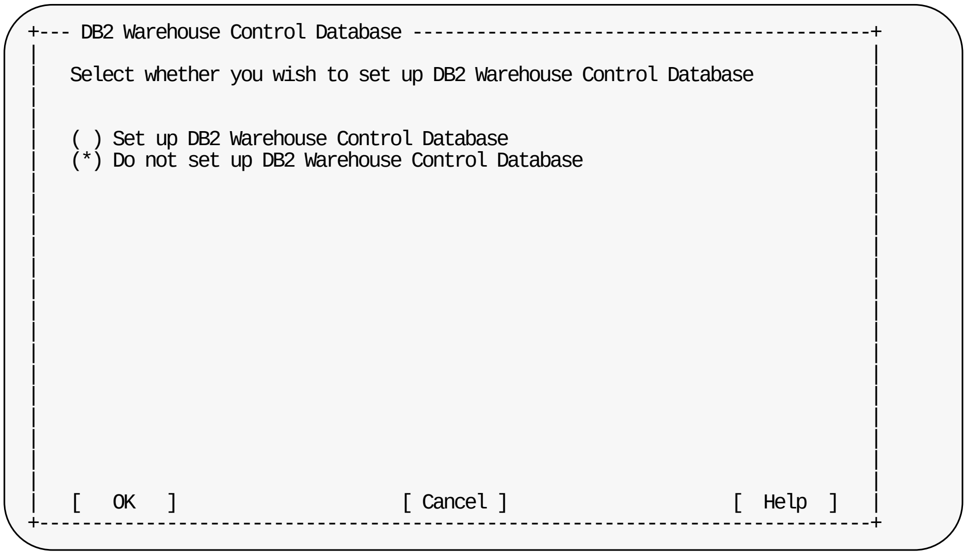

7. The following panel will appear if you have not created a DB2 Warehouse Control Database on the DB2 instance which you entered in the previous panel. (DB2 Warehouse Control Database contains meta data information for the DB2 Data Warehouse environment.) You do NOT need to set up this database to use DB2 Query Patroller. Select **OK** after you make your selection.



```
+--- DB2 Warehouse Control Database ------------------------------------------+
|                                                                             |
|   Select whether you wish to set up DB2 Warehouse Control Database          |
|                                                                             |
|                                                                             |
|   ( ) Set up DB2 Warehouse Control Database                                 |
|   (*) Do not set up DB2 Warehouse Control Database                          |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
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|                                                                             |
|                                                                             |
|                                                                             |
|   [   OK   ]                   [ Cancel ]                   [  Help  ]    |
+-----------------------------------------------------------------------------+
```
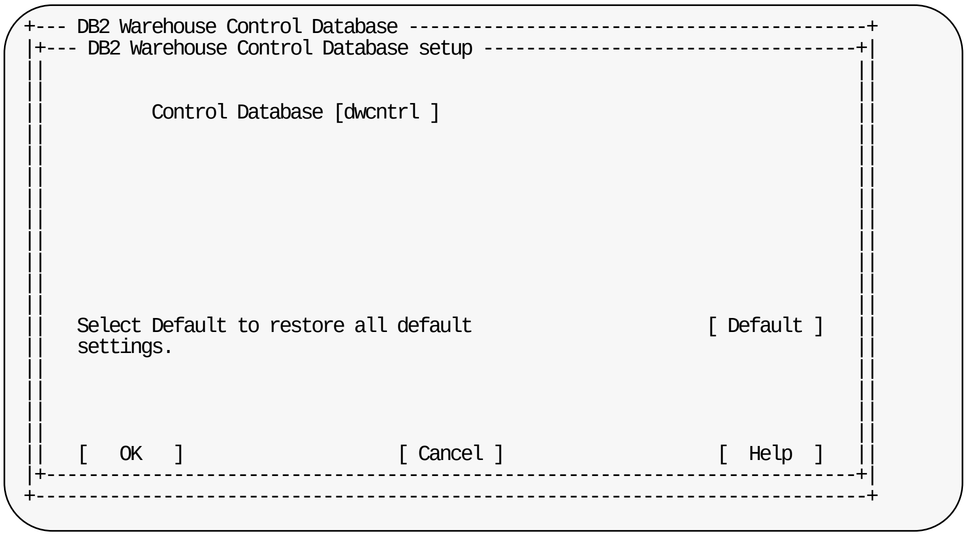

8. The following panel will appear if you selected “Set up DB2 Warehouse Control Database” in the previous panel. Enter a name for the DB2 Warehouse Control Database, and select **OK** when you are done.

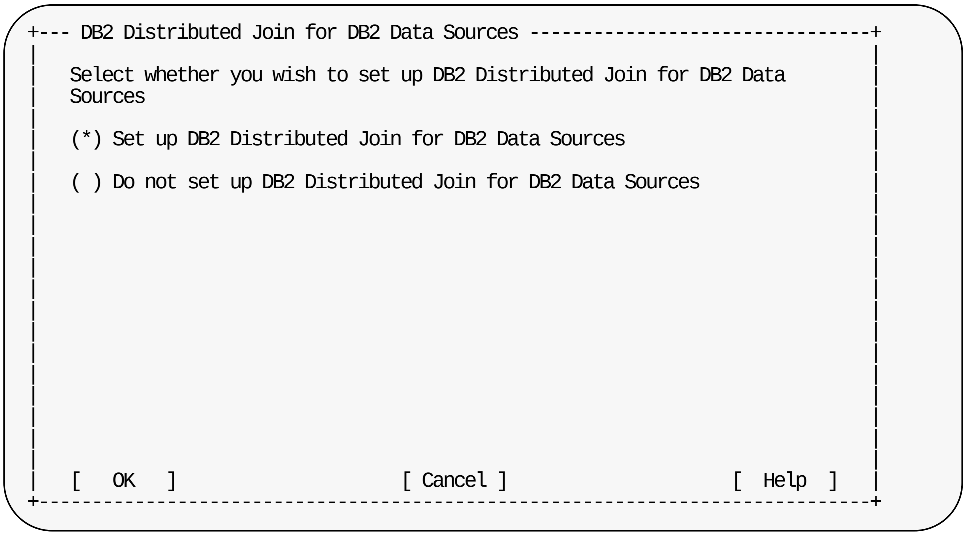
Note:

dwcntrl is the default name. You can use a different name by overtyping it.



```
+--- DB2 Warehouse Control Database ------------------------------------------+
|+--- DB2 Warehouse Control Database setup ----------------------------------+|
||                                                                           ||
||                                                                           ||
||          Control Database [dwcntrl ]                                      ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||   Select Default to restore all default                    [ Default ]   ||
||   settings.                                                               ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||                                                                           ||
||   [   OK   ]                  [ Cancel ]                   [  Help  ]    ||
|+---------------------------------------------------------------------------+|
+-----------------------------------------------------------------------------+
```

9. The following panel will appear if you have not set up DB2 Distributed Join for DB2 Data Sources in this DB2 instance. (DB2 Distributed Join for DB2 is a wrapper module that enables your DB2 server to access DB2 family data sources.) You do NOT need to set this up to use DB2 Query Patroller. Select **OK** after you make your selection.



```
+--- DB2 Distributed Join for DB2 Data Sources -------------------------------+
|                                                                             |
|   Select whether you wish to set up DB2 Distributed Join for DB2 Data       |
|   Sources                                                                   |
|                                                                             |
|   (*) Set up DB2 Distributed Join for DB2 Data Sources                      |
|                                                                             |
|   ( ) Do not set up DB2 Distributed Join for DB2 Data Sources               |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
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|                                                                             |
|                                                                             |
|                                                                             |
|   [   OK   ]                  [ Cancel ]                   [  Help  ]      |
+-----------------------------------------------------------------------------+
```
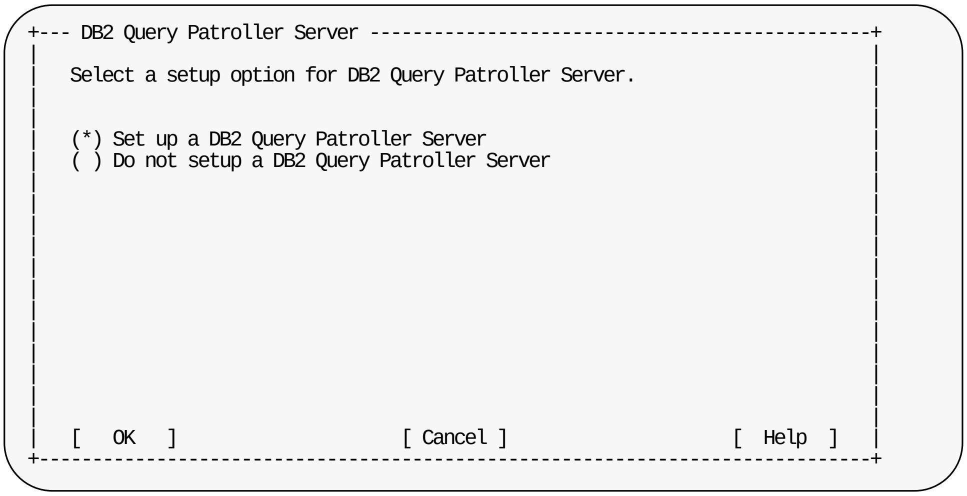
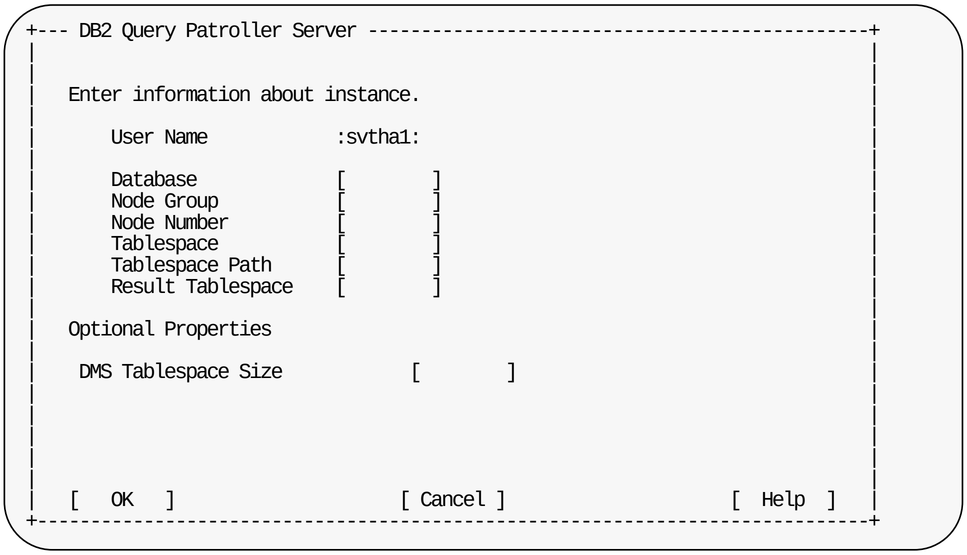

10. The following panel will appear. Select **Set up a DB2 Query Patroller Server** and then select **OK**.



```
+--- DB2 Query Patroller Server ---------------------------------------------+
|                                                                            |
|   Select a setup option for DB2 Query Patroller Server.                    |
|                                                                            |
|                                                                            |
|   (*) Set up a DB2 Query Patroller Server                                  |
|   ( ) Do not setup a DB2 Query Patroller Server                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                  [ Cancel ]                  [  Help  ]       |
+----------------------------------------------------------------------------+
```

11. The following panel will appear. To enter the fields on this panel, you will need the names of the nodegroup and tablespaces which you created in steps 3 and 4. on page 6. In the **Database** field, enter the name of the database which you want to manage using DB2 Query Patroller. In the **Node Group** field, enter the name of the single node nodegroup where the DB2 Query Patroller meta data tablespace resides. In the **Node Number** field, enter the node where the single node nodegroup resides. In the **Tablespace** field, enter the name of the tablespace which you created to store the DB2 Query Patroller meta data (i.e. the tablespace described in step 6 a. on page 6). In the **Tablespace Path** field, enter any existing path. This field will be ignored because the above tablespace is already created. In the **Result Tablespace** field, enter the name of the tablespace which you created to store the DB2 Query Patroller result tables (i.e. The tablespace described in item 6 b. on page 6). Ignore the **Optional Properties** because the tablespaces are already created beforehand. When you are done, select **OK**.

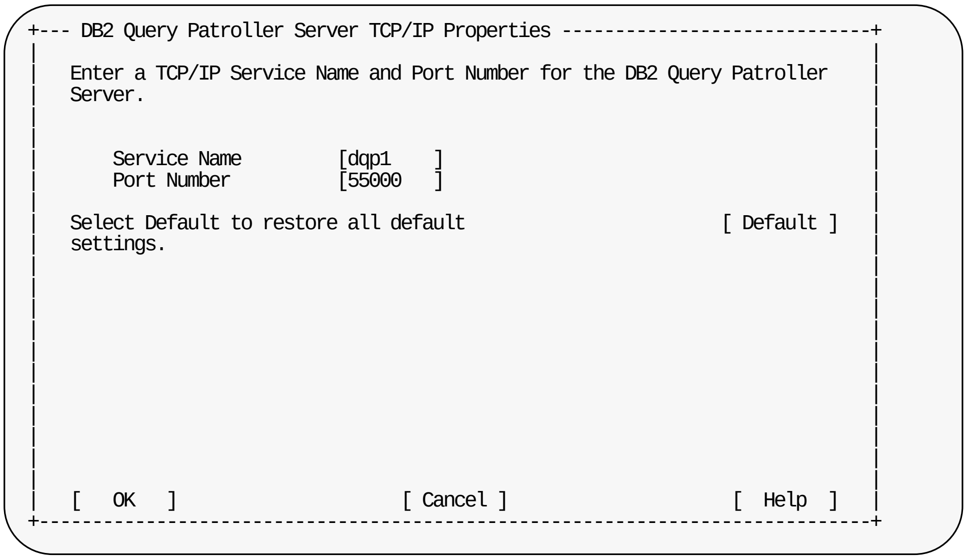


```
+--- DB2 Query Patroller Server ---------------------------------------------+
|                                                                            |
|                                                                            |
|   Enter information about instance.                                        |
|                                                                            |
|       User Name            :svtha1:                                        |
|                                                                            |
|       Database             [        ]                                      |
|       Node Group           [        ]                                      |
|       Node Number          [        ]                                      |
|       Tablespace           [        ]                                      |
|       Tablespace Path      [        ]                                      |
|       Result Tablespace    [        ]                                      |
|                                                                            |
|   Optional Properties                                                      |
|                                                                            |
|    DMS Tablespace Size            [        ]                               |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                  [ Cancel ]                  [  Help  ]       |
+----------------------------------------------------------------------------+
```

12.The following panel will appear. In the **Port Number** field, enter the port number which you have reserved for the communication between the DB2 Query Patroller communications (as described in the “Before You Begin” section of the *DB2 Query Patroller Installation Guide*). In the **Service Name** field, enter the service name associated with this port number.

