

IBM Tivoli Monitoring for Virtual Environments Agent for
NetApp Storage
Version 7.1

User's Guide



IBM Tivoli Monitoring for Virtual Environments Agent for
NetApp Storage
Version 7.1

User's Guide



Note

Before using this information and the product it supports, read the information in “Notices” on page 107.

This edition applies to version 7.1 of IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage (product number 5724-L92) and to all subsequent releases and modifications until otherwise indicated in new editions.

© **Copyright IBM Corporation 2010, 2011.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Tables v

Chapter 1. Overview of the agent 1

New in this release 2

Components of the IBM Tivoli Monitoring environment 2

Agent Management Services 3

User interface options 3

Chapter 2. Agent installation and configuration 5

Language pack installation 5

 Installing language packs on Windows systems. . 5

 Installing language packs on UNIX or Linux systems 6

 Silent installation of language packs for agents . 6

Agent-specific installation and configuration. . . . 8

 User ID 8

 Number of instances. 8

 NetApp Storage agent application support . . . 8

 Downloading and installing the NetApp

 Manageability SDK JAR file 9

 Configuration values 9

 Remote installation and configuration 10

Chapter 3. Workspaces reference 13

Predefined workspaces 13

Workspace descriptions 14

 NetApp Storage Navigator item 14

 Aggregates Navigator item 14

 Hosts Navigator item 15

 LUNs Navigator item 16

 Volumes Navigator item 17

Chapter 4. Attributes reference 19

Attribute groups for the monitoring agent 19

Attributes in each attribute group 20

 Aggregates attribute group 20

 Host Network Interfaces attribute group. . . . 27

 Hosts attribute group 32

 LUNs attribute group 38

 Performance Object Status attribute group . . 43

 Volumes attribute group 47

Disk capacity planning for historical data 59

Chapter 5. Situations reference 61

Predefined situations 61

Situation descriptions 62

 NetApp Storage Navigator item 62

 Aggregates Navigator item 62

 Hosts Navigator item 63

 LUNs Navigator item 64

 Volumes Navigator item 65

Chapter 6. Take Action commands reference. 67

Predefined Take Action commands 67

Chapter 7. Policies reference 69

Chapter 8. Troubleshooting 71

Trace logging 72

 Overview of log file management 72

 Principal trace log files 73

 Examples: Using trace logs 76

 RAS trace parameters 77

 Dynamic modification of trace settings 80

 Setting trace parameters for the Tivoli Enterprise

 Console server 83

Problems and workarounds 83

 Installation and configuration troubleshooting. . 83

 Remote deployment troubleshooting 86

 Agent troubleshooting. 87

 Workspace troubleshooting 89

 Situation troubleshooting 91

 Take Action commands troubleshooting 94

Support information 94

Appendix A. IBM Tivoli Enterprise Console event mapping 95

Appendix B. Documentation library 103

Prerequisite publications. 103

Related publications 104

Other sources of documentation 104

Accessibility. 105

Notices 107

Trademarks 109

Index 111

Tables

1. Capacity planning for historical data logged by the NetApp Storage agent.	59	6. Remote deployment problems and solutions	87
2. Information to gather before contacting IBM Software Support	71	7. Agent problems and solutions	87
3. Trace log files for troubleshooting agents	73	8. Workspace problems and solutions.	89
4. Problems and solutions for installation and configuration	84	9. Situation problems and solutions	91
5. General problems and solutions for uninstallation	85	10. Take Action commands problems and solutions	94

Chapter 1. Overview of the agent

The IBM® Tivoli® Monitoring for Virtual Environments Agent for NetApp Storage provides you with the capability to monitor NetApp and IBM N Series storage systems through NetApp DataFabric Manager (DFM). IBM Tivoli Monitoring is the base software for the NetApp Storage agent.

IBM Tivoli Monitoring overview

IBM Tivoli Monitoring provides a way to monitor the availability and performance of all the systems in your enterprise from one or several designated workstations. It also provides useful historical data that you can use to track trends and to troubleshoot system problems.

You can use IBM Tivoli Monitoring to achieve the following tasks:

- Monitor for alerts on the systems that you are managing by using predefined situations or custom situations.
- Establish your own performance thresholds.
- Trace the causes leading to an alert.
- Gather comprehensive data about system conditions.
- Use policies to take actions, schedule work, and automate manual tasks.

The Tivoli Enterprise Portal is the interface for IBM Tivoli Monitoring products. You can use the consolidated view of your environment as seen in the Tivoli Enterprise Portal to monitor and resolve performance issues throughout the enterprise.

