Symantec™ ApplicationHA Agent for DB2 Configuration Guide

Linux

5.1 Service Pack 2

September 2011

Symantec

Symantec™ ApplicationHA Agent for DB2 Configuration Guide

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Agent version: 5.1.101.000

Document version: 5.1.101.000.0

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Contents

Technical Support 4

Chapter 1 Introducing the Symantec ApplicationHA agent for DB2 9

About the Symantec ApplicationHA agent for DB2 9
About installing and removing the ApplicationHA agent for DB2 10
Supported software for ApplicationHA agent for DB2 10
How the agent makes DB2 highly available 10
DB2 agent functions 11
Monitor options for the DB2 agent 12
How the agent handles DB2 error codes during detail monitoring 13
About setting up DB2 in a ApplicationHA virtual machine 14

Chapter 2 Installing and configuring DB2 15

Before you install DB2 in an ApplicationHA environment 15
Installing DB2 in an ApplicationHA environment 15

Chapter 3 Configuring application monitoring with Symantec ApplicationHA 17

About configuring application monitoring with ApplicationHA 17
Before configuring application monitoring for DB2 18
Configuring application monitoring for DB2 18

Chapter 4 Troubleshooting Symantec ApplicationHA agent for DB2 23

About troubleshooting ApplicationHA agent for DB2 23
Error messages specific to the DB2 agent 24

Appendix A Resource type definitions 25

About the resource type and attribute definitions 25
Resource type definition for the DB2 agent 25
Attribute definition for the DB2 agent 26

Appendix B Detail monitoring 31

Setting the PATH variable 31
Setting up detail monitoring of a DB2 instance 31
Enabling detail monitoring from the command line 32
Disabling detail monitoring from the command line 33

Chapter 1

Introducing the Symantec ApplicationHA agent for DB2

This chapter includes the following topics:

- About the Symantec ApplicationHA agent for DB2
- About installing and removing the ApplicationHA agent for DB2
- Supported software for ApplicationHA agent for DB2
- How the agent makes DB2 highly available
- DB2 agent functions
- About setting up DB2 in a ApplicationHA virtual machine

About the Symantec ApplicationHA agent for DB2

The Symantec ApplicationHA agents monitor specific components within an enterprise application. They determine the status of the application instances and start or stop them according to external events.

The Symantec ApplicationHA agent for DB2 provides high availability, controlling, and monitoring for DB2 instances.

Symantec agents do the following:

- Monitor specific resources within an enterprise application.
- Determine the status of these resources.
- Start or stop the resources according to external events.

The agents include resource type definitions and agent executables. The agent for DB2 monitors the DB2 server processes, brings them online, and takes them offline.

About installing and removing the ApplicationHA agent for DB2

When you run the installer or uninstall program that accompanies the quarterly agent pack release of high availability agents from Symantec, the latest version of the ApplicationHA agent for DB2 is automatically installed or removed. For more information, see the *Symantec ApplicationHA Agent Pack Installation Guide*.

Supported software for ApplicationHA agent for DB2

The Symantec ApplicationHA agent for DB2 supports the following software versions:

Symantec ApplicationHA	■ 5.1 Service Pack 2
VMware ESX and VMware ESXi	■ 4.1 ■ 4.1 U1
Operating Systems	■ Red Hat Enterprise Linux (RHEL) 5 with Update 3 (2.6.18-128.el5 kernel) or later; architecture: x86_64 ■ SUSE Linux Enterprise Server (SLES) 11 Service Pack 1 (2.6.32.12-0.7 kernel) or later; architecture: x86_64 ■ Oracle Enterprise Linux (OEL) 5 with Update 3 (2.6.18-128.0.0.0.1.el5) or later; architecture: x86_64
DB2	■ 9.5 and 9.7

How the agent makes DB2 highly available

The Symantec ApplicationHA agent for DB2 continuously monitors the DB2 database processes to verify they function properly.

See "DB2 agent functions" on page 11.