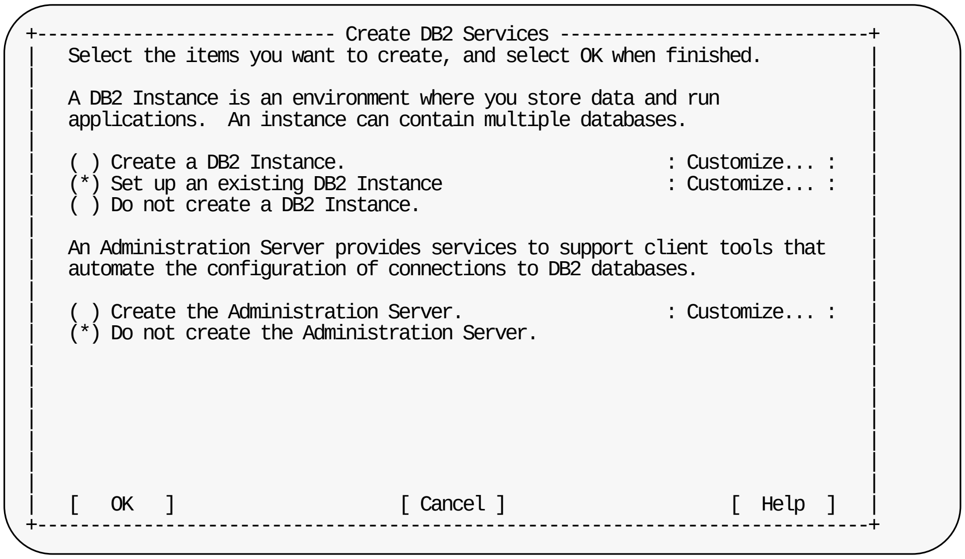
When you are done, select **OK**. During install, **db2setup** will append the service name and port number which you enter here to the /etc/services file.

Please note that dqp1 and 55000 are the default values. You can use a different port number or service name by overtyping these values



```
+--- DB2 Query Patroller Server TCP/IP Properties -----------------------------+
|                                                                              |
|   Enter a TCP/IP Service Name and Port Number for the DB2 Query Patroller    |
|   Server.                                                                    |
|                                                                              |
|                                                                              |
|       Service Name          [dqp1    ]                                       |
|       Port Number           [55000   ]                                       |
|                                                                              |
|   Select Default to restore all default                        [ Default ]   |
|   settings.                                                                  |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                   [ Cancel ]                    [  Help  ]     |
+------------------------------------------------------------------------------+
```

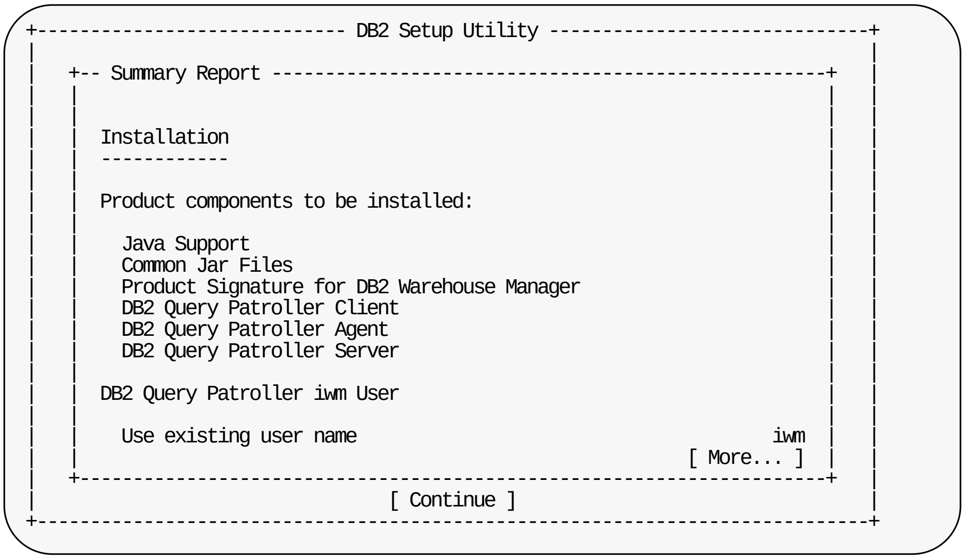
13.Next, you will return to the following panel. Select **OK**.



```
+---------------------------- Create DB2 Services -----------------------------+
|   Select the items you want to create, and select OK when finished.          |
|                                                                              |
|   A DB2 Instance is an environment where you store data and run              |
|   applications.  An instance can contain multiple databases.                 |
|                                                                              |
|   ( ) Create a DB2 Instance.                               : Customize... :  |
|   (*) Set up an existing DB2 Instance                      : Customize... :  |
|   ( ) Do not create a DB2 Instance.                                          |
|                                                                              |
|   An Administration Server provides services to support client tools that    |
|   automate the configuration of connections to DB2 databases.                |
|                                                                              |
|   ( ) Create the Administration Server.                    : Customize... :  |
|   (*) Do not create the Administration Server.                               |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                   [ Cancel ]                    [  Help  ]     |
+------------------------------------------------------------------------------+
```

14.A **Summary Report** panel similar to the following will appear. Verify that it summarizes the tasks which you want to perform, based on what you selected in the previous steps. If it is correct, select **Continue** to perform the tasks.

By installing DB2 Query Patroller Server, you are also installing the DB2 Query Patroller Agent and DB2 Query Patroller Client on this machine. Therefore you will see DB2 Query Patroller Agent and DB2 Query Patroller Client is in the list of product components to be installed.



```
+---------------------------- DB2 Setup Utility ------------------------------+
|                                                                             |
|   +-- Summary Report --------------------------------------------------+   |
|   |                                                                    |   |
|   |                                                                    |   |
|   |  Installation                                                      |   |
|   |  ------------                                                      |   |
|   |                                                                    |   |
|   |  Product components to be installed:                               |   |
|   |                                                                    |   |
|   |    Java Support                                                    |   |
|   |    Common Jar Files                                                |   |
|   |    Product Signature for DB2 Warehouse Manager                     |   |
|   |    DB2 Query Patroller Client                                      |   |
|   |    DB2 Query Patroller Agent                                       |   |
|   |    DB2 Query Patroller Server                                      |   |
|   |                                                                    |   |
|   |  DB2 Query Patroller iwm User                                      |   |
|   |                                                                    |   |
|   |    Use existing user name                                      iwm |   |
|   |                                                        [ More... ] |   |
|   +--------------------------------------------------------------------+   |
|                                  [ Continue ]                               |
+-----------------------------------------------------------------------------+
```

The **db2setup** utility will inform you when the installation completes, and will provide you with a status report found in `/tmp/db2setup.log` file.

The DB2 Query Patroller Server software will be installed in the same location as the DB2 software on your server. The installation path for Version 7 for the AIX operating system is:

`/usr/lpp/db2_07_01`

15. Exit from the **db2setup** utility.

16. While you are still logged on as root, run the following command on your UNIX command prompt:

    /usr/lpp/db2_07_01/instance/db2iupdt -k *instname* where *instname* is the name of the DB2 instance.

    If the above command is not executed, **dqpstart** will fail with a DB2 Query Patroller license error. This is because the license information on the DB2 instance was not updated. This is a limitation which will be lifted in the future release.

17. To verify the installation of your DB2 Query Patroller Server, run the command **db2stop** and **db2start** to restart DB2 and then follow the instructions in the "Verifying the Installation" section of the *DB2 Query Patroller Installation Guide* book.

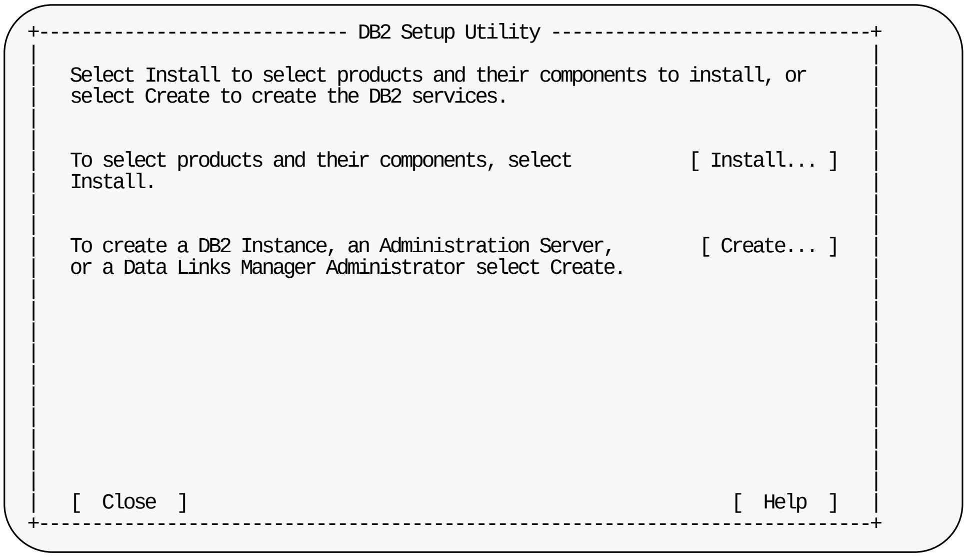
2.2.2 Setting up the DB2 Query Patroller server on the DB2 instance

If you have performed all installation steps in section "Installing and setting up the DB2 Query Patroller server" on page 7 you can skip this section.

This section outlines the steps to setup the DB2 Query Patroller server without installing the files.

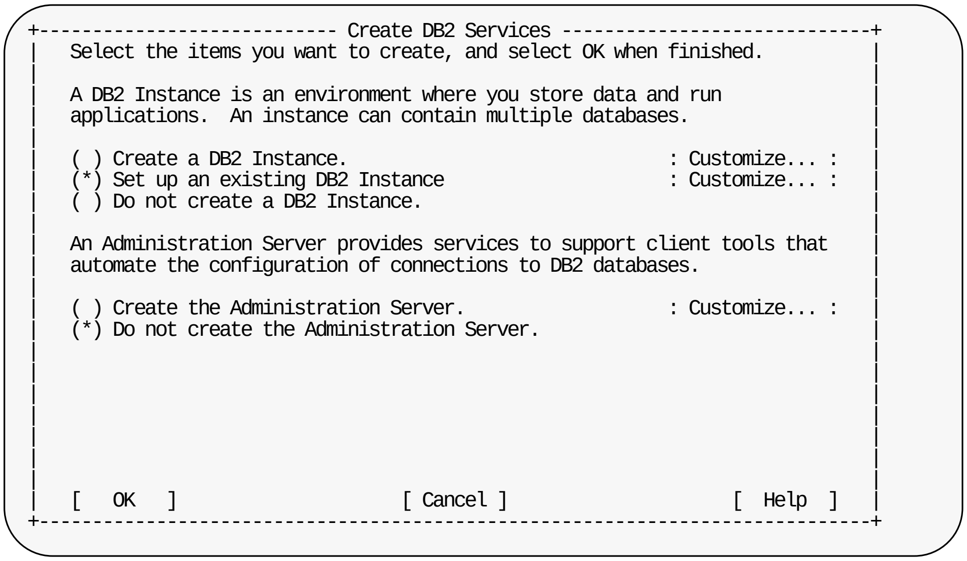
By using the **db2setup** utility, you can setup a DB2 instance so that DB2 Query Patroller can manage the database which resides on that instance. Before proceeding, please make sure that the two tablespaces, described in item Section 2.1, “Before You Begin” on page 5, are already created.

1. Log on to your workstation as a user with root authority.
2. Change to the directory where the CD-ROM is mounted.
3. Enter the **./db2setup** command. You will see the following panel if the DB2 Query Patroller software is already installed. Select **Create...**, and then select **OK**.