See the IBM Tivoli Monitoring publications listed in “Prerequisite publications” on page 103 for complete information about IBM Tivoli Monitoring and the Tivoli Enterprise Portal.

Functions of the monitoring agent

Displays health and performance of NetApp and IBM N series storage systems

You can use the NetApp Storage agent to visualize capacity, latency, and throughput performance metrics of NetApp and IBM N series storage systems.

Helps identify poorly performing storage system objects

The NetApp Storage agent collects several important performance metrics for four important NetApp storage objects: hosts (filers), aggregates, volumes, and logical unit numbers (LUNs); sorts object lists by performance metrics to show the least healthy or busiest objects at the top; and displays trend graphs of the same performance metrics when showing an object in detail.

Interoperates with the VMware VI agent

The NetApp Storage agent interoperates with the IBM Tivoli Monitoring for Virtual Environments Agent for VMware VI and provides data sharing and workspace linking between the NetApp Storage agent and the VMware VI agent. The detailed workspaces for NFS data stores in the VMware VI agent can show detailed data about related NetApp volume. Clicking a link from that VMware VI data store workspace takes you to the detailed workspace of the related volume in the NetApp Storage agent.

Helps isolate VM guest performance problems

You can use the NetApp agent to isolate performance problems in their NetApp storage systems, and in cooperation with the VMware VI agent, see how storage system problems might be affecting VM guest performance. Links within the NetApp Storage agent workspaces make it easy to drill up and down in the hierarchy of the NetApp storage system objects to see the status and performance metrics of related objects.

Performs discovery and monitoring with the DFM server focal point

Each agent instance connects to a single NetApp DFM server. The DFM server discovers the objects in the NetApp storage system. Only one set of user credentials is required to monitor all the objects in the storage system. Additional agent instances can monitor additional DFM servers allowing operational monitoring of very large NetApp storage installations from a single Tivoli Enterprise Portal.

New in this release

For version 7.1 of the NetApp Storage agent, the following enhancements have been made since version 6.2.3:

- Added a new attribute group.
The Host Network Interfaces attribute group contains information about network interfaces for a filer, including the interface name, IP address, physical address, operational status, and packet transmission and reception counts.
- Provides data to IBM Tivoli Monitoring for Virtual Environments Dashboard.

Components of the IBM Tivoli Monitoring environment

After you install and set up the NetApp Storage agent, you have an environment that contains the client, server, and monitoring agent implementation for IBM Tivoli Monitoring.

This IBM Tivoli Monitoring environment contains the following components:

Tivoli Enterprise Portal client

The portal has a user interface based on Java for viewing and monitoring your enterprise.

Tivoli Enterprise Portal Server

The portal server is placed between the client and the Tivoli Enterprise Monitoring Server and enables retrieval, manipulation, and analysis of data from the monitoring agents. The Tivoli Enterprise Portal Server is the central repository for all user data.

Tivoli Enterprise Monitoring Server

The monitoring server acts as a collection and control point for alerts received from the monitoring agents, and collects their performance and availability data. The Tivoli Enterprise Monitoring Server is also a repository for historical data.

Tivoli Enterprise Monitoring Agent, NetApp Storage agent (one or more instances of the monitoring agent) The instances communicate with the systems or subsystems that you want to monitor. This monitoring agent collects and distributes data to a Tivoli Enterprise Portal Server.

IBM Tivoli Enterprise Console®

The Tivoli Enterprise Console is an optional component that acts as a central collection point for events from a variety of sources, including events from other Tivoli software applications, Tivoli partner applications, custom applications, network management platforms, and relational database systems. You can view these events through the Tivoli Enterprise Portal (by using the event viewer), and you can forward events from IBM Tivoli Monitoring situations to the Tivoli Enterprise Console component.

IBM Tivoli Netcool/OMNIBus

Tivoli Netcool/OMNIBus is an optional component and an alternative to the Tivoli Enterprise Console. The Netcool/OMNIBus software is a service level management (SLM) system that delivers real-time, centralized monitoring of complex networks and IT domains. The Tivoli Netcool/OMNIBus components work together to collect and manage network event information.

Tivoli Common Reporting

Tivoli Common Reporting is a separately installable feature available to users of Tivoli software that provides a consistent approach to generating and customizing reports. Some individual products provide reports that are designed for use with Tivoli Common Reporting and have a

consistent look and feel. For IBM Tivoli Monitoring for Virtual Environments, you can use Tivoli Common Reporting as a separate installation or as part of the IBM Tivoli Monitoring for Virtual Environments Performance and Capacity Management Reports capability.