The agent provides the following levels of application monitoring:

- Primary or Basic monitoring

Basic monitoring include Process check monitoring. With the Process check, the agent verifies that the DB2 process is present in the process table. Process check cannot detect whether process is in a hung state or a stopped state. When a DB2 process terminates abnormally, the agent faults the DB2 resource of the corresponding DB2 instance. The agent reports DB2 resource as offline if you gracefully bring down DB2 resource using the following command:

```
# hares -offline DB2_Resource_Name -sys System_Name
```

Note: ApplicationHA commands reside in the /opt/VRTS/bin directory. Add this directory to your PATH environment variable before running the ApplicationHA commands. See "Setting the PATH variable" on page 31.

- Secondary or Detail monitoring
  In detail monitoring, the agent runs a perl script that executes commands against the database to verify its status in detail. Secondary or Detailed monitoring is disabled, by default. You can enable the same using the following command:

  ```
  # hares -modify DB2_Resource_Name IndepthMonitor 1
  ```

The agent detects application failure if the monitoring routine reports an improper function of the DB2 processes. When this application failure occurs, the agent attempts to restart the DB2 processes. After a configurable number of attempts, if the application services do not start, the agents consider this as an application failure and report the status to the VMware HA solution. Depending on the configuration, the VMware HA solution can then restart the virtual machine. After the machine restarts, the agent starts the application services and brings the configured resources online. The agent thus ensures high availability for the DB2 services.

Note: You can use the ApplicationHA wizards to configure only primary or basic monitoring. To configure secondary or detailed monitoring, use CLI/Veritas Operations Manager (VOM).

DB2 agent functions

The agent consists of resource type definitions and agent executables. The agent executables are organized into online, offline, monitor, and clean functions.

Table 1-1 lists the DB2 agent functions.

Table 1-1 DB2 agent functions

Agent operation	Description
Online	Starts the DB2 database process by using the following command: `db2start`
Offline	Stops the DB2 database process with the specified options by using the following command: `db2stop`
Monitor	Verifies the status of the DB2 database server processes. The DB2 agent provides two levels of monitoring: basic and detail. See "Monitor options for the DB2 agent" on page 12.
Clean	Forcibly stops the DB2 database by using the following command: `db2stop force` If the process does not respond to the `db2stop force` command, then the agent does the following: ■ Scans the process table for the processes that are associated with the configured instance ■ Kills the processes that are associated with the configured instance ■ Cleans the IPC resources that the db2instance creates using the ipcclean utility provided by DB2

Monitor options for the DB2 agent

The DB2 agent provides two levels of monitoring: basic and detail. By default, the agent does a basic monitoring.

Table 1-2 describes the monitoring options.

Table 1-2 Monitoring options

Option	Description
0 (Default)	Basic monitoring (Process check) The agent scans the process table for the db2sysc process to verify that DB2 is running.

Table 1-2 Monitoring options *(continued)*

Option	Description
1	Detail monitoring Detail monitoring provides a higher level of confidence in the availability of the instance or partition and its database. It sends additional queries to the database, to verify whether the database is available. For information about the IndepthMonitor attribute, you can refer to the following section: See "Attribute definition for the DB2 agent" on page 26.

Note: ApplicationHA wizards configure DB2 for Basic monitoring. To enable detailed monitoring, use CLI/Veritas Operation Manager (VOM).

How the agent handles DB2 error codes during detail monitoring

The Symantec ApplicationHA agent for DB2 comes with enhanced ability to handle DB2 errors during detail monitoring. The agent classifies DB2 errors according to their severity and associates predefined actions with each error code. You can create a custom error handling file, db2error.dat. The file lists the DB2 errors and the associated actions that the agent should take when it encounters an error.

The file stores information in the following format:

```
SQL_error_string:action_to_be_taken
```

For example:

```
SQL1034N: IGNORE
SQL1039N: WARN
```

Table 1-3 lists the predefined actions that the agent takes when a DB2 error is encountered.

Table 1-3 Predefined agent actions for DB2 errors

Action	Description
IGNORE	Ignores the error.