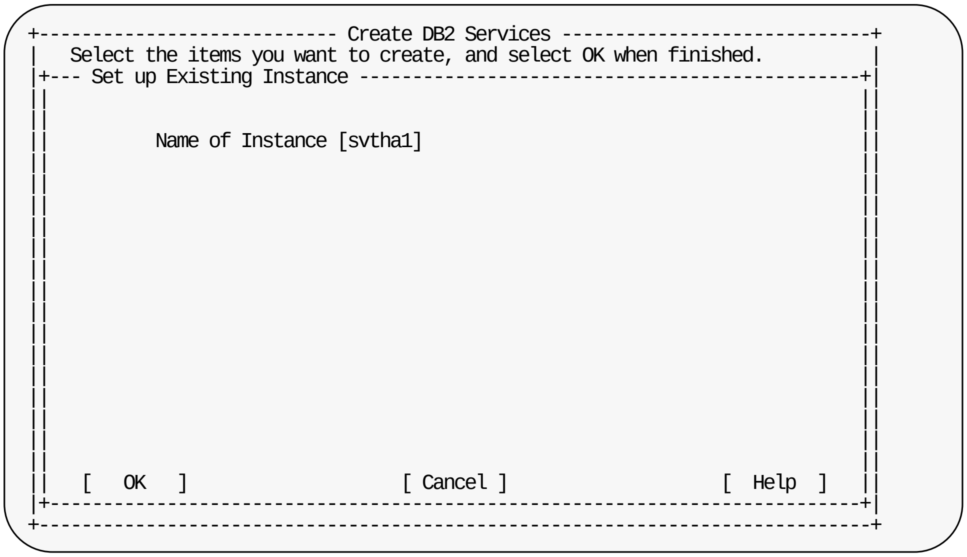
```
+---------------------------- DB2 Setup Utility ------------------------------+
|                                                                              |
|   Select Install to select products and their components to install, or      |
|   select Create to create the DB2 services.                                  |
|                                                                              |
|                                                                              |
|   To select products and their components, select          [ Install... ]    |
|   Install.                                                                   |
|                                                                              |
|                                                                              |
|   To create a DB2 Instance, an Administration Server,       [ Create... ]    |
|   or a Data Links Manager Administrator select Create.                       |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [  Close  ]                                                  [  Help  ]    |
+------------------------------------------------------------------------------+
```

4. The following panel will appear. Select **Set up an existing DB2 Instance** and then select **OK**.



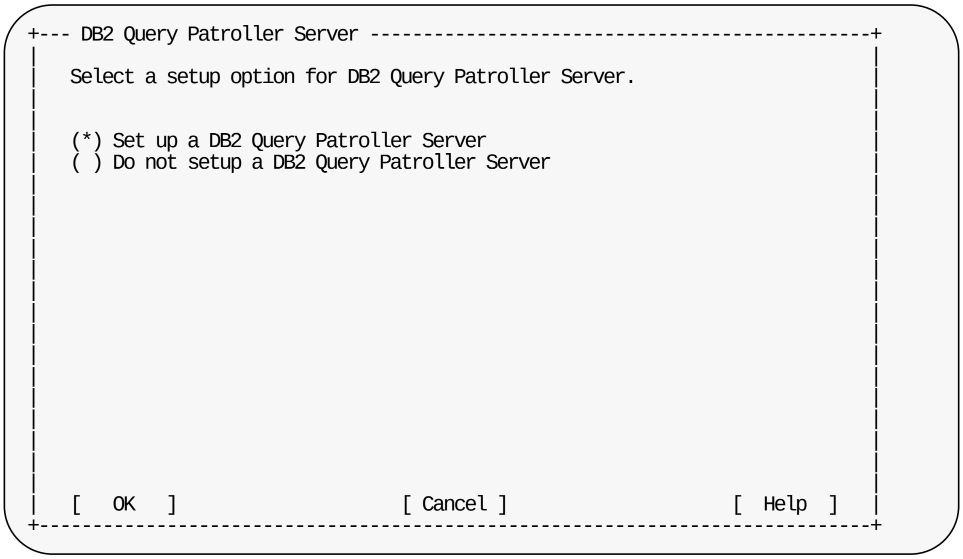
```
+--------------------------- Create DB2 Services -----------------------------+
|   Select the items you want to create, and select OK when finished.         |
|                                                                              |
|   A DB2 Instance is an environment where you store data and run             |
|   applications.  An instance can contain multiple databases.                |
|                                                                              |
|   ( ) Create a DB2 Instance.                          : Customize... :      |
|   (*) Set up an existing DB2 Instance                 : Customize... :      |
|   ( ) Do not create a DB2 Instance.                                          |
|                                                                              |
|   An Administration Server provides services to support client tools that   |
|   automate the configuration of connections to DB2 databases.               |
|                                                                              |
|   ( ) Create the Administration Server.               : Customize... :      |
|   (*) Do not create the Administration Server.                               |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                  [ Cancel ]                       [  Help  ]    |
+------------------------------------------------------------------------------+
```

5. The following panel will appear. Enter the name of the DB2 instance where the database which you want to manage using DB2 Query Patroller resides. Select **OK** when you are done.



```
+---------------------------- Create DB2 Services -----------------------------+
|   Select the items you want to create, and select OK when finished.          |
|+--- Set up Existing Instance ---------------------------------------------+|
||                                                                          ||
||                                                                          ||
||        Name of Instance [svtha1]                                         ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||                                                                          ||
||  [   OK   ]                  [ Cancel ]                  [  Help  ]     ||
|+--------------------------------------------------------------------------+|
+------------------------------------------------------------------------------+
```

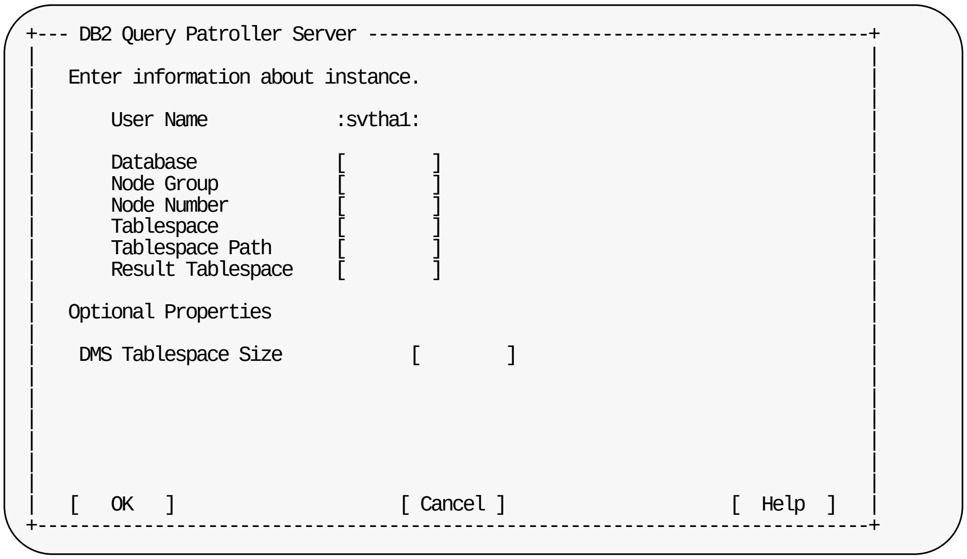
6. The following panel will appear. Select **Set up a DB2 Query Patroller Server** and then select **OK**.



```
+--- DB2 Query Patroller Server ------------------------------------------------+
|                                                                              |
|   Select a setup option for DB2 Query Patroller Server.                      |
|                                                                              |
|                                                                              |
|   (*) Set up a DB2 Query Patroller Server                                    |
|   ( ) Do not setup a DB2 Query Patroller Server                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                  [ Cancel ]                  [  Help  ]        |
+------------------------------------------------------------------------------+
```

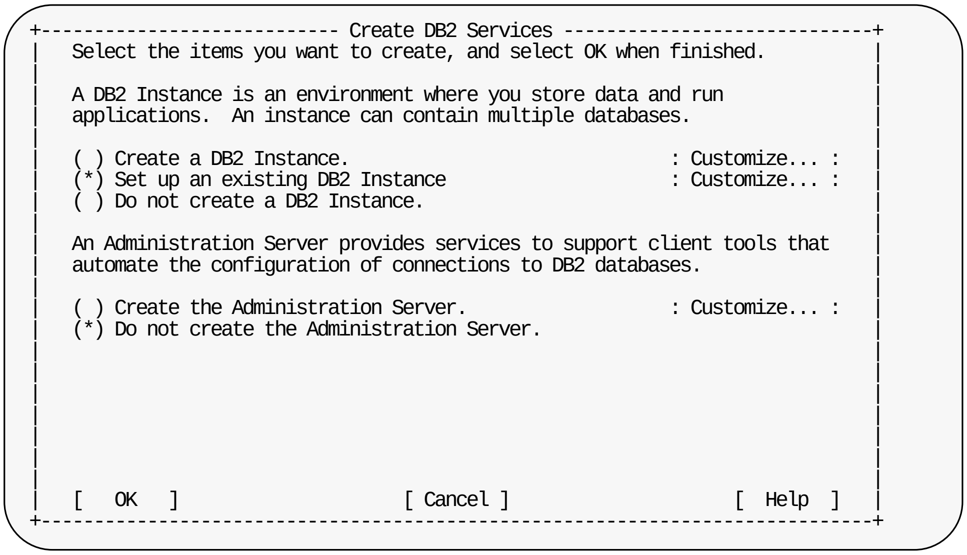
7. The following panel will appear. To enter the fields on this panel, you will need the names of the nodegroup and tablespaces which you created in item 4. on page 6. In the **Database** field, enter the name of the database which you want to manage using DB2 Query Patroller. In the **Node Group** field, enter the name of the single node nodegroup where the DB2 Query Patroller meta data tablespace resides. In the **Node Number** field, enter the node number where the single node nodegroup resides. In the **Tablespace** field, enter the name of the tablespace which you created to store the DB2 Query Patroller meta data (i.e. the tablespace described in item 6 a. on page 6). In the **Tablespace Path** field, enter any existing path. This field will be ignored because the above tablespace is already created. In the **Result Tablespace** field, enter the name of the tablespace which

you created to store the DB2 Query Patroller result tables (i.e. The tablespace described in item 6 b. on page 6). Ignore the **Optional Properties** because the tablespaces are already created beforehand. When you are done, select **OK**.



```
+--- DB2 Query Patroller Server ---------------------------------------------+
|                                                                            |
|   Enter information about instance.                                        |
|                                                                            |
|       User Name           :svtha1:                                         |
|                                                                            |
|       Database            [        ]                                       |
|       Node Group          [        ]                                       |
|       Node Number         [        ]                                       |
|       Tablespace          [        ]                                       |
|       Tablespace Path     [        ]                                       |
|       Result Tablespace   [        ]                                       |
|                                                                            |
|   Optional Properties                                                      |
|                                                                            |
|    DMS Tablespace Size            [        ]                               |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                  [ Cancel ]                    [  Help  ]     |
+----------------------------------------------------------------------------+
```

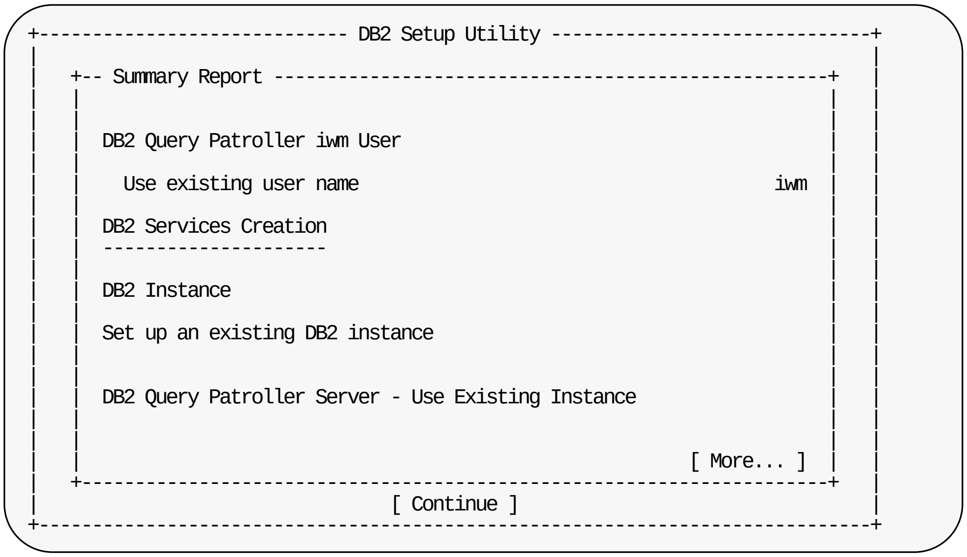
8. Next, you will return to the following panel. Select **OK**.



```
+---------------------------- Create DB2 Services ----------------------------+
|   Select the items you want to create, and select OK when finished.          |
|                                                                              |
|   A DB2 Instance is an environment where you store data and run              |
|   applications.  An instance can contain multiple databases.                 |
|                                                                              |
|   ( ) Create a DB2 Instance.                          : Customize... :       |
|   (*) Set up an existing DB2 Instance                 : Customize... :       |
|   ( ) Do not create a DB2 Instance.                                          |
|                                                                              |
|   An Administration Server provides services to support client tools that   |
|   automate the configuration of connections to DB2 databases.               |
|                                                                              |
|   ( ) Create the Administration Server.               : Customize... :       |
|   (*) Do not create the Administration Server.                               |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                  [ Cancel ]                    [  Help  ]       |
+------------------------------------------------------------------------------+
```

9. A Summary Report panel similar to the following will appear. Verify that it summarizes the tasks which you want to perform, based on what you

selected in the previous steps. If it is correct, select **Continue** to perform the tasks.



```
+---------------------------- DB2 Setup Utility ------------------------------+
|                                                                             |
|   +-- Summary Report ---------------------------------------------------+   |
|   |                                                                     |   |
|   |                                                                     |   |
|   |  DB2 Query Patroller iwm User                                       |   |
|   |                                                                     |   |
|   |    Use existing user name                                      iwm  |   |
|   |                                                                     |   |
|   |  DB2 Services Creation                                              |   |
|   |  ---------------------                                              |   |
|   |                                                                     |   |
|   |  DB2 Instance                                                       |   |
|   |                                                                     |   |
|   |  Set up an existing DB2 instance                                    |   |
|   |                                                                     |   |
|   |                                                                     |   |
|   |  DB2 Query Patroller Server - Use Existing Instance                 |   |
|   |                                                                     |   |
|   |                                                                     |   |
|   |                                                        [ More... ]  |   |
|   +---------------------------------------------------------------------+   |
|                                [ Continue ]                                 |
+-----------------------------------------------------------------------------+
```

The **db2setup** utility will inform you when it is done and will provide you with a status report found in `/tmp/db2setup.log` file.