IBM Tivoli Monitoring for Virtual Environments Dashboard, reporting, and Capacity Planner capabilities

The dashboard capability provides a summary view of the health of the entire environment so you can quickly assess if a problem exists and take action to address the problem. Predefined performance and capacity management reports provide a complete assessment of the capacity (including forecast) of the virtual environment based on actual historical usage. Capacity planner analytics and reports provide the ability to create what-if planning scenarios that can be used to optimize and consolidate the virtual environment.

Agent Management Services

You can use IBM Tivoli Monitoring Agent Management Services to manage the NetApp Storage agent.

Agent Management Services is available for the following IBM Tivoli Monitoring OS agents: Windows, Linux, and UNIX. The services are designed to keep the NetApp Storage agent available, and to provide information about the status of the product to the Tivoli Enterprise Portal. IBM Tivoli Monitoring V6.2.2, Fix Pack 1 or later provides support for Agent Management Services. For more information about Agent Management Services, see the *IBM Tivoli Monitoring Administrator's Guide*, "Agent Management Services" chapter.

User interface options

Installation of the base Tivoli monitoring software and other integrated applications provides a variety of interfaces that you can use to work with your resources and data.

The following interfaces are available:

Tivoli Enterprise Portal user interface

You can run the Tivoli Enterprise Portal as a desktop application or a browser application. The client interface is a graphical user interface (GUI) based on Java on a Windows or Linux workstation. The browser application is automatically installed with the Tivoli Enterprise Portal Server. The desktop application is installed by using the Tivoli Monitoring installation media or with a Java Web Start application. To start the Tivoli Enterprise Portal browser client in your Internet browser, enter the URL for a specific Tivoli Enterprise Portal browser client installed on your Web server.

Command-line interface

You can use IBM Tivoli Monitoring commands to manage the Tivoli Monitoring components and their configuration. You can also run commands at the Tivoli Enterprise Console event server or the Tivoli Netcool/OMNIBus ObjectServer to configure event synchronization for enterprise situations.

Manage Tivoli Enterprise Monitoring Services window

You can use the window for the Manage Tivoli Enterprise Monitoring Services utility to configure the agent and start Tivoli services not designated to start automatically.

IBM Tivoli Enterprise Console

You can use the Tivoli Enterprise Console to help ensure the optimal availability of an IT service for an organization. The Tivoli Enterprise Console is an event management application that integrates system, network, database, and application management.

IBM Tivoli Netcool/OMNIBus event list

You can use the event list to monitor and manage alerts. An alert is created when the ObjectServer receives an event, alarm, message, or data item. Each alert is made up of columns (or fields) of information that are held in a row in the ObjectServer alerts.status table. The Tivoli

Netcool/OMNIbus web GUI is also a web-based application that processes network events from one or more data sources and presents the event data in various graphical formats.

Tivoli Common Reporting

Use the Tivoli Common Reporting web user interface when you have installed Tivoli Common Reporting separately. In this interface, you specify report parameters and other report properties, generate formatted reports, schedule reports, and view reports. This user interface is based on the Tivoli Integrated Portal.

IBM Tivoli Monitoring for Virtual Environments Dashboard, reporting, and Capacity Planner capabilities

This user interface is based on the Tivoli Integrated Portal. The Dashboard provides predefined contextual summary views of the health (availability, performance, and capacity) of the complete virtual environment. Performance and Capacity Management Reports provides predefined Cognos-based reports that contain historical data, and a data model with tools for creating ad hoc reports. Capacity Planner provides you with a tool to import data for analysis and observe trends and patterns that you use to generate recommendations and create reports in the dashboard.

Chapter 2. Agent installation and configuration

Agent installation and configuration requires the use of the *IBM Tivoli Monitoring Installation and Setup Guide* and agent-specific installation and configuration information.

Before installing and configuring the agent, make sure your environment meets the requirements for the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage. See the Prerequisites topic for the agent in the the IBM Tivoli Monitoring for Virtual Environments information center.

To install and configure the NetApp Storage agent, use the procedures for installing monitoring agents in the *IBM Tivoli Monitoring Installation and Setup Guide* along with the agent-specific installation and configuration information.

If you are doing a silent installation by using a response file, see that information in the *IBM Tivoli Monitoring Installation and Setup Guide*.

Language pack installation

The steps for installing language packs depend on which operating system and mode of installation you are using.