Table 1-3 Predefined agent actions for DB2 errors *(continued)*

Action	Description
UNKNOWN	Marks the resource state as UNKNOWN and sends a notification if the Notifier resource is configured. For more information about VCS notification, refer to the *Veritas Cluster Server Administrator's Guide*. This action is typically associated with configuration errors.
WARN	Marks the resource state as ONLINE and sends a notification if the Notifier resource is configured. This action is typically associated with low-severity errors.

About setting up DB2 in a ApplicationHA virtual machine

Tasks involved in setting up DB2 in an ApplicationHA environment include:

- Setting up an ApplicationHA virtual machine
  Refer to *Symantec ApplicationHA Installation Guide* for more information on installing and configuring ApplicationHA.
- Installing DB2 in an ApplicationHA environment
  See "Installing DB2 in an ApplicationHA environment" on page 15.
- Configuring application monitoring with ApplicationHA
  See "Configuring application monitoring for DB2" on page 18.

Chapter 2

Installing and configuring DB2

This chapter includes the following topics:

- Before you install DB2 in an ApplicationHA environment
- Installing DB2 in an ApplicationHA environment

Before you install DB2 in an ApplicationHA environment

Make sure you meet the following prerequisites:

- Verify that all virtual machines have adequate resources to run DB2 and ApplicationHA.
- Verify that the network supports the TCP/IP protocol.
- Make sure that you meet the ApplicationHA requirements to install DB2.

Installing DB2 in an ApplicationHA environment

This section demonstrates how to install DB2 in an ApplicationHA environment.

To install DB2 in ApplicationHA environment

1. Set shared memory parameters. Refer to the relevant IBM DB2 UDB guide to make sure that memory requirements are met.
2. Install the binaries. Install the DB2 UDB system binaries on local disks. You can use IBM's db2setup tool.

   Note: For installing DB2, Symantec recommends that you follow the installation procedure in the relevant IBM DB2 UDB guide

3. Install the database instances on the local disks. You can use IBM's db2setup tool.

Chapter 3

Configuring application monitoring with Symantec ApplicationHA

This chapter includes the following topics:

- About configuring application monitoring with ApplicationHA
- Before configuring application monitoring for DB2
- Configuring application monitoring for DB2

About configuring application monitoring with ApplicationHA

This chapter describes the steps to configure application monitoring with ApplicationHA in a virtualization environment.

Consider the following points before you proceed:

- You configure an application for monitoring on a virtual machine using the Application Monitoring Configuration Wizard.
- The Application Monitoring Configuration Wizard is launched when you click **Configure Application Monitoring** on the ApplicationHA tab of the VMware vSphere Client.
- In this release, the wizard allows you to configure monitoring for only one application per virtual machine.
  To configure another application using the wizard, you must first unconfigure the existing application monitoring.

- After you have configured monitoring for an application using the wizard, you can configure monitoring for other applications residing in the same virtual machine, using Veritas Cluster Server (VCS) commands.
  For more information read the following technote:
  http://www.symantec.com/docs/TECH159846
- After configuring DB2 for monitoring, if you create another DB2 instance, this new instance is not monitored as part of the existing configuration.
  In such a case, you must first unconfigure the existing configuration and then reconfigure the application using the wizard. You can then select all the instances for monitoring.

Before configuring application monitoring for DB2

Ensure that you complete the following tasks before configuring application monitoring for DB2 on a virtual machine:

- Install ApplicationHA Console.
- Install ApplicationHA guest components on the virtual machine that you need to monitor.
- Install VMware Tools on the virtual machine. Install a version that is compatible with VMware ESX server.
- If you do not have the latest version of ApplicationHA agent for DB2 installed, then run the agent pack installer on the virtual machine that you need to monitor.
- Install the VMware vSphere Client.
- Assign ApplicationHA - Configure Application Monitoring (Admin) privileges to the logged-on user on the virtual machine where you want to configure application monitoring.
- Install the application and the associated components that you wish to monitor on the virtual machine.
- If you have configured a firewall, ensure that your firewall settings allow access to ports used by ApplicationHA installer, wizards, and services.
  Refer to the *Symantec ApplicationHA Installation and Upgrade Guide* for a list of ports and services used.