2.2.3 Installing and setting up the DB2 Query Patroller agent

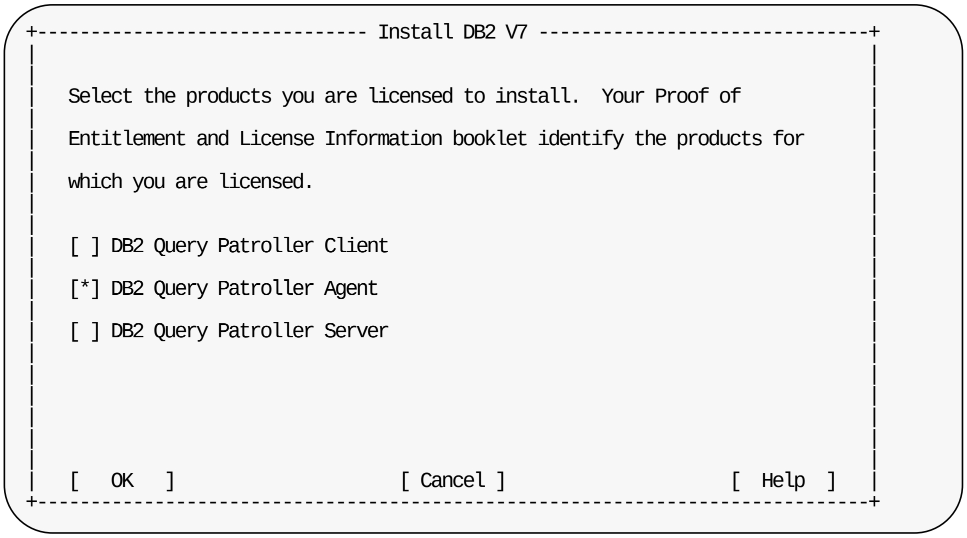
If you installed DB2 Query Patroller server in a DB2 Enterprise - Extended Edition environment, you can optionally install a DB2 Query Patroller agent on all of the database partition servers that participate in the instance. Installing multiple agents will help balance the database workload across all partitions.

In the DB2 Enterprise - Extended Edition environment, you must first install the DB2 Query Patroller server on one database partition server, before (optionally) installing the DB2 Query Patroller agent on the remaining database partition servers that participate in the instance. If you have not installed the DB2 Query Patroller server, then follow the instructions in Section 2.2.1, “Installing and setting up the DB2 Query Patroller server” on page 7.

To install the DB2 Query Patroller agent, use the following instructions.

1. Log on to your workstation as a user with root authority.
2. Insert and mount your product’s CD-ROM. If you are not sure how to mount the CD-ROM drive on your operating system, refer to the “Basic Task Knowledge” appendix in your DB2 server’s *Quick Beginnings* manual.
3. Change to the directory where the CD-ROM is mounted.
4. Enter the **./db2setup** command. If the DB2 Query Patroller agent files are already installed before hand, you will see the panel in step 5. If this is the

case, proceed to step 5. Otherwise you will see the following pannel. Select **DB2 Query Patroller Agent** and then select **OK**.

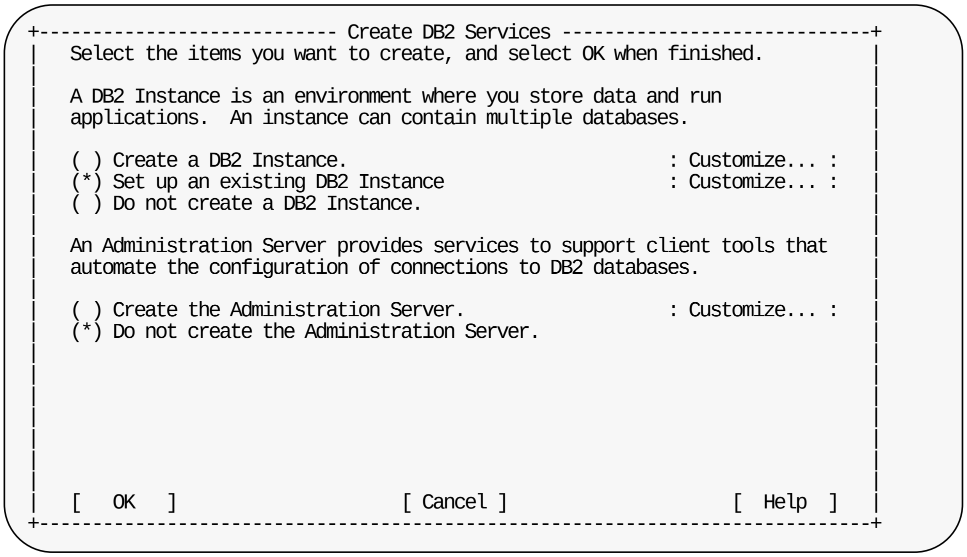


```
+------------------------------ Install DB2 V7 -------------------------------+
|                                                                             |
|                                                                             |
|   Select the products you are licensed to install.  Your Proof of          |
|                                                                             |
|   Entitlement and License Information booklet identify the products for    |
|                                                                             |
|   which you are licensed.                                                   |
|                                                                             |
|                                                                             |
|   [ ] DB2 Query Patroller Client                                            |
|                                                                             |
|   [*] DB2 Query Patroller Agent                                             |
|                                                                             |
|   [ ] DB2 Query Patroller Server                                            |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|   [   OK   ]                [ Cancel ]                   [  Help  ]         |
+-----------------------------------------------------------------------------+
```

5. The following panel will appear. Select **Set up an existing DB2 Instance**.

Note:
If you do not have a DB2 instance on your server, you will not see this option. If this is the case, the DB2 Query Patroller server has not been installed or setup on your DB2 EEE environment.

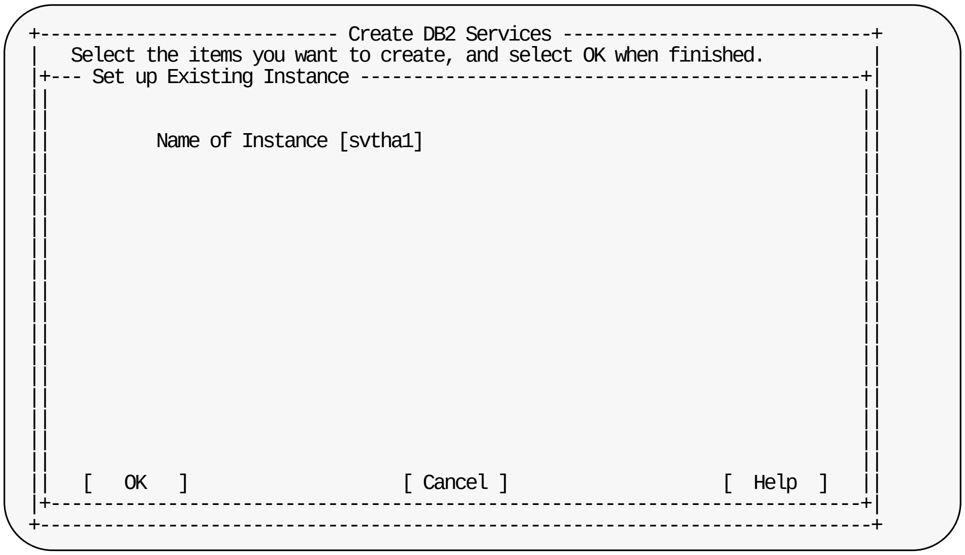
To install the DB2 Query Patroller server, please refer to Section 2.2.1, “Installing and setting up the DB2 Query Patroller server” on page 7.



```
+--------------------------- Create DB2 Services ----------------------------+
|   Select the items you want to create, and select OK when finished.        |
|                                                                            |
|   A DB2 Instance is an environment where you store data and run            |
|   applications.  An instance can contain multiple databases.               |
|                                                                            |
|   ( ) Create a DB2 Instance.                          : Customize... :     |
|   (*) Set up an existing DB2 Instance                 : Customize... :     |
|   ( ) Do not create a DB2 Instance.                                        |
|                                                                            |
|   An Administration Server provides services to support client tools that |
|   automate the configuration of connections to DB2 databases.             |
|                                                                            |
|   ( ) Create the Administration Server.               : Customize... :     |
|   (*) Do not create the Administration Server.                             |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|   [   OK   ]                [ Cancel ]                  [  Help  ]         |
+----------------------------------------------------------------------------+
```

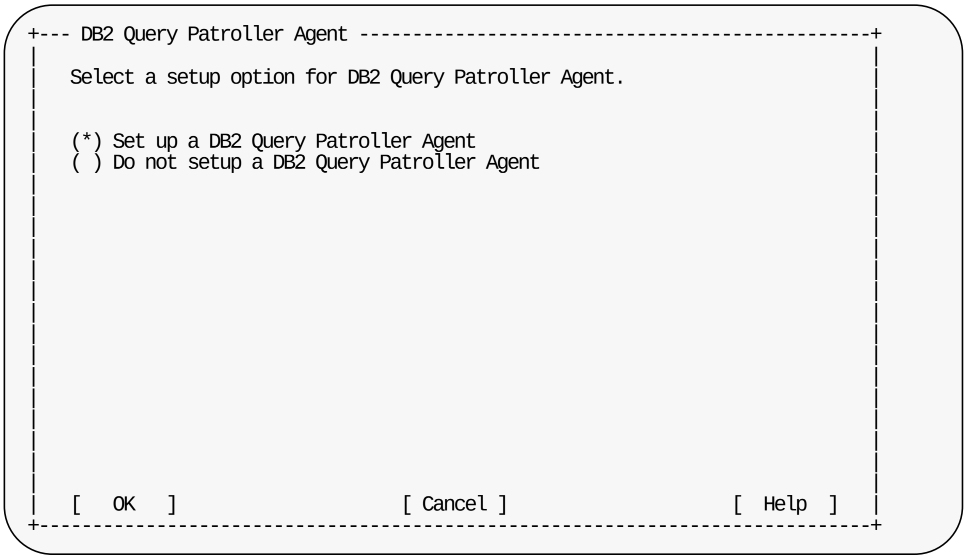
6. The following panel will appear. Enter the name of the DB2 instance where the DB2 Query Patroller server was setup (i.e. The DB2 instance where the

database which is managed by the DB2 Query Patroller server resides). Select **OK** when you are done.



```
+---------------------------- Create DB2 Services -----------------------------+
|   Select the items you want to create, and select OK when finished.          |
|+--- Set up Existing Instance ----------------------------------------------+|
||                                                                            ||
||                                                                            ||
||         Name of Instance [svtha1]                                          ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||                                                                            ||
||   [   OK   ]                  [ Cancel ]                  [  Help  ]      ||
|+---------------------------------------------------------------------------+|
+-----------------------------------------------------------------------------+
```

7. The following panel will appear. Select **Set up a DB2 Query Patroller Agent** and then select **OK**.

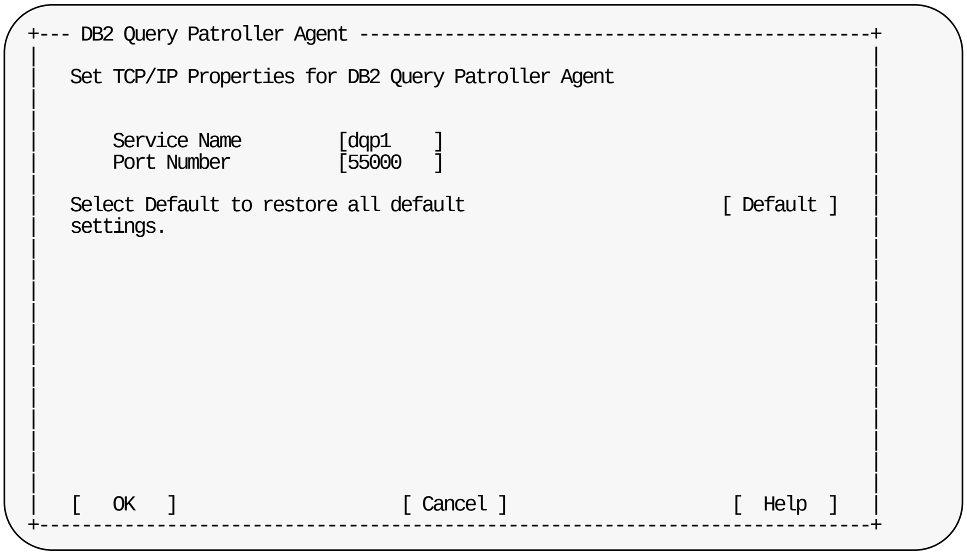


```
+--- DB2 Query Patroller Agent ------------------------------------------------+
|                                                                              |
|   Select a setup option for DB2 Query Patroller Agent.                       |
|                                                                              |
|                                                                              |
|   (*) Set up a DB2 Query Patroller Agent                                     |
|   ( ) Do not setup a DB2 Query Patroller Agent                               |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                   [ Cancel ]                   [  Help  ]     |
+------------------------------------------------------------------------------+
```

8. The following panel will appear. In the **Port Number** field, enter the port number which you have reserved for the communication between the DB2 Query Patroller communications (as described in the “Before You Begin” section of the *DB2 Query Patroller Installation Guide* book). Please note that this port number MUST match with the port number which you used for the installation of the DB2 Query Patroller server. In the **Service Name** field, enter the service name associated with this port number.

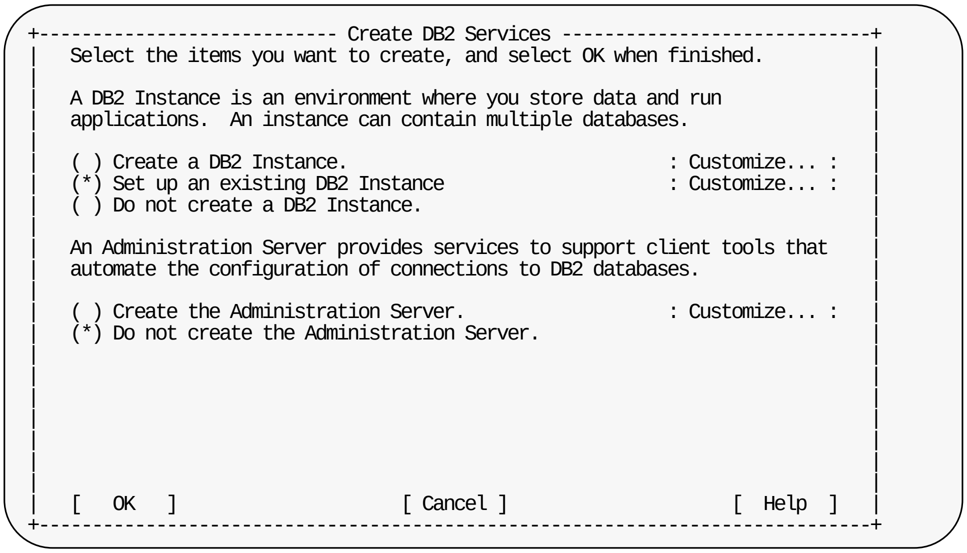
   When you are done, select **OK**. During install, **db2setup** will append the service name and port number which you enter here to the `/etc/services` file.