To install a language pack for the agent support files on the Tivoli Enterprise Monitoring Server, the Tivoli Enterprise Monitoring Agent, and the Tivoli Enterprise Portal Server, make sure that you installed the product in the English language. Then use the steps for the operating system or mode of installation you are using:

- “Installing language packs on Windows systems”
- “Installing language packs on UNIX or Linux systems” on page 6
- “Silent installation of language packs for agents” on page 6

Installing language packs on Windows systems

You can install the language packs on a Windows system.

Before you begin

First, make sure that you installed the product in the English language.

Procedure

1. On the language pack CD, double-click the `lpinstaller.bat` file to start the installation program.
2. Select the language of the installer and click **OK**.
3. In the Introduction panel, click **Next**
4. Click **Add/Update** and click **Next**.
5. Select the folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder where the installer executable file is located.
6. Select the language support for the agent of your choice and click **Next**. To make multiple selections, press **Ctrl** and select the language that you want.
7. Select the languages that you want to install and click **Next**.
8. Examine the installation summary page and click **Next** to begin installation.
9. After installation completes, click **Finish** to exit the installer.

10. Restart the Tivoli Enterprise Portal, Tivoli Enterprise Portal Server, and Eclipse Help Server if any of these components are installed.

Installing language packs on UNIX or Linux systems

You can install the language packs on a UNIX or Linux system.

Before you begin

First, make sure that you installed the product in the English language.

Procedure

1. Enter the following command to create a temporary directory on the computer. Make sure that the full path of the directory does not contain any spaces: `mkdir dir_name`
2. Mount the language pack CD to the temporary directory that you created.
3. Enter the following command to start the installation program: `cd dir_name lpinstaller.sh -c install_dir` where *install_dir* is where you installed IBM Tivoli Monitoring. Typically, the directory name is `/opt/IBM/ITM` for AIX® and Linux systems.
4. Select the language of the installer and click **OK**.
5. In the Introduction panel, click **Next**.
6. Click **Add/Update** and click **Next**.
7. Select the folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder where the installer executable file is located.
8. Select the language support for the agent of your choice and click **Next**. To make multiple selections, press **Ctrl** and select the language that you want.
9. Select the languages that you want to install and click **Next**.
10. Examine the installation summary page and click **Next** to begin installation.
11. After installation completes, click **Finish** to exit the installer.
12. Restart the Tivoli Enterprise Portal, Tivoli Enterprise Portal Server, and Eclipse Help Server if any of these components are installed.

Silent installation of language packs for agents

You can use the silent-mode installation method to install the language packs. In silent mode, the installation process obtains the installation settings from a predefined response file. It does not prompt you for any information.

Before you begin

First, make sure that you installed the product in the English language.

Procedure

1. Copy and paste the `ITM_Agent_LP_silent.rsp` response file template as shown in “Response file example” on page 7.
2. Change the following parameter settings:

NLS_PACKAGE_FOLDER

Folder where the National Language Support package (NLSPackage) files are located. Typically, the NLSPackage files are located in the `nlspackage` folder, for example:
`NLS_PACKAGE_FOLDER = //tmp//LP//nlspackage.`

PROD_SELECTION_PKG

Name of the language pack to install. Several product components can be included in one language package. You might want to install only some of the available components in a language pack.

BASE_AGENT_FOUND_PKG_LIST

Agent for which you are installing language support. This value is usually the same as *PROD_SELECTION_PKG*.

LANG_SELECTION_LIST

Language you want to install.

3. Enter the command to install the language pack with a response file (silent installation):

- For Windows systems:
`lpinstaller.bat -f path_to_response_file`
- For UNIX or Linux systems:
`lpinstaller.sh -c candle_home -f path_to_response_file`

where *candle_home* is the IBM Tivoli Monitoring base directory.