Configuring application monitoring for DB2

Perform the following steps to configure monitoring for DB2 on a virtual machine.

To configure application monitoring for DB2

1. Launch the VMware vSphere Client and connect to the VMware vCenter Server that hosts the virtual machine.

   The vSphere Client is used to configure and control application monitoring.

2. From the vSphere Client's Inventory view in the left pane, select the virtual machine where you want to configure application monitoring for DB2.

3. From the vSphere Client's Management view in the right pane, click the **ApplicationHA** tab.

   The ApplicationHA view displays the status of all the supported applications that are installed on the selected virtual machine.

4. In the ApplicationHA view, click **Configure Application Monitoring**.

   This launches the Application Monitoring Configuration Wizard.

5. Review the information on the Welcome screen and then click **Next**.

   The wizard lists all the supported applications for the system.

6. On the Application Selection page, click **DB2 Database Server** in the Supported Applications list.

7. On the DB2 instance Selection panel, review the information on the listed DB2 instances.

DB2 Instance Home	Home directory of the created DB2 instance.
DB2 Instance Owner	Owner of the DB2 Database instance.
Partition Number	Partition number or node number of the db2sysc process.

8. On the DB2 Instance Selection screen, select the partition number of the DB2 instances that you want to monitor and then click **Configure**.

9. The wizard performs the application monitoring configuration tasks. The ApplicationHA Configuration screen displays the status of each task.

   After all the tasks are complete, click **Next**.

Note: If the configuration tasks fail, click **View Logs** to check the details of the failure.

You then have to run the wizard again to configure the application monitoring.

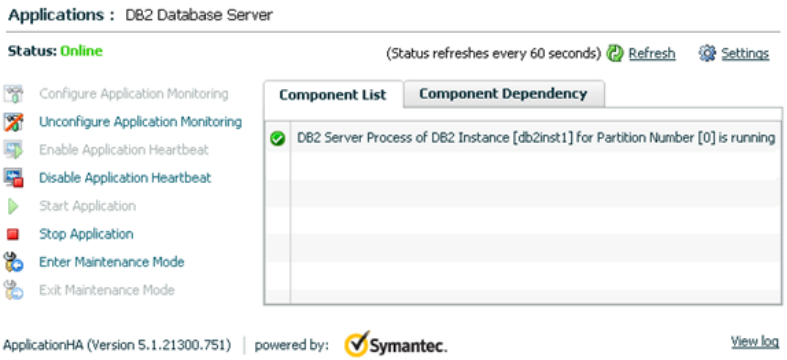
---

10 Click **Finish** to complete the wizard.

This completes the application monitoring configuration.

11 To view the status of the configured application on a virtual machine, in the inventory view of the vSphere Client, click the appropriate virtual machine, and then click the **ApplicationHA** tab.

The ApplicationHA view appears.

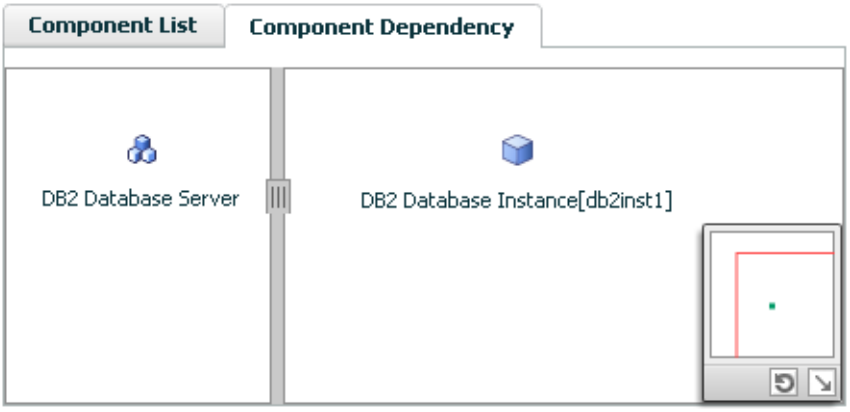


By default, the Component List tab appears. The tab lists each component of the configured application and the status description of each component.