Please note that **dqp1** and **55000** are the default values. You can use a different port number or service name by overwriting these values. Select **OK**.



```
+--- DB2 Query Patroller Agent -----------------------------------------------+
|                                                                              |
|   Set TCP/IP Properties for DB2 Query Patroller Agent                        |
|                                                                              |
|                                                                              |
|       Service Name         [dqp1    ]                                        |
|       Port Number          [55000   ]                                        |
|                                                                              |
|   Select Default to restore all default                       [ Default ]   |
|   settings.                                                                  |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                   [ Cancel ]                     [  Help  ]   |
+------------------------------------------------------------------------------+
```

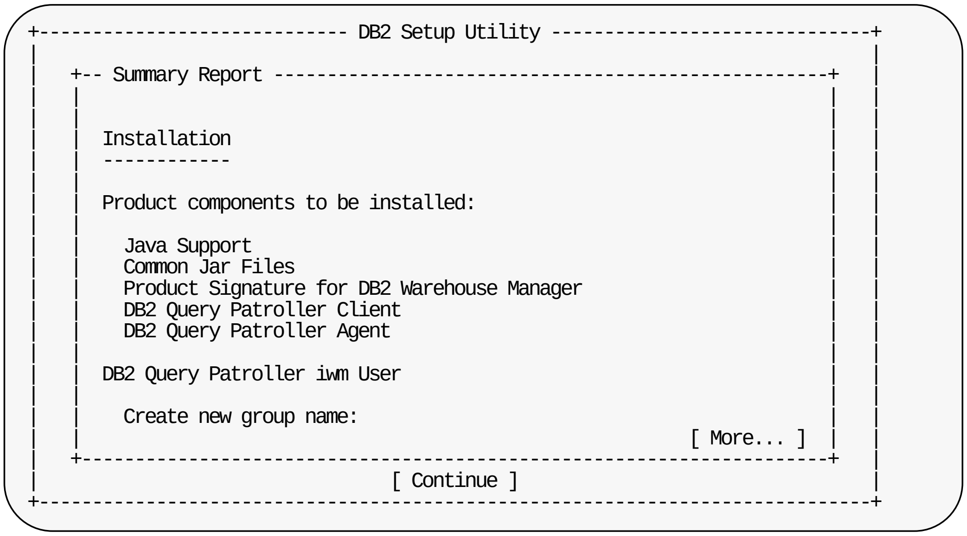
9. Next, you will return to the following panel. Select **OK**.



```
+---------------------------- Create DB2 Services -----------------------------+
|   Select the items you want to create, and select OK when finished.          |
|                                                                              |
|   A DB2 Instance is an environment where you store data and run              |
|   applications.  An instance can contain multiple databases.                 |
|                                                                              |
|   ( ) Create a DB2 Instance.                          : Customize... :      |
|   (*) Set up an existing DB2 Instance                 : Customize... :      |
|   ( ) Do not create a DB2 Instance.                                          |
|                                                                              |
|   An Administration Server provides services to support client tools that   |
|   automate the configuration of connections to DB2 databases.                |
|                                                                              |
|   ( ) Create the Administration Server.               : Customize... :      |
|   (*) Do not create the Administration Server.                               |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|   [   OK   ]                   [ Cancel ]                     [  Help  ]   |
+------------------------------------------------------------------------------+
```

10. A “Summary Report” panel similar to the following will appear. Verify that it summarizes the tasks which you want to perform, based on what you

selected in the previous steps. If it is correct, select **Continue** to perform the tasks.



```
+---------------------------- DB2 Setup Utility ------------------------------+
|                                                                             |
|   +-- Summary Report ---------------------------------------------------+   |
|   |                                                                     |   |
|   |                                                                     |   |
|   |  Installation                                                       |   |
|   |  ------------                                                       |   |
|   |                                                                     |   |
|   |  Product components to be installed:                                |   |
|   |                                                                     |   |
|   |    Java Support                                                     |   |
|   |    Common Jar Files                                                 |   |
|   |    Product Signature for DB2 Warehouse Manager                      |   |
|   |    DB2 Query Patroller Client                                       |   |
|   |    DB2 Query Patroller Agent                                        |   |
|   |                                                                     |   |
|   |  DB2 Query Patroller iwm User                                       |   |
|   |                                                                     |   |
|   |    Create new group name:                                           |   |
|   |                                                          [ More... ] |   |
|   +---------------------------------------------------------------------+   |
|                                [ Continue ]                                 |
+-----------------------------------------------------------------------------+
```

The **db2setup** utility will inform you when the installation completes, and will provide you with a status report found in `/tmp/db2setup.log`. file.

The DB2 Query Patroller agent software will be installed in the same location as the DB2 software on your server. The installation path for Version 7 for the AIX operating system is:

`/usr/lpp/db2_07_01`

11. Exit from the **db2setup** utility.

12. Edit the `$HOME/sqllib/dqpnodes.cfg` file to add an entry for the DB2 Query Patroller agent which you just installed. The **dqpstart** and **dqpstop** command use the `dqpnodes.cfg` file to synchronize start and stop processes on the listed database partition servers. You do not need to add this entry if you do not want to start the agent at the same time when you are starting the DB2 Query Patroller server. For more information, please refer to the *DB2 Query Patroller Administration Guide*.

    The `dqpnodes.cfg` file was created when you installed the DB2 Query Patroller server. It looks like the following:

    ```
    0 bf01n013 server
    ```

    After you add the entry for the DB2 Query Patroller agent, it will look like the following:

    ```
    0 bf01n103 server
    1 bf01n104 agent
    ```

Chapter 3. HACMP setup

This chapter describes the HACMP/ES 4.3 specific changes to application server scripts required to properly operate in this clustered environment. The basic assumption being that HACMP/ES 4.3 has been installed and configured on the two cluster nodes.

HACMP cluster

a group of 2 to 32 IBM RS/6000 servers, configured to provide highly available services. If any resource fails, its function is taken over by another part of the cluster.

Client

any system that utilizes the services provided by the cluster. Clients can be connected to the HACMP cluster by TCP/IP networks. The only requirement is that clients be able to access all of the nodes, so that in the event of a failure, the clients can access the nodes that have taken over a failed node.

Cluster node

any IBM RS/6000 system that has been configured to function as a highly available server. In the event that a cluster node fails, its resources will be taken over by another cluster node. The nodes that participate in the takeover may mount the failed system’s file systems, start up its applications, and even provide its IP & MAC address so that clients can reconnect to applications without reconfiguration.

Resource

an object that is protected by HACMP, and may include IP address, file systems, raw devices, or volume groups. A resource group is a set of resources that are grouped together to support a particular application.

Application server

a name given to the stop and start scripts for the application. In this paper, the application server is the start and stop scripts for DB2.

3.1 Update application server scripts

With our configuration, we have the four application servers, two per cluster, as described in Table 3.

Table 3. Application server scripts.

Cluster	Application server name	start script	stop script
cl1314	as1314	/usr/bin/rc.db2pe.13.start	/usr/bin/rc.db2pe.13.stop
	as1413	/usr/bin/rc.db2pe.14.start	/usr/bin/rc.db2pe.14.stop
cl1516	as1516	/usr/bin/rc.db2pe.15.start	/usr/bin/rc.db2pe.15.stop
	as1615	/usr/bin/rc.db2pe.16.start	/usr/bin/rc.db2pe.16.stop

The application server scripts must be accessible and executable from both nodes in the cluster. They are not required to have the same content. The scripts must be updated to support the starting and stopping of QP. We do not have to make any changes to the HACMP configuration files to add the support for QP.

When setting up the cl1314 cluster, we need to take into consideration that the $HOME for the instance is a resource in the cluster. With this in mind, we will set up the application servers as follows:

The contents of `/usr/bin/rc.db2pe.13.start` are:

```
/usr/bin/rc.db2pe svtha1 NFS SERVER start
/usr/bin/rc.db2pe svtha1 130 140,141 start
/usr/bin/rc.db2qp.eee svtha1 130 bf01n013 server 140 bf01n014 agent start ENET
```

and the contents of `/usr/bin/rc.db2pe.13.stop` are:

```
/usr/bin/rc.db2qp.eee svtha1 130 bf01n013 server 140 bf01n014 agent stop ENET
/usr/bin/rc.db2pe svtha1 130 140,141 stop
/usr/bin/rc.db2pe svtha1 NFS SERVER stop
```

The contents of `/usr/bin/rc.db2pe.14.start` are:

```
/usr/bin/rc.db2pe svtha1 140 130,131 start
/usr/bin/rc.db2qp.eee svtha1 140 bf01n014 agent 130 bf01n013 server start ENET
```

and the contents of `/usr/bin/rc.db2pe.14.stop` are:

```
/usr/bin/rc.db2qp.eee svtha1 140 bf01n014 agent 130 bf01n013 server stop ENET
/usr/bin/rc.db2pe svtha1 140 130,131 stop
```

The contents of `/usr/bin/rc.db2pe.15.start` are:

```
/usr/bin/rc.db2pe svtha1 150 160,161 start
/usr/bin/rc.db2qp.eee svtha1 150 bf01n015 agent 160 bf01n016 agent start ENET
```

and the contents of `/usr/bin/rc.db2pe.15.stop` are:

```
/usr/bin/rc.db2qp.eee svtha1 150 bf01n015 agent 160 bf01n016 agent stop ENET
/usr/bin/rc.db2pe svtha1 150 160,161 stop
```

The contents of `/usr/bin/rc.db2pe.16.start` are:

```
/usr/bin/rc.db2pe svtha1 160,161 150 start
/usr/bin/rc.db2qp.eee svtha1 160 bf01n016 agent 150 bf01n015 agent start ENET
```

and the contents of `/usr/bin/rc.db2pe.16.stop` are:

```
/usr/bin/rc.db2qp.eee svtha1 160 bf01n016 agent 150 bf01n015 agent stop ENET
/usr/bin/rc.db2pe svtha1 160,161 150 stop
```

The syntax of `rc.db2pe` for DB2 database partitions is:

```
rc.db2pe <instance> <partition for the primary node> <partition for the
secondary node> <start | stop>
```

or for the NFS server nodes:

```
rc.db2pe <instance> NFS SERVER < start | stop >
```

The syntax of `rc.db2qp.eee` is:

```
rc.db2qp.eee <db2user>
```

```
<qp_nodenum> <hostname> server|agent
<takeover_qp_nodenum> <hostname> server|agent|none
start|stop [enet]
```

Your DB2 UDB and HACMP/ES setup is complete.

Note:

Be sure to start and stop the cluster using the HACMP commands `smit clstart` and `smit clstop` respectively.

Chapter 4. Troubleshooting

This chapter documents some hints and tips to address some situations that may occur in an HACMP and DB2 UDB EEE V7.2 environment with Query Patroller installed.

4.1 db2setup fails with container already in use error

If you receive an error in the /tmp/db2setup.log saying that the container is already in use while setting up the DB2 Query Patroller Server, check that the profile variable DB2NODE is not set in the instance. If DB2NODE is set to the node number other than the DB2 Query Patroller Server node, installation will fail to find the meta data tablespace (i.e. the tablespace where the DB2 QP control tables reside) which you created previously. When the meta data tablespace cannot be found, it will attempt to create a new one. This creation will fail either because the container path which you input is already in use, or because the tablespace with the same name already exists.

The following is an example of what the /tmp/db2setup.log file would look like if installation attempts to create a new tablespace but the container is already in use:

```
 ./db2iexec dbprod2 . sqllib/db2profile; dqpsetup -D edwprod -g ng_13 -n 13
-t ts_patrol -r ts_patrol_result -l /db2_qpatrol/node0013

 Output log of the above command:

    Database Connection Information

  Database server        = DB2/6000 7.2.0
  SQL authorization ID   = DBPROD2
  Local database alias   = EDWPROD

 DB20000I  The TERMINATE command completed successfully.
 DB20000I  The SET CLIENT command completed successfully.
 SQL1031N  The database directory cannot be found on the indicated file system.
 SQLSTATE=58031
 DBI1366E The container /db2_qpatrol/node0013 is already in use.

 Explanation:  The directory named as a container for the
 tablespace already exists.

 User Response:  Run the command again using a different path for
 the container for the tablespace.
```

4.2 db2setup fails with tablespace already exists error

This is an other symptom of the same problem as described in section 4.1. Please refer to section 4.1 for the explanation of this problem.

4.3 db2setup fails with DB2 QP Server already setup error

If you are installing or setting up DB2 Query Patroller Server the **db2setup** command calls the **dqpcrt** command to setup DB2 Query Patroller Server on the specified instance. The **dqpcrt** command might fail with the following error:

```
DBI1353E An DB2 Query Patroller Server instance has been set up
already.
```

DB2 Query Patroller Server can be set up on one DB2 UDB instance only. Run this command: **/usr/lpp/db2_07_01/instance/dqplist**, to find out the instance which is currently managed by DB2 QP. If the instance name is correct, it means that the **dqpcrt** command was run previously. In this case, you do not need to do anything.

If the instance name is not correct or you no longer need to have DB2 QP manage this instance, then you can reset DB2 QP for this instance by running the following command: **/usr/lpp/db2_07_01/instance/dqpdrop *instance_name***.

If you are installing or setting up DB2 Query Patroller Agent make sure the proper instance name is specified.