Response file example

```
# IBM Tivoli Monitoring Agent Language Pack Silent Installation Operation
#
#This is a sample response file for silent installation mode for the IBM Tivoli
#Monitoring Common Language Pack Installer.
#.
#This file uses the IBM Tivoli Monitoring Common Agent Language Pack with the
#install package as an example.
#Note:
#This response file is for the INSTALLATION of language packs only.
#This file does not support UNINSTALLATION of language packs in silent mode.
#-----
#-----
#To successfully complete a silent installation of the the example of Common Agent
#localization pack, complete the following steps:
#
#1.Copy ITM_Agent_LP_silent.rsp to the directory where lpinstaller.bat or
#lpinstaller.sh is located (IBM Tivoli Monitoring Agent Language Pack build
#location).
#
#2.Modify the response file so that it is customized correctly and completely for
#your site.
# Complete all steps listed below in the response file.
#
#3.After customizing the response file, invoke the silent installation using the
#following command:
#For Windows:
# lpinstaller.bat -f <path_to_response_file>
#For UNIX and Linux:
# lpinstaller.sh -c <candle_home> -f <path_to_response_file>
#Note:<candle_home> is the IBM Tivoli Monitoring base directory.
#-----
#-----
#Force silent install mode.
#-----
INSTALLER_UI=silent
#-----
#Run add and update actions.
#-----
CHOSEN_INSTALL_SET=ADDUPD_SET
#-----
#NLS Package Folder, where the NLS Packages exist.
#For Windows:
# Use the backslash-backslash(\\) as a file separator (for example,
```



```

#C:\\zosgm\\LCD7-3583-01\\nlspackage).
#For UNIX and Linux:
#   Use the slash-slash (//) as a file separator (for example,
#//installtivolii//lpsilenttest//nlspackage).
#-----
#NLS_PACKAGE_FOLDER=C:\\zosgm\\LCD7-3583-01\\nlspackage
NLS_PACKAGE_FOLDER=//tmp//LP//nlspackage
#-----
#List the packages to process; both variables are required.
#Each variable requires that full paths are specified.
#Separate multiple entries with a semicolon (;).
#For Windows:
#       Use the backslash-backslash(\\) as a file separator.
#For Unix and Linux:
#       Use the slash-slash (//) as a file separator.
#-----
#PROD_SELECTION_PKG=C:\\zosgm\\LCD7-3583-01\\nlspackage\\KIP_NLS.nlspkg
#BASE_AGENT_FOUND_PKG_LIST=C:\\zosgm\\LCD7-3583-01\\nlspackage\\KIP_NLS.nlspkg
PROD_SELECTION_PKG=//tmp//LP//nlspackage//kex_nls.nlspkg;//tmp//LP//nlspackage//
koq_nls.nlspkg
BASE_AGENT_FOUND_PKG_LIST=//tmp//LP//nlspackage//kex_nls.nlspkg;//
tmp//LP//nlspackage//koq_nls.nlspkg
#-----
#List the languages to process.
#Separate multiple entries with semicolons.
#-----
LANG_SELECTION_LIST=pt_BR;fr;de;it;ja;ko;zh_CN;es;zh_TW

```

Agent-specific installation and configuration

In addition to the installation and configuration information in the *IBM Tivoli Monitoring Installation and Setup Guide*, use the agent-specific installation and configuration information to install NetApp Storage agent.

User ID

The monitoring agent requires a user ID with a minimum privilege of GlobalRead on the NetApp data source that is being monitored. The user ID is used by the NetApp Storage agent to communicate with the NetApp DFM Server.

Create a user ID in your NetApp storage system. For more information on how to create the user ID in your NetApp storage system, see the NetApp documentation.

Number of instances

Additional instances of this monitoring agent increase the load on the DFM server and provide redundant information.

Keep the number of instances of the NetApp Storage agent that you configure for the same data source to a minimum, preferably one.

NetApp Storage agent application support

All agents require that you install application support files containing agent-specific information on the monitoring server, portal server, and portal desktop client.

See the *IBM Tivoli Monitoring Installation and Setup Guide* for information about installing application support.

Downloading and installing the NetApp Manageability SDK JAR file

The NetApp Storage agent requires the NetApp Manageability SDK JAR file to communicate with a NetApp DFM server.

About this task

After the NetApp Storage agent is installed, the NetApp Manageability SDK JAR file (`manageontap.jar`) must be downloaded from the NetApp website and installed in the monitoring agent lib directory.

Procedure

1. Download a compressed file containing the JAR file from <http://communities.netapp.com/docs/DOC-1152>.
2. When this compressed file has been downloaded and extracted, copy the `manageontap.jar` file to the following locations:
 - a. For 32-bit and 64-bit systems Windows systems, copy the file to `install_dir/tmaitm6`.
 - b. For 32-bit Linux systems, copy the file to `install_dir/i686/nu/lib`.
 - c. For 64-bit x86-64 Linux systems, copy the file to `install_dir/x86_64/nu/lib`.
 - d. For 64-bit zLinux systems, copy the file to `install_dir/s390/nu/lib`.

Configuration values

For both local and remote configuration, you provide the configuration values for the agent to operate.

When you are configuring an agent, a panel is displayed so you can enter each value. When a default value exists, this value is pre-entered into the field. If a field represents a password, two entry fields are displayed. You must enter the same value in each field. The values you type are not displayed to help maintain the security of these values.