For more information on viewing and administering applications by using the vSphere Client, see the *Symantec ApplicationHA User's Guide*.

12 To view component dependency for the monitored application, click the **Component Dependency** tab.

The component dependency graph appears.



The graph illustrates the dependencies between a selected component group (an application or a group of inter-related components) and its components for the configured application. The left pane displays component groups and/or configured applications. The right pane displays components of the selected component group or application.

For more information on viewing component dependency for any configured application, see the *Symantec ApplicationHA User's Guide*.

Chapter 4

Troubleshooting Symantec ApplicationHA agent for DB2

This chapter includes the following topics:

- About troubleshooting ApplicationHA agent for DB2
- Error messages specific to the DB2 agent

About troubleshooting ApplicationHA agent for DB2

Review the information on the error logs that you must access:

- To check the ApplicationHA log file, you must access:

  `/var/VRTSvcs/log/AppControlOperations_A.log`

  `/var/VRTSvcs/log/engine_A.log`

- To check the ApplicationHA DB2 agent log file, you must access:

  `/var/VRTSvcs/log/Db2udb_A.log`

These files contain all the actions that the ApplicationHA engine and the agent for DB2 perform.

Error messages specific to the DB2 agent

Table 4-1 lists the error messages for the ApplicationHA agent for DB2 with the description and a recommended solution, if available.

Table 4-1 DB2 agent error messages

Message	Description and solution
Custom monitor script monitor_custom_db2inst1_0 does not exist. Sample custom monitor script can be found in /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb directory.	The custom monitor script cannot be found in the agent installation directory /opt/VRTSagents/ha/bin. Solution: Copy the custom monitor script "monitor_custom_db2inst1_0" from /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb into the agent directory /opt/VRTSagents/ha/bin/Db2udb.
Custom online script online_custom_db2inst1_0 does not exist. Sample custom online script can be found in /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb directory.	The custom online script cannot be found in the agent installation directory /opt/VRTSagents/ha/bin. Solution: Copy the custom online script "online_custom_db2inst1_0" from /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb into the agent directory /opt/VRTSagents/ha/bin/Db2udb.
Custom offline script offline_custom_db2inst1_0 does not exist. Sample custom offline script can be found in /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb directory.	The custom offline script cannot be found in the agent installation directory /opt/VRTSagents/ha/bin. Solution: Copy the custom offline script "offline_custom_db2inst1_0" from /etc/VRTSagents/ha/conf/Db2udb/sample_db2udb into the agent directory /opt/VRTSagents/ha/bin/Db2udb.

Appendix A

Resource type definitions

This appendix includes the following topics:

- About the resource type and attribute definitions
- Resource type definition for the DB2 agent
- Attribute definition for the DB2 agent

About the resource type and attribute definitions

The resource type represents the configuration definition of the agent and specifies how the agent is defined in the configuration file. The attribute definitions describe the attributes associated with the agent. The required attributes describe the attributes that must be configured for the agent to function.