4.4 db2setup completes with .profile or .login file warning

While setting up DB2 Query Patroller Server, **db2setup** will call the **dqpcrt** command, which will attempt to append a line in the `.profile` or `.login` file of the user iwm to load the `db2profile` of the proper instance. If the file permissions are not set properly, you will see the following warning:

```
DBI1370W Unable to modify the .profile or the .login file of user
iwm.
```

A workaround to this problem is to add the following line to the `.profile` or `.login` file manually:

```
.$HOME/sqllib/db2profile
```

4.5 dqpstart/dqpstop or job submission fails with profile/registry error

If **dqpstart**, **dqpstop** or job submissions fail with an error saying that a certain profile or registry variable is not set, then the **dqpcrt** command was not run or did not complete properly. Run the following command: **/usr/lpp/db2_07_01/instance/dqplist**. If the **dqplist** command returns the correct instance, then the **dqpcrt** command might not have completed properly. If this is the case run the following two commands:
/usr/lpp/db2_07_01/instance/dqpdrop *instance_name*
/usr/lpp/db2_07_01/instance/dqpcrt *instance_name*

You should also verify that the DB2 QP control tables are created by doing a list table for schema IWM. If they are not created, then you might want to run the following command: **/usr/lpp/db2_07_01/instance/dqpdrop *instance_name***, and then execute the steps outlined in section 2.2.2, “Setting up the DB2 Query Patroller server on the DB2 instance” on page 13.

If the **dqplist** command returns the wrong instance name, check if that instance needs to be managed by DB2 QP. If it does not need to be managed by DB2 QP, then run the following command to reset or disable DB2 QP on that instance: **/usr/lpp/db2_07_01/instance/dqpdrop *instance_name***.

Then you can follow the instructions in section 2.2.2, “Setting up the DB2 Query Patroller server on the DB2 instance” on page 13 to setup DB2 Query Patroller Server on the instance you desired.

If the **dqplist** command does not return anything, it means that DB2 Query Patroller Server has not been setup. Follow the instructions in section 2.2.2, “Setting up the DB2 Query Patroller server on the DB2 instance” on page 13 to setup DB2 Query Patroller Server on the instance you desired.

Note:

DB2 Query Patroller Server can only be set up on one DB2 instance at a time.

4.6 dqpstart / dqpstop hangs

If the **dqpstart** or **dqpstop** command seems to hang and then returns with error message:

```
DB221006E Node start or stop processing has reached timeout value.
```

Make sure the `.rhosts` file exists in iwm’s home directory, and contains proper entries. Make sure the home directory for the user iwm exists, is mounted and is shared across all QP nodes.

The `.rhosts` file for iwm in our sample configuration is defined as follows:

```
swserv13 iwm
swserv14 iwm
swserv15 iwm
swserv16 iwm
b_sw_013 iwm
b_sw_014 iwm
b_sw_015 iwm
b_sw_016 iwm
bf01n013 iwm
bf01n014 iwm
bf01n015 iwm
bf01n016 iwm
```

4.7 dqpstart fails with hostname mismatch error

If the **dqpstart** command fails with the following error message:

```
DB210114E The machine name set in the DB2 registry variable
DQP_SERVER does not match the server node entry in the dqpnodes.cfg
```

Make sure the host name set in the DQP_SERVER profile variable matches with the QP server node in the `dqpnodes.cfg` file. Make sure the DQP_SERVER profile variable does not use a full host name while the `dqpnodes.cfg` file uses the short host name, or vice versa.

Another situation that may cause this error is when the DQP_SERVER profile variable and the host name of the QP server node, in the `dqpnodes.cfg` file, are both using the short form of the host name; but the DQP_SEVER environment variable is using the fully qualified host name, or is set to a different host name.

4.8 dqpstart fails to start iwm_net

If the **dqpstart** command returns with the following error message:

```
DB29987E Failed to start “iwm_net” - Please check system log “...”
```

Make sure that there are no old DB2 QP socket files lying around. The old socket files can be removed by logging onto iwm and issuing the following command:

```
rm -rf /tmp/iwm*
```

4.9 dqpstart fails with message queue failure

If the **dqpstart** command returns with the following error message:

```
DB210064E System error. Message queue failed.
```

Make sure that there are no old IPC resources lying around. Follow these steps to clean up the execution environment for DB2 QP on a UNIX platform

1. Login as iwm
2. Kill all processes with a name starting with a iwm_ prefix
3. Clean up old IPC resources:
   ```
   ipclean -a
   ```
4. Remove old DB2 QP socket files
   ```
   rm -rf /tmp/iwm*
   ```
5. Remove old DB2 QP lock files
   ```
   rm DB2_RUNTIME/ctrl/dqp*.lck
   ```
   where *DB2_RUNTIME* is the DB2 installation path
6. Remove old DB2 QP result communication files
   ```
   rm DB2_RUNTIME/ctrl/DQP*.RES
   ```
   where *DB2_RUNTIME* is the DB2 installation path

4.10 dqpstart fails with license error

If the **dqpstart** command returns with the following error message:

```
DB210041E Request for DB2 Query Patroller license failed.
```

Make sure that the instance was updated after applying a fix pack. To update the instance after applying a fix pack issue the following command(s):

```
/usr/lpp/db2_07_01/instance/db2iupdt <instance>
```

where <*instance*> is the instance name of the database being managed by QP.

Chapter 5. Testing

It is assumed there is a fully tested and operational HACMP cluster running DB2 UDB. This chapter will only address the testing of the Query Patroller installation and configuration.

The testing of the QP installation and configuration is divided into two phases.

1. QP installation verification
2. QP integration into the HACMP cluster

5.1 Test environment and tools

The best testing environment is on the HACMP cluster itself. Enough additional scheduled downtime should be set aside to thoroughly test the QP configuration before the system is put into production. A short, planned outage is preferable to a long, unplanned outage that reveals that an untested point of failure has left an application unavailable.

The testing procedure itself is simple. Connect to the cluster from a client machine, cause one of the points of failure to fail, and watch to ensure that the failover takes place properly, and that QP is available and properly configured after failover. If the cluster is built using a cascading cluster configuration, check again after service has been restored to the original node. If the cluster is built using a rotating cluster configuration, bring up the original node again, then cause the second node to fail, which should restore the system to its original node.

When testing the availability of the application, be sure that accounts and passwords work as expected, hostnames and IP addresses work as expected, the data is complete and up to date, and the changeover is essentially transparent to the user.

Configure a remote machine to be able to connect to the highly available DB2 UDB database. A script can be easily written that will connect to our database, select some data from a table, record the results, and disconnect from the database. If these steps are set inside a loop that will run until interrupted by the operator, the procedure can be used to monitor the state of the cluster. Keep in mind that the script should continue even if the database cannot be contacted. This way, when the database restarts, it will provide a benchmark for the length of time that failover is expected to take. Here is a brief sample script that may be useful for testing an HACMP cluster:

```
while :
do
        db2 connect to database
        db2 "select count(*) from syscat.tables"
        db2 connect reset
      sleep 60
done
```

Figure 3. Sample script for testing

clstat is an excellent tool for testing and monitoring the status of an HACMP cluster and is included in the HACMP package. It also comes in an X-windows compatible version, **xclstat**. From a remote client system (that is, a machine that is not part of the HACMP cluster), **clstat** will continuously monitor the status of the cluster and the individual nodes within the cluster. The display, or its sub-windows in the case of **xclstat**, will provide information about whether the cluster is running, if it is stable, the status of the individual nodes, and the IP address used to connect to the nodes.

For more information on **clstat** or **xclstat** you can refer to the HACMP documentation or to the technical report in the Appendix , "IBM DB2 Universal Database Enterprise Extended - Edition for AIX and HACMP/ES TR-74.174" on page 50.

The primary tool for monitoring QP is **QueryMonitor**. This tool can be used during your testing to monitor the jobs that are being managed by QP. This and other tools are documented in the *IBM DB2 Query Patroller Administration Guide*.

5.2 QP installation verification

For the QP product verification phase of testing follow the instructions in the *IBM DB2 Query Patroller Installation Guide chapter 3,* section *Verifying the Installation*

Although this chapter is for a Windows™ NT or Windows 2000 installation, you should be able to do the verifying steps on the UNIX platform.

5.3 QP integration into the HACMP cluster

Once the QP product installation has been successfully tested we can move onto testing the QP integration into the HACMP cluster environment.

With the target configuration there is a potential for five two stage test scenarios. These scenarios are outlined in Table 4 below. In stage one we force a failover of the primary node to the takeover node and in phase two we recover by failing back to the primary node from the takeover node.

Table 4. Query Patroller test scenarios

Phase	Primary node (node 1)	Takeover node (node 2)	Pre-fallover dqpnode.cfg	Fallover dqpnodes.cfg	Fallback dqpnodes.cfg
1A	server	agent	1 node1 server 2 node2 agent	1 node2 server 2 node1 none	1 node1 server 2 node2 agent
1B	server	none (for hot standby)	1 node1 server 2 node2 none OR 1 node1 server	1 node2 server 2 node1 none	1 node1 server 2 node2 none
2A	agent	server	1 node1 agent 2 node2 server	1 node1 none 2 node2 server	1 node1 agent 2 node2 server
2B	agent	agent	1 node1 agent 2 node2 agent	1 node1 none 2 node2 agent	1 node1 agent 2 node2 agent

Phase	Primary node (node 1)	Takeover node (node 2)	Pre-fallover dqpnode.cfg	Fallover dqpnodes.cfg	Fallback dqpnodes.cfg
2C	agent	none (for hot standby)	1 node1 agent 2 node2 none OR 1 node1 agent	1 node2 agent 2 node1 none	1 node1 agent 2 node2 none

The following sections detail each of these test phases. Each one will show the `dqpnodes.cfg` and `db2nodes.cfg` files in the pre-fallover, fallover and fallback stages of the test phase. There are also be excerpts from the `/tmp/hacmp.out` file to show the commands and results of the **rc.db2qp.eee** script that is the heart of the QP restart support in the HACMP environment on a RS/6000 SP cluster. This will allow you to compare what your test results are to what should be expected. In each scenario we used a graceful takeover of the HACMP nodes to enable us to capture the output from the `/tmp/hamcp.out` file on the failing node.

To help you track the entries in the `/tmp/hamcp.out` files you could create some simple scripts to start and stop the HACMP cluster code to place markers in the `/tmp/hacmp.out` file to make it easier to find your results.

Here is a brief sample script to issue the **clstop** command with a graceful takeover:

```
# Sample script to stop HACMP and put an entry in hacmp.out to that affect
/usr/bin/echo "######### " ‘date‘ "Stop HACMP gracefull with takeover” >> /tmp/hacmp.out
/usr/sbin/cluster/utilities/clstop -y ’-N’  ’-gr’
```

Figure 4. Sample clstop script

Here is a brief sample script to issue the **clstart** command:

```
# Sample script to start HACMP and put an entry in hacmp.out to that affect
/usr/bin/echo "######### " ‘date‘ "Starting HACMP" >> /tmp/hacmp.out
/usr/sbin/cluster/etc/rc.cluster -boot ’-N’ ’-b’
```

Figure 5. Sample clstart script

Here is a brief sample script to put a comment or marker into the `/tmp/hacmp.out` file:

```
# Sample script to add a commnet into /tmp/hacmp.out
/usr/bin/echo "######### " ‘date‘ "$1" >> /tmp/hacmp.out
```

Figure 6. Sample script to add a comment into /tmp/hacmp.out

Make sure you put any comments you wish to add to `/tmp/hamcp.out` between double quotes when using the sample script in Figure 6.

5.3.1 Phase 1A: Server to Agent test scenario

In this scenario a failure of the QP server node causes the QP server node to fallover to the partner QP agent node. To run this test scenario follow these steps:

1. Ensure your DB2 clusters are operating normally. Following are samples of what the `db2nodes.cfg` and `dqpnodes.cfg` files contain before the fallover:

   `db2nodes.cfg`

```
130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016
```

dqpnodes.cfg

```
130 bf01n013 server
150 bf01n015 agent
160 bf01n016 agent
140 bf01n014 agent
```

2. Append a comment to the /tmp/hacmp.out file to mark the start of the test.
3. Stop the QP server node, either by stopping the HACMP cluster on the QP server node, or by shutting down the node completely. The following is a sample output from the /tmp/hacmp.out file from the QP server system and the QP agent node after the fallover:

```
-------------------------------------------------------------------------------
su - iwm -c dqpstop
-------------------------------------------------------------------------------
08-01-2001 15:49:17   160   DB210038I DQPSTOP processing was successful.
08-01-2001 15:49:18   150   DB210038I DQPSTOP processing was successful.
08-01-2001 15:49:18   140   DB210038I DQPSTOP processing was successful.
08-01-2001 15:49:31   130   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
```

Figure 7. bf01n013 /tmp/hacmp.out sample at QP server fallover.

```
-------------------------------------------------------------------------------
Doing failover of DB2 Query Patroller nodes ...
-------------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 140 dropnode
08-01-2001 15:54:03   140   DB210117E The DB2 Query Patroller was already stopped on
this node.

DB210076E DQPSTOP processing has completed.  "0" node(s) were stopped successfully,
"1" node(s) were already stopped, "0" node(s) have failed.
-------------------------------------------------------------------------------
su - svtha1 -c db2set DQP_SERVER=bf01n014:55000
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 130 restart bf01n014 server
08-01-2001 15:54:29   130   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 addnode bf01n013 none
DB29816I  Completed successfully.
-------------------------------------------------------------------------------
su - iwm -c dqpstart
-------------------------------------------------------------------------------
08-01-2001 15:54:40   130   DB210116E The DB2 Query Patroller was already started on
this node.

08-01-2001 15:54:48   150   DB210037I DQPSTART processing was successful.
08-01-2001 15:54:50   160   DB210037I DQPSTART processing was successful.
DB210075E DQPSTART processing has completed.  "2" node(s) were started successfully,
"1" node(s) were already started, "0" node(s) have failed.
```

Figure 8. bf01n014 /tmp/hacmp.out sample after QP server fallover.