The configuration for this agent is organized into the following groups:

Data Provider (DATA_PROVIDER)

Maximum Number Of Data Provider Log Files (KNU_LOG_FILE_MAX_COUNT)

The number of log files the data provider produces before overwriting previous log files. The default value is 10.

Maximum Size in KB of Each Data Provider Log (KNU_LOG_FILE_MAX_SIZE)

The maximum amount of data (in kilobytes) that the data provider writes to a single log file before creating a new log file. The default value is 5190.

Level of Detail in Data Provider Log. (KNU_LOG_LEVEL)

The amount of detail that the data provider includes in its log files. The default value is Info. Log levels include the following log messages:

- **Off:** No messages are logged.
- **Severe:** Only errors are logged.
- **Warning:** Everything that is logged at the Severe level and potential errors that might result in undesirable behavior.
- **Info:** Everything that is logged at the Warning level and high-level informational messages that describe the state of the data provider as it executes.
- **Fine:** Everything that is logged at the Info level and low-level informational messages that describe the state of the data provider as it executes.
- **Finer:** Everything that is logged at the Fine level plus highly-detailed informational messages, such as performance profiling information and debug data. Choosing this

option can adversely affect the performance of the monitoring agent. This setting is intended only as a tool for problem determination in conjunction with IBM support staff.

- **Finest:** Everything that is logged at the Fine level and the most detailed informational messages, including low-level programming messages and data. Choosing this option might adversely affect the performance of the monitoring agent. This setting is intended only as a tool for problem determination in conjunction with IBM support staff.
- **All:** All messages are logged.

DataFabric Manager (Data Source)

Server (KNU_DATASOURCE_HOST_ADDRESS)

The host name or IP address of the NetApp DFM server that will be monitored.

User (KNU_DATASOURCE_USERNAME)

A user name on the NetApp DFM server that has sufficient privileges to collect monitoring

Password (KNU_DATASOURCE_PASSWORD)

The password for the user name in this section.

Protocol (KNU_DATASOURCE_PROTOCOL)

The protocol over which to communicate with the NetApp DFM server. HTTPS is the default.

Remote installation and configuration

You can install the monitoring agent remotely from the Tivoli Enterprise Portal or from the command line.

When installing the agent remotely, you must provide the configuration values for the agent to operate. See “Configuration values” on page 9.

To install from the portal, see the *IBM Tivoli Monitoring Installation and Setup Guide*.

To remotely install or configure an agent through the Tivoli Enterprise Portal, you must have installed the application support for that agent (Tivoli Enterprise Monitoring Server, Tivoli Enterprise Portal Server, and Tivoli Enterprise Portal). You must also have installed the agent bundle into the Remote Deploy Depot.

See the *tacmd describeSystemType* section in the *IBM Tivoli Monitoring Command Reference* for information about displaying the configuration options that are available to use with the **configureSystem** or **addSystem** commands.

If you are using the command line, the following command is an example of remote installation and configuration for Windows operating systems:

```
tacmd addSystem -t NU -n OSAgentManagedSystemName -p INSTANCE=InstanceName \  
  KNU_LOG_FILE_MAX_COUNT=LogFileMaxCount \  
  KNU_LOG_FILE_MAX_SIZE=LogFileMaxSize \  
  KNU_LOG_LEVEL=LogLevel \  
  KNU_DATASOURCE_HOST_ADDRESS=HostAddress \  
  KNU_DATASOURCE_PROTOCOL=Protocol \  
  KNU_DATASOURCE_USERNAME=Username \  
  KNU_DATASOURCE_PASSWORD=Password
```

In this command, the fields are defined as follows. For more information, see “Configuration values” on page 9.

OSAgentManagedSystemName

The managed system name of the OS agent that is running on the system to which the NetApp Storage agent is to be remotely deployed.

InstanceName

The name of the instance being deployed.

LogFileMaxCount

The maximum number of data provider log files. Valid values are positive integers.

LogFileMaxSize

The maximum size (in kilobytes) of each data provider log. Valid values are positive integers.

LogLevel

The level of detail in data provider logs. Valid values are OFF, SEVERE, WARNING, INFO, FINE, FINER, FINEST, and ALL.

HostAddress

The host name or IP address of the NetApp DFM server that is to be monitored.

Username

A user name on the NetApp DFM server.

Password

The password for the user name in *Username*.

Protocol

The protocol over which to communicate with the NetApp DFM server. Valid values are HTTP and HTTPS.

Chapter 3. Workspaces reference

A workspace is the working area of the Tivoli Enterprise Portal application window. The Navigator tree that is displayed at the left of the workspace contains a list of the workspaces provided by the agent.