Resource type definition for the DB2 agent

The ApplicationHA agent for DB2 is represented by the DB2 resource type in ApplicationHA.

```
type Db2udb (
        static str AgentDirectory = "/opt/VRTSagents/ha/bin/Db2udb"
        static str AgentFile = "/opt/VRTSagents/ha/bin/Db2udb/Db2udbAgent"
        static keylist SupportedActions = {
        VRTS_GetInstanceName,
        VRTS_GetRunningServices }
        static int CleanTimeout = 240
        static int MonitorTimeout = 240
        static int OfflineTimeout = 240
        static int OnlineRetryLimit = 2
        static int OnlineTimeout = 180
```

```
        static int OnlineWaitLimit = 1
        static int RestartLimit = 3
        static int ToleranceLimit = 1
        static str ArgList[] = {
        DB2InstOwner, DB2InstHome, IndepthMonitor,
        DatabaseName, NodeNumber, StartUpOpt, ShutDownOpt,
        AgentDebug, Encoding, WarnOnlyIfDBQueryFailed,
        LastWarningDay, UseDB2start }
        static int IMF{} = { Mode=3, MonitorFreq=5, RegisterRetryLimit=3 }
        static str IMFRegList[] = { DB2InstOwner, DB2InstHome }
        str DB2InstOwner
        str DB2InstHome
        int IndepthMonitor
        str DatabaseName
        int NodeNumber
        str StartUpOpt = START
        str ShutDownOpt = STOP
        boolean AgentDebug = 0
        str Encoding
        boolean WarnOnlyIfDBQueryFailed = 1
        temp str LastWarningDay
        boolean UseDB2start = 0
)
```

Attribute definition for the DB2 agent

Review the description of the DB2 agent attributes. The agent attributes are classified as required, optional, and internal.

Table A-1 shows the required attributes for the agent for DB2, you must assign values to required attributes.

Table A-1 Required attributes for the agent for DB2

Required attributes	Description
DB2InstHome	Path to DB2 UDB instance home directory that contains critical data and configuration files for the DB2 instance. Type and dimension: string-scalar

Table A-1 Required attributes for the agent for DB2 *(continued)*

Required attributes	Description
DB2InstOwner	User ID of Instance Owner that starts a DB2 UDB instance. Each instance requires a unique user ID. Type and dimension: string-scalar **Caution:** Incorrect changes to this attribute can result in DB2 entering an inconsistent state.

Table A-2 shows the optional attributes for the agent for DB2.

Table A-2 Optional attributes for the agent for DB2

Optional attributes	Description
DatabaseName	Name of the database for detail monitoring; required if detail monitoring is enabled (IndepthMonitor = 1). Be careful when you change the DatabaseName attribute as you can fault all the partitions in the database. Do not change the DataBaseName attribute to an invalid or an incorrect value. **Note:** Make sure the database with the provided DatabaseName has been created in the same partition for which the Db2udb agent resource has been configured. Type and dimension: string-scalar
NodeNumber	Node number or partition number of the database. Used when monitoring a specific database partition. Default: 0 Type and dimension: integer-scalar

Table A-2 Optional attributes for the agent for DB2 *(continued)*

Optional attributes	Description
StartUpOpt	Provides start up options. The allowed values are: START, ACTIVATEDB, or CUSTOM. Review the following options: ■ START (default) Starts the DB2 instance or partition. ■ ACTIVATEDB Performs activate database command after db2 processes start. ■ CUSTOM The agent leaves all the online function completely to the user when the StartUpOpt attribute is set to CUSTOM. It looks for a file named start_custom_$db2instance_$nodenum in the /opt/VRTSagents/ha/bin/Db2udb directory. If this file exists and is executable, it executes this customized online file instead. Example: To customize the online function for partition/nodenum 1 for the db2 instance named db2inst1, the agent for DB2 runs this customized file start_custom_db2inst1_1. It runs this file under the /opt/VRTSagents/ha/bin/Db2udb directory. Type and dimension: string-scalar

Table A-2 Optional attributes for the agent for DB2 *(continued)*

Optional attributes	Description
ShutDownOpt	The allowed values for this attribute are STOP and CUSTOM. Review the following options: ■ STOP Shuts the DB2 instance or partition down in the usual way. ■ CUSTOM Leaves all the offline function completely to the user when the ShutDownOpt is set to CUSTOM. It looks for a file named stop_custom_$db2instance_$nodenum in the /opt/VRTSagents/ha/bin/Db2udb directory. If this file exists and is executable, it executes this customized offline file instead. Example: You want to customize the offline function for partition/nodenum 0 for the db2 instance named db2inst1. You have the agent for DB2 run this customized file: stop_custom_db2inst1_0. The file is in the /opt/VRTSagents/ha/bin/Db2udb directory. Type and dimension: string-scalar
IndepthMonitor	Set the value of the IndepthMonitor attribute to 1 to enable in-depth monitoring. The agent now looks for the monitor_custom_$db2instance_$nodenum file in the /opt/VRTSagents/ha/bin/Db2udb directory. It executes the customized in-depth monitor file if the file exists and is executable. You can find samples of custom monitor scripts in the sample_db2udb directory. Type and dimension: string-integer
Encoding	Specifies the operating system encoding corresponding to DB2 UDB encoding for display of DB2 UDB output. Type and dimension: string-scalar
AgentDebug	When the value of this attribute is 1, it causes the agent to log additional debug messages. Type and dimension: boolean-scalar