4. Check that the QP server and the DB2 partition(s) restarted on the former QP agent node. The db2nodes.cfg and the dqpnodes.cfg files should now have the following entries:

db2nodes.cfg

```
130 bf01n014 2 b_sw_014
131 bf01n014 1 b_sw_014
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016
```

dqpnodes.cfg

```
130 bf01n014 server
150 bf01n015 agent
160 bf01n016 agent
140 bf01n013 none
```

5. Submit a few jobs to QP and ensure they are processed normally.
6. Test the fallback of the QP server to the original node by starting the HACMP cluster code again on the previous QP server node or booting the node if you chose to shut it down in step 3. The following is a sample from the `/tmp/hacmp.out` file of fallback of the QP server to the original node. This is from the node that the QP server fell over to and is now leaving to return to the original QP server node:

```
-----------------------------------------------------------------------------
WARNING: Node 130 with hostname bf01n013 and node type server cannot be found in
dqpnodes.cfg file.
-----------------------------------------------------------------------------
WARNING: Node 140 with hostname bf01n014 and node type agent cannot be found in
dqpnodes.cfg file.
-----------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
130 bf01n014 server
140 bf01n013 none
-----------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-----------------------------------------------------------------------------
su - iwm -c dqpstop
-----------------------------------------------------------------------------
08-01-2001 16:00:06   160   DB210038I DQPSTOP processing was successful.
08-01-2001 16:00:07   150   DB210038I DQPSTOP processing was successful.
08-01-2001 16:00:20   130   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
```

Figure 9. bf01n014 /tmp/hacmp.sample at QP server fallback.

The contents of the `/tmp/hacmp.out` file for the original QP server node can be found in Figure 10 on page 36.

7. Ensure the QP server and the DB2 partition(s) start up on their original node. The `db2nodes.cfg` and the `dqpnodes.cfg` files should now have the same entries as they did in step 1:

db2nodes.cfg

```
130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016
```

dqpnodes.cfg

```
130 bf01n013 server
150 bf01n015 agent
160 bf01n016 agent
140 bf01n014 agent
```

8. Submit a few jobs to QP and ensure they are processed normally.

```
-------------------------------------------------------------------------------
WARNING: Node 130 with hostname bf01n013 and node type server cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
WARNING: Node 140 with hostname bf01n014 and node type agent cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
130 bf01n014 server
140 bf01n013 none
-------------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Doing failback for the DB2 Query Patroller nodes ...
su - iwm -c dqpstop
-------------------------------------------------------------------------------
08-01-2001 16:06:26   160   DB210117E The DB2 Query Patroller was already stopped on
this node.

08-01-2001 16:06:27   150   DB210117E The DB2 Query Patroller was already stopped on
this node.

08-01-2001 16:06:32   130   DB210117E The DB2 Query Patroller was already stopped on
this node.

DB210076E DQPSTOP processing has completed.  "0" node(s) were stopped successfully,
"
3" node(s) were already stopped, "0" node(s) have failed.
-------------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 140 dropnode
DB29816I  Completed successfully.
-------------------------------------------------------------------------------
su - svtha1 -c db2set DQP_SERVER=bf01n013:55000
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 130 restart bf01n013 server
08-01-2001 16:06:52   130   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 addnode bf01n014 agent
08-01-2001 16:07:00   140   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
su - iwm -c dqpstart
-------------------------------------------------------------------------------
08-01-2001 16:07:04   130   DB210116E The DB2 Query Patroller was already started on
this node.

08-01-2001 16:07:10   140   DB210116E The DB2 Query Patroller was already started on
this node.

08-01-2001 16:07:12   160   DB210037I DQPSTART processing was successful.
08-01-2001 16:07:13   150   DB210037I DQPSTART processing was successful.
DB210075E DQPSTART processing has completed.  "2" node(s) were started successfully,
"2" node(s) were already started, "0" node(s) have failed.
```

Figure 10. bf01n013 /tmp/hacmp.out sample after QP server fallback.

5.3.2 Phase 1B: Server to none test scenario

In this scenario the HACMP configuration is defined with a hot standby node. With a failure of the QP server node the fallover is to the hot standby system. To run this test scenario follow these steps:

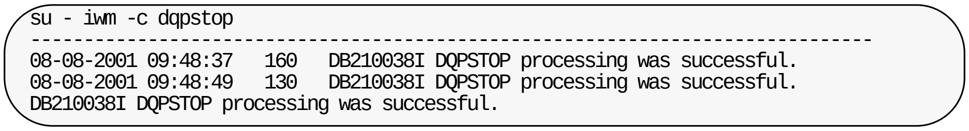
1. Ensure your DB2 clusters are operating normally and has been configured to look like a hot standby HACMP configuration. Then start QP. To do this set up the `db2nodes.cfg` and the `dqpnodes.cfg` files to resemble the following:

   ```
   db2nodes.cfg

   130 bf01n013 0 b_sw_013
   131 bf01n013 1 b_sw_013
   140 bf01n014 0 b_sw_014
   150 bf01n015 0 b_sw_015
   160 bf01n016 0 b_sw_016
   161 bf01n016 1 b_sw_016

   dqpnodes.cfg

   130 bf01n013 server
   140 bf01n014 none
   150 bf01n015 none
   160 bf01n016 agent
   ```

   With the `dqpnodes.cfg` configured with bf01n014 and bf01n015 as none, QP agents will not be started on these nodes. This will approximate a hot standby configuration for QP.

2. Append a comment to the `/tmp/hacmp.out` file to mark the start of the test.

3. Stop the QP server node, either by stopping the HACMP cluster on the QP server node, or by shutting down the node completely. The following is a sample output from the `/tmp/hacmp.out` file from the QP server system and the QP agent node after the fallover:



```
su - iwm -c dqpstop
---------------------------------------------------------------------------
08-08-2001 09:48:37   160   DB210038I DQPSTOP processing was successful.
08-08-2001 09:48:49   130   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
```

Figure 11. bf01n013 /tmp/hacmp.out sample at fallover of QP server.

The following is sample output from the /tmp/hacmp.out file from the QP agent node after the fallover:

```
-----------------------------------------------------------------------------
Doing failover of DB2 Query Patroller nodes ...
-----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 140 dropnode
DB29816I  Completed successfully.
-----------------------------------------------------------------------------
su - svtha1 -c db2set DQP_SERVER=bf01n014:55000
-----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 130 restart bf01n014 server
08-08-2001 13:18:50   130   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 addnode bf01n013 none
DB29816I  Completed successfully.
-----------------------------------------------------------------------------
su - iwm -c dqpstart
-----------------------------------------------------------------------------
08-08-2001 13:18:52   130   DB210116E The DB2 Query Patroller was already started on
this node.

08-08-2001 13:18:56   160   DB210037I DQPSTART processing was successful.
DB210075E DQPSTART processing has completed.  "1" node(s) were started successfully,
"1" node(s) were already started, "0" node(s) have failed.
```

Figure 12. bf01n014 /tmp/hacmp.out sample after fallover of QP server.

4. Check that the QP server and the DB2 partition(s) restarted on the hot standby node. The db2nodes.cfg and the dqpnodes.cfg should now have the following entries:

   db2nodes.cfg

   130 bf01n014 2 b_sw_014
   131 bf01n014 1 b_sw_014
   140 bf01n014 0 b_sw_014
   150 bf01n015 0 b_sw_015
   160 bf01n016 0 b_sw_016
   161 bf01n016 1 b_sw_016

   dqpnodes.cfg

   130 bf01n014 server
   150 bf01n015 none
   160 bf01n016 agent
   140 bf01n013 none

5. Submit a few jobs to QP and ensure they are processed normally.
6. Test the fallback of the QP server to the original node by starting the HACMP cluster code again on the previous QP server node or booting the node if you chose to shut it down in step 3. The following is a sample from

the /tmp/hacmp.out files from the two nodes during and after the fallback of the QP server to the original node:

```
-------------------------------------------------------------------------------
WARNING: Node 130 with hostname bf01n013 and node type server cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
130 bf01n014 server
140 bf01n013 none
-------------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-------------------------------------------------------------------------------
su - iwm -c dqpstop
-------------------------------------------------------------------------------
08-08-2001 11:10:10   160   DB210038I DQPSTOP processing was successful.
08-08-2001 11:10:22   130   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
```

Figure 13. bf01n014 /tmp/hamcp.out sample at fallback of QP server.

The sample output from the bf01n003 /tmp/hamcp.out file is in Figure 14 on page 40.

7. Ensure the QP server and the DB2 partition(s) start up on their original node. The db2nodes.cfg and the dqpnodes.cfg files should now have the same entries as they did in step 1:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
140 bf01n014 none
150 bf01n015 none
160 bf01n016 agent
```

8. Submit a few jobs to QP and ensure they are processed normally.

```
---------------------------------------------------------------------------
WARNING: Node 130 with hostname bf01n013 and node type server cannot be found in
dqpnodes.cfg file.
---------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
130 bf01n014 server
140 bf01n013 none
---------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
---------------------------------------------------------------------------
---------------------------------------------------------------------------
Doing failback for the DB2 Query Patroller nodes ...
su - iwm -c dqpstop
---------------------------------------------------------------------------
08-08-2001 11:14:59   160   DB210117E The DB2 Query Patroller was already stopped on
this node.

08-08-2001 11:15:02   130   DB210117E The DB2 Query Patroller was already stopped on
this node.

DB210076E DQPSTOP processing has completed.  "0" node(s) were stopped successfully,
"2" node(s) were already stopped, "0" node(s) have failed.
---------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 140 dropnode
DB29816I  Completed successfully.
---------------------------------------------------------------------------
su - svtha1 -c db2set DQP_SERVER=bf01n013:55000
---------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 130 restart bf01n013 server
08-08-2001 11:15:10   130   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
---------------------------------------------------------------------------
---------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 addnode bf01n014 none
DB29816I  Completed successfully.
---------------------------------------------------------------------------
su - iwm -c dqpstart
---------------------------------------------------------------------------
08-08-2001 11:15:13   130   DB210116E The DB2 Query Patroller was already started on
this node.

08-08-2001 11:15:17   160   DB210037I DQPSTART processing was successful.
DB210075E DQPSTART processing has completed.  "1" node(s) were started successfully,
"1" node(s) were already started, "0" node(s) have failed.
```

Figure 14. bf01n013 /tmp/hacmp.out sample at fallback of QP server.

5.3.3 Phase 2A: Agent to server test scenario

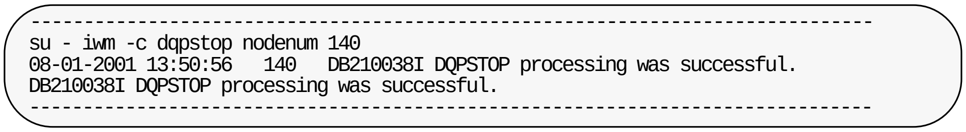
In this scenario a failure of a QP agent node causes the QP agent node to fallover to the partner QP server node. To run this test scenario follow these steps:

1. Ensure your DB2 clusters are operating normally. Following are samples of what the `db2node.cfg` and `dqpnodes.cfg` files contain before the fallover:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
```

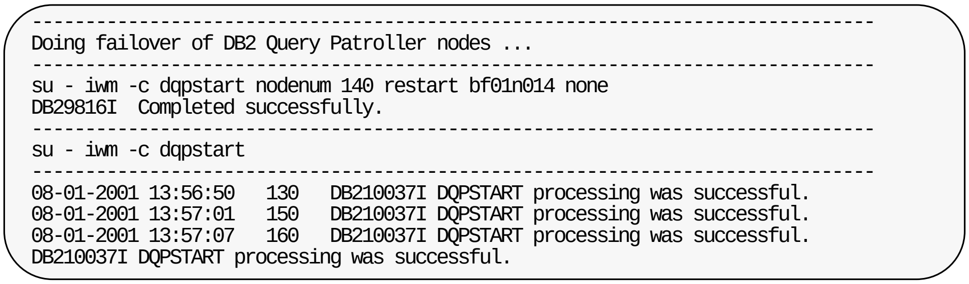
```
140 bf01n014 agent
150 bf01n015 agent
160 bf01n016 agent
```

2. Append a comment to the `/tmp/hacmp.out` file to mark the start of the test.
3. Stop the QP agent node, either by stopping the HACMP cluster on the QP agent node, or by shutting down the node completely. The following is a sample output from the `/tmp/hacmp.out` file from the QP server system and the QP agent node after the fallover:



```
-----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 140
08-01-2001 13:50:56   140   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
-----------------------------------------------------------------------------
```

Figure 15. bf01n014 /tmp/hamcp.out sample at fallover of QP agent.



```
-----------------------------------------------------------------------------
Doing failover of DB2 Query Patroller nodes ...
-----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 restart bf01n014 none
DB29816I  Completed successfully.
-----------------------------------------------------------------------------
su - iwm -c dqpstart
-----------------------------------------------------------------------------
08-01-2001 13:56:50   130   DB210037I DQPSTART processing was successful.
08-01-2001 13:57:01   150   DB210037I DQPSTART processing was successful.
08-01-2001 13:57:07   160   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
```

Figure 16. bf01n013 /tmp/hacmp.out sample of QP agent fallover.

4. Check that the QP agent and the DB2 partition(s) restarted on the hot standby node. The `db2nodes.cfg` and the `dqpnodes.cfg` files should now have the following entries:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n013 2 b_sw_013
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
150 bf01n015 agent
160 bf01n016 agent
140 bf01n014 none
```

5. Submit a few jobs to QP and ensure they are processed normally.
6. Test the fallback of the QP agent to the original node by starting the HACMP cluster code again on the previous QP agent node or booting the node if you chose to shut it down in step 3. The following is a sample from

the /tmp/hacmp.out files from the two nodes during and after the fallback of the QP agent to the original node:

```
-------------------------------------------------------------------------------
WARNING: Node 140 with hostname bf01n014 and node type agent cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
140 bf01n014 none
130 bf01n013 server
-------------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-------------------------------------------------------------------------------
su - iwm -c dqpstop
-------------------------------------------------------------------------------
08-01-2001 14:42:49   150   DB210038I DQPSTOP processing was successful.
08-01-2001 14:42:50   160   DB210038I DQPSTOP processing was successful.
08-01-2001 14:43:03   130   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
```

Figure 17. bf01n013 /tmp/hacmp.out sample of QP agent fallback.