About workspaces

Use the Navigator tree that is displayed at the left of the workspace to select the workspace you want to see. As part of the application window, the right side of the status bar shows the Tivoli Enterprise Portal Server name and port number to which the displayed information applies and the ID of the current user.

When you select an item in the Navigator tree, a default workspace is displayed. When you right-click a Navigator item, a menu that includes a Workspace item is displayed. The Workspace item contains a list of workspaces for that Navigator item. Each workspace has at least one view. Some views have links to other workspaces. You can also use the Workspace Gallery tool as described in the *Tivoli Enterprise Portal User's Guide* to open workspaces.

The workspaces in the Navigator are displayed in a Physical view that shows your enterprise as a physical mapping or a dynamically populated logical view that is agent-specific. You can also create a Logical view. The Physical view is the default view.

This monitoring agent provides predefined workspaces. You cannot modify or delete the predefined workspaces, but you can create new workspaces by editing them and saving the changes with a different name.

Workspace views can be any combination of query-based views, event views, and special purpose views.

Additional information about workspaces

For more information about creating, customizing, and working with workspaces, see the *Tivoli Enterprise Portal User's Guide*

For a list of the predefined workspaces for this monitoring agent and a description of each workspace, see Predefined workspaces and the information about each individual workspace.

Some attribute groups for this monitoring agent might not be represented in the predefined workspaces or views for this agent. For a full list of the attribute groups, see "Attribute groups for the monitoring agent" on page 19.

Predefined workspaces

The NetApp Storage agent provides predefined workspaces, which are organized by Navigator item.

- NetApp Storage Navigator item
 - NetApp Storage workspace
- Aggregates Navigator item
 - Aggregate Detail workspace
 - Aggregates workspace
- Hosts Navigator item
 - Host Detail workspace
 - Hosts workspace

- LUNs Navigator item
 - LUN Detail workspace
 - LUNs workspace
- Volumes Navigator item
 - Volume Detail workspace
 - Volumes workspace

Workspace descriptions

Each workspace description provides information about the workspace such as the purpose and a list of views in the workspace.

Workspaces are listed under Navigator items.

NetApp Storage Navigator item

The workspace descriptions are organized by the Navigator item to which the workspaces are relevant.

NetApp Storage workspace

This workspace shows the status of hosts, aggregates, volumes, and LUNs (logical unit numbers). Each type of object is shown in its own view, and the view is sorted with the worst status at the top of the list. Each row has a link to a detailed workspace for the object.

This workspace contains the following views:

Hosts Status

This view shows all the hosts in the monitored storage system. The rows are sorted so that the host with the worst status sorts to the top of the list. Each host row has a link to the detailed workspace for that host.

Aggregates Status

This view shows all the aggregates in the monitored storage system. The rows are sorted so that the aggregate with the worst status sorts to the top of the list. Each aggregate row has a link to the detailed workspace for that aggregate.

Volumes Status

This view shows all the volumes in the monitored storage system. The rows are sorted so that the volume with the worst status sorts to the top of the list. Each volume row has a link to the detailed workspace for that volume.

LUNs Status

This view shows all the LUNs in the monitored storage system. The rows are sorted so that the LUN with the worst status sorts to the top of the list. Each LUN row has a link to the detailed workspace for that LUN.

Aggregates Navigator item

The workspace descriptions are organized by the Navigator item to which the workspaces are relevant.

Aggregate Detail workspace

This workspace shows the performance metrics for a particular aggregate, and the volumes and disks on which the aggregate relies. Each type of performance metric is shown in its own bar graph or trend graph over the last 60 minutes.

This workspace contains the following views:

Operations per Second - History

This view shows a trend graph of the operations per second for the aggregate in the following categories -- total transfers, user reads, user writes, consistency point reads, user block reads, user block writes, and consistency point block reads.

Percent Used - History

This view shows a trend graph of the percent of available storage used for the aggregate over the last 60 minutes.

Size This view shows a bar graph of the current storage sizes for the aggregate in the following categories: amount used, amount available, total size, and total space committed.

Aggregate

This view shows the most recent detailed data collected for the aggregate.

Volumes

This view shows the volumes on which this aggregate relies. Each volume row has a link to the detailed workspace for that volume. You can use the link to drill down to the performance metrics for the volume and the LUNs on which this volume relies.