Table A-2 Optional attributes for the agent for DB2 *(continued)*

Optional attributes	Description
WarnOnlyIfDBQueryFailed	This attribute either logs SQL errors, or checks the errors to handle them specially. Set the value of the WarnOnlyIfDBQueryFailed attribute to 1 to enable it. When this attribute is enabled, it ignores all SQL errors and logs a warning message in the agent log once a day. Set the value of the WarnOnlyIfDBQueryFailed attribute to 0 to disable it. When disabled, it checks if an error code needs to be handled specially in the db2error.dat file. If the error code does not exist in the db2error.dat file, then it returns OFFLINE for monitor. Otherwise, it follows the action of that particular error code in the db2error.dat file. Type and dimension: boolean-scalar
UseDB2start	Enables you to choose an alternate way to start DB manager. The agent executes the db2start when UseDBStart is set to 1, whereas it uses db2gcf when UseDBStart is set to 0. Type and dimension: boolean-scalar Default: 0

Appendix B

Detail monitoring

This appendix includes the following topics:

- Setting the PATH variable
- Setting up detail monitoring of a DB2 instance

Setting the PATH variable

ApplicationHA commands reside in the `/opt/VRTS/bin` directory. Add this directory to your PATH environment variable.

To set the PATH variable

- Perform one of the following steps:

  For the Bourne Shell (sh or ksh), type:

  ```
  $ PATH=/opt/VRTS/bin:$PATH; export PATH
  ```

  For the C Shell (csh or tcsh), type:

  ```
  $ setenv PATH :/opt/VRTS/bin:$PATH
  ```

Setting up detail monitoring of a DB2 instance

Shallow monitoring of a DB2 instance involves checking the exit status of the `db2gcf` command. In contrast, detail monitoring provides a higher level of confidence in the availability of the instance or partition and its database. It makes additional queries to the database to verify whether the database is available.

Enabling detail monitoring from the command line

You can dynamically configure detail monitoring. Symantec recommends that you successfully run DB2 with the agent's default (shallow) monitoring before you start the detail monitoring.

You need to have custom monitoring scripts. Refer to the following table for information on the IndepthMonitor attribute:

See "Resource type definition for the DB2 agent" on page 25.

To start the detail monitoring for a given instance

1. Make the ApplicationHA configuration writable:

```
# haconf -makerw
```

2. Freeze the service group so ApplicationHA does not perform actions automatically based on an incomplete reconfiguration:

```
# hagrp -freeze db2udb_group
```

3. Enable detail monitoring using the command:

```
# hares -modify resource DatabaseName name
```

```
# hares -modify resource IndepthMonitor 1
```

4. Unfreeze the service group:

```
# hagrp -unfreeze db2udb_group
```

5. Make the ApplicationHA configuration read-only:

```
# haconf -dump -makero
```

For example:

```
# haconf -makerw
# hagrp -freeze db2udb_group
# hares -modify db2udb DatabaseName SAMPLE
# hares -modify db2udb IndepthMonitor 1
# hagrp -unfreeze db2udb_group
# haconf -dump -makero
```

Disabling detail monitoring from the command line

Review the instructions to disable detail monitoring.

To disable detail monitoring

- Set the IndepthMonitor attribute to 0.

```
# hares -modify Db2udb_res_1 IndepthMonitor 0
```