```
-------------------------------------------------------------------------------
WARNING: Node 140 with hostname bf01n014 and node type agent cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
140 bf01n014 none
130 bf01n013 server
-------------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Doing failback for the DB2 Query Patroller nodes ...
su - iwm -c dqpstart
-------------------------------------------------------------------------------
08-01-2001 14:48:20   130   DB210037I DQPSTART processing was successful.
08-01-2001 14:48:26   150   DB210037I DQPSTART processing was successful.
08-01-2001 14:48:28   160   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 140 restart bf01n014 agent
08-01-2001 14:48:36   140   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
```

Figure 18. bf01n014 /tmp/hacmp.out sample of QP agent fallback.

7. Ensure the QP agent and the DB2 partition(s) start up on their original node. The db2nodes.cfg and the dqpnodes.cfg files should now have the same entries as they did in step 1:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016


dqpnodes.cfg

130 bf01n013 server
```

```
140 bf01n014 agent
150 bf01n015 agent
160 bf01n016 agent
```

8. Submit a few jobs to QP and ensure they are processed normally.

5.3.4 Phase 2A: Agent to agent test scenario

In this scenario a failure of a QP agent node causes the QP agent node to fallover to the partner QP agent node. To run this test scenario follow these steps:

1. Ensure your DB2 clusters are operating normally. Following are samples of what the `db2nodes.cfg` and `dqpnodes.cfg` files contain before the fallover:

   ```
   db2nodes.cfg

   130 bf01n013 0 b_sw_013
   131 bf01n013 1 b_sw_013
   140 bf01n014 0 b_sw_014
   150 bf01n015 0 b_sw_015
   160 bf01n016 0 b_sw_016
   161 bf01n016 1 b_sw_016

   dqpnodes.cfg

   130 bf01n013 server
   140 bf01n014 agent
   150 bf01n015 agent
   160 bf01n016 agent
   ```

2. Append a comment to the `/tmp/hacmp.out` file to mark the start of the test.

3. Stop the QP agent node, either by stopping the HACMP cluster on the QP agent node, or by shutting down the node completely. In our sample we stop the QP agent node on bf01n015. The following is a sample output from the `/tmp/hacmp.out` file from the QP agent nodes after the fallover:

```
-------------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 150
08-01-2001 15:24:15   150   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
-------------------------------------------------------------------------------
```

Figure 19. bf01n015 /tmp/hamcp.out sample at fallover of QP agent.

```
-------------------------------------------------------------------------------
Doing failover of DB2 Query Patroller nodes ...
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 150 restart bf01n015 none
DB29816I  Completed successfully.
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 160
08-01-2001 15:28:45   160   DB210116E The DB2 Query Patroller was already started on this
node.
DB210075E DQPSTART processing has completed.  "0" node(s) were started successfully, "1"
node(s) were already started, "0" node(s) have failed.
-------------------------------------------------------------------------------
```

Figure 20. bf01n016 /tmp/hacmp.out sample at fallover of QP agent.

4. Check that the QP agent and the DB2 partition(s) restarted on the partner node. The `db2nodes.cfg` and the `dqpnodes.cfg` files should now have the following entries:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n016 2 b_sw_016
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
140 bf01n014 agent
150 bf01n015 none
160 bf01n016 agent
```

5. Submit a few jobs to QP and ensure they are processed normally.
6. Test the fallback of the QP agent to the original node by starting the HACMP cluster code again on the previous QP agent node or booting the node if you chose to shut it down in step 3. The following is a sample from the `/tmp/hacmp.out` files from the two nodes during and after the fallback of the QP agent to the original node:

```
----------------------------------------------------------------------------
WARNING: Node 150 with hostname bf01n015 and node type agent cannot be found in
dqpnodes.cfg file.
----------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
150 bf01n015 none
160 bf01n016 agent
----------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
----------------------------------------------------------------------------
----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 160
08-01-2001 15:35:45   160   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
----------------------------------------------------------------------------
```

Figure 21. bf01n016 /tmp/hacmp.out sample of QP agent fallback.

```
-------------------------------------------------------------------------------
WARNING: Node 150 with hostname bf01n015 and node type agent cannot be found in
dqpnodes.cfg file.
-------------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
150 bf01n015 none
160 bf01n016 agent
-------------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Doing failback for the DB2 Query Patroller nodes ...
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 150 restart bf01n015 agent
08-01-2001 15:40:53   150   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 160
08-01-2001 15:41:02   160   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-------------------------------------------------------------------------------
```

Figure 22. bf01n015 /tmp/hacmp.out sample of QP agent fallback.

7. Ensure the QP agent and the DB2 partition(s) start up on their original node. The `db2nodes.cfg` and the `dqpnodes.cfg` files should now have the same entries as they did in step 1:

   ```
   db2nodes.cfg

   130 bf01n013 0 b_sw_013
   131 bf01n013 1 b_sw_013
   140 bf01n014 0 b_sw_014
   150 bf01n015 0 b_sw_015
   160 bf01n016 0 b_sw_016
   161 bf01n016 1 b_sw_016


   dqpnodes.cfg

   130 bf01n013 server
   140 bf01n014 agent
   150 bf01n015 agent
   160 bf01n016 agent
   ```

8. Submit a few jobs to QP and ensure they are processed normally.

5.3.5 Phase 2C: Agent to none test scenario

In this scenario the HACMP configuration is defined with a hot standby node. With a failure of the QP agent node the fallover is to the hot standby system.

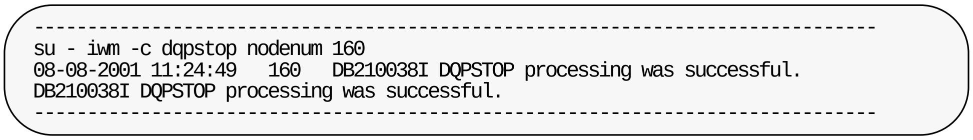
1. Ensure your DB2 clusters are operating normally and has been configured to look like a hot standby HACMP configuration then start QP. To do this set up the `db2nodes.cfg` and the `dqpnodes.cfg` files to resemble the following:

   ```
   db2nodes.cfg

   130 bf01n013 0 b_sw_013
   131 bf01n013 1 b_sw_013
   140 bf01n014 0 b_sw_014
   ```

```
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
140 bf01n014 none
150 bf01n015 none
160 bf01n016 agent
```

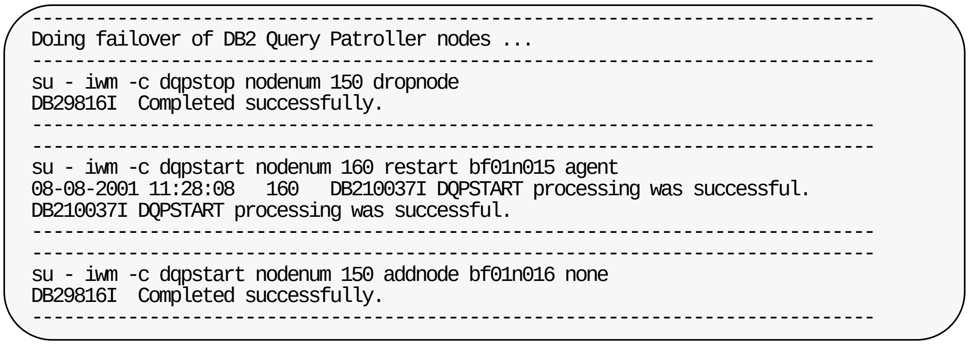
With the dqpnodes.cfg configured with bf01n014 and bf01n015 as none, QP agents will not be started on these nodes. This will approximate a hot standby configuration as far as QP is concerned.

2. Append a comment to the /tmp/hacmp.out file to mark the start of the test.
3. Stop the QP agent node, either by stopping the HACMP cluster on the QP agent node, or by shutting down the node completely. The following is a sample output from the /tmp/hacmp.out file from the QP agent node and the hot standby node after the fallover:



```
----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 160
08-08-2001 11:24:49   160   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
----------------------------------------------------------------------------
```

Figure 23. bf01n016 /tmp/hacmp.out sample of QP agent fallover.



```
----------------------------------------------------------------------------
Doing failover of DB2 Query Patroller nodes ...
----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 150 dropnode
DB29816I  Completed successfully.
----------------------------------------------------------------------------
----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 160 restart bf01n015 agent
08-08-2001 11:28:08   160   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
----------------------------------------------------------------------------
----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 150 addnode bf01n016 none
DB29816I  Completed successfully.
----------------------------------------------------------------------------
```

Figure 24. bf01n015 /tmp/hacmp.out sample of QP agent fallover.

4. Check that the QP server and the DB2 partition(s) restarted on the hot standby node. The db2nodes.cfg and the dqpnodes.cfg files should now have the following entries:

```
db2nodes.cfg

130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n015 2 b_sw_015
161 bf01n015 1 b_sw_015

dqpnodes.cfg

130 bf01n013 server
160 bf01n015 agent
140 bf01n014 none
150 bf01n016 none
```

5. Submit a few jobs to QP and ensure they are processed normally.
6. Test the fallback of the QP agent to the original node by starting the HACMP cluster code again on the previous QP agent node or booting the node if you chose to shut it down in step 3. The following is a sample from the `/tmp/hacmp.out` files from the two nodes during and after the fallback of the QP agent to the original node:

```
-----------------------------------------------------------------------------
WARNING: Node 160 with hostname bf01n016 and node type agent cannot be found in
dqpnodes.cfg file.
-----------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
160 bf01n015 agent
150 bf01n016 none
-----------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 160
08-08-2001 13:03:35   160   DB210038I DQPSTOP processing was successful.
DB210038I DQPSTOP processing was successful.
-----------------------------------------------------------------------------
```

Figure 25. bf01n015 /tmp/hacmp.out sample of QP agent fallback.

```
-----------------------------------------------------------------------------
WARNING: Node 160 with hostname bf01n016 and node type agent cannot be found in
dqpnodes.cfg file.
-----------------------------------------------------------------------------
The nodes that you input might not be in the default state.  According to the
default nodes information which you input, the nodes would be in the
following state if failover was done:
160 bf01n015 agent
150 bf01n016 none
-----------------------------------------------------------------------------
Checking the dqpnodes.cfg file to find matching entries ...
Matching entries found for both nodes .
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
Doing failback for the DB2 Query Patroller nodes ...
-----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 160
08-08-2001 13:07:29   160   DB210117E The DB2 Query Patroller was already stopped on
this node.

DB210076E DQPSTOP processing has completed.  "0" node(s) were stopped successfully,
"1" node(s) were already stopped, "0" node(s) have failed.
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
su - iwm -c dqpstop nodenum 150 dropnode
DB29816I  Completed successfully.
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 160 restart bf01n016 agent
08-08-2001 13:07:32   160   DB210037I DQPSTART processing was successful.
DB210037I DQPSTART processing was successful.
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
su - iwm -c dqpstart nodenum 150 addnode bf01n015 none
DB29816I  Completed successfully.
-----------------------------------------------------------------------------
```

Figure 26. bf01n016 /tmp/hacmp.out sample of QP agent fallback.

7. Ensure the QP agent and the DB2 partition(s) start up on their original node. The `db2nodes.cfg` and the `dqpnodes.cfg` files should now have the same entries as they did in step 1:

   `db2nodes.cfg`

```
130 bf01n013 0 b_sw_013
131 bf01n013 1 b_sw_013
140 bf01n014 0 b_sw_014
150 bf01n015 0 b_sw_015
160 bf01n016 0 b_sw_016
161 bf01n016 1 b_sw_016

dqpnodes.cfg

130 bf01n013 server
160 bf01n016 agent
140 bf01n014 none
150 bf01n015 none
```

8. Submit a few jobs to QP and ensure they are processed normally.

Chapter 6. Additional information

Availant (Formally known as CLAM Associates of Cambridge, Massachusetts):

```
http://www.availant.com/services/cluster.html
http://www.clam.com/services/cluster.html
```

IBM:

- IBM Websites:

  ```
  http://www.ibm.com/
  http://www.rs6000.ibm.com/software/Apps/hacmp/
  http://www.ibm.com/software/data/db2/udb/
  ```

- IBM Redbooks:

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

  Managing VLDB Using DB2 UDB EEE SG24-5105

  IBM Certification Study Guide AIX HACMP SG24-5131

- DB2 documentation from the install image or the Web:

  ```
  http://www.ibm.com/cgi-bin/db2www/data/db2/udb/winos2unix/support/v7pubs
  .d2w/en_main
  ```

  DB2 UDB Administration Guide: Implementation SC09-2944

  DB2 UDB Enterprise Extended - Edition for UNIX Quick Beginnings GC09-2964

  DB2 UDB and DB2 Connect Installation and Configuration Supplement GC09-2957

  DB2 Universal Database V7.1 for UNIX, Linux, Windows and OS/2 Database Certification Guide ISBN 0-13-091366-9

  IBM DB2 Query Patroller Installation Guide GC09-2959

  iBM DB2 Query Patroller Administration Guide GC09-2958

  iBM DB2 Query Patroller User's Guide GC09-2960

- AIX documentation:

  ```
  http://www.ibm.com/servers/aix/library/
  ```

- HACMP Documentation:

  HACMP Concepts and Facilities SC23-4276

  HACMP Planning Guide SC23-4277

  HACMP Installation Guide SC23-4278

  HACMP Administration Guide SC23-4279

  HACMP Troubleshooting Guide SC23-4280

  HACMP Enhanced Scalability Installation and Admin Guide SC23-4284

- Technical Reports:

  ```
  http://www.ibm.com/software/data/pubs/papers
  ```

  IBM DB2 Universal Database Enterprise Edition and HACMP/ES TR-74.171

IBM DB2 Universal Database Enterprise Extended - Edition for AIX and HACMP/ES TR-74.174

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