Aggregates workspace

This workspace shows the performance metrics for the aggregates. Each performance metric is shown in its own view, sorted with the highest transfer operation rate, percent used, file access rate, or block access rate shown at the top of the list

This workspace contains the following views:

Aggregates by Total Transfers

This view shows all the aggregates in the monitored storage system. The rows are sorted so that the aggregate with the most transfer operations per second sorts to the top of the list. Each row has a link to the detailed workspace for that aggregate.

Aggregates by Percent Used

This view shows all the aggregates in the monitored storage system. The rows are sorted so that the aggregate with the highest percent used sorts to the top of the list. Each aggregate row has a link to the detailed workspace for that aggregate.

Aggregates by File Access Rate

This view shows all the aggregates in the monitored storage system. The rows are sorted so that the aggregate with the highest file access rate sorts to the top of the list. Each aggregate row has a link to the detailed workspace for that aggregate.

Aggregates by Block Access Rate

This view shows all the aggregates in the monitored storage system. The rows are sorted so that the aggregate with the highest block access rate sorts to the top of the list. Each aggregate row has a link to the detailed workspace for that aggregate.

Hosts Navigator item

The workspace descriptions are organized by the Navigator item to which the workspaces are relevant.

Host Detail workspace

This workspace shows the performance metrics for a particular host, and the aggregates and volumes on which the host relies. Each type of performance metric is shown in its own trend graph over the last 60 minutes.

This workspace contains the following views:

Operations per Second - History

This view shows a trend graph of the operations per second over the last 60 minutes for the host in the following categories: CIFS, FCP, iSCSI, and NFS.

CPU Busy - History

This view shows a trend graph of the CPU utilization percent for the host over the last 60 minutes.

Data Transfer Rate - History

This view shows a trend graph of the data transfer rate for the host over the last 60 minutes in the following categories: disk data read, disk data written, network data received, and network data sent.

Host This view shows the most recent detailed data collected for the host.

Aggregates

This view shows the aggregates on which this host relies. Each aggregate row has a link to the detailed workspace for that aggregate, allowing you to drill down to the performance metrics for the aggregate and its volumes and disks.

Volumes

This view shows the volumes on which this host relies. Each volume row has a link to the detailed workspace for that volume. You can use the link to drill down and see the performance metrics for the volume and the LUNs on which this volume relies.

Hosts workspace

This workspace shows the performance metrics of the hosts. Each type of performance metric is shown in its own view, sorted with the highest operations per second, CPU percent, or data transfer rate shown at the top of the list

This workspace contains the following views:

Hosts by Operations per Second

This view shows all the hosts in the monitored storage system. The rows are sorted so that the host with the most total operations per second sorts to the top of the list. Each host row has a link to the detailed workspace for that host.

Hosts by CPU Percent

This view shows all the hosts in the monitored storage system. The rows are sorted so that the host with the highest CPU utilization percent sorts to the top of the list. Each host row has a link to the detailed workspace for that host.

Hosts by Data Rate

This view shows all the hosts in the monitored storage system. The rows are sorted so that the host with the highest data transfer rate sorts to the top of the list. Each host row has a link to the detailed workspace for that host.

LUNs Navigator item

The workspace descriptions are organized by the Navigator item to which the workspaces are relevant.

LUN Detail workspace

This workspace shows the performance metrics for a particular LUN. Each type of performance metric is shown in its trend graph over the last 60 minutes.

This workspace contains the following views:

Operations per Second - History

This view shows a trend graph of the operations per second over the last 60 minutes for the LUN in the following categories: read ops, write ops, and other ops.

Average Latency - History

This view shows a trend graph of the average latency for the LUN over the last 60 minutes.

LUN This view shows the most recent detailed data collected for the LUN.

LUNs workspace

This workspace shows the performance metrics of the LUNs. Each performance metric is shown in its own view, sorted with the highest average latency or operations per second shown at the top of the list.

This workspace contains the following views:

LUNs by Operations per Second

This view shows all the LUNs in the monitored storage system. The rows are sorted so that the LUN with the most operations per second sorts to the top of the list. Each row has a link to the detailed workspace for that LUN.

LUNs by Average Latency

This view shows all the LUNs in the monitored storage system. The rows are sorted so that the LUN with the highest latency sorts to the top of the list. Each row has a link to the detailed workspace for that LUN.

Volumes Navigator item

The workspace descriptions are organized by the Navigator item to which the workspaces are relevant.

Volume Detail workspace

This workspace shows the performance metrics for a particular volume, and the LUNs on which the volume relies. Each type of performance metric is shown in its trend graph over the last 60 minutes.

This workspace contains the following views:

Operations Per Second - History

This view shows a trend graph of the operations per second for the volume over the last 60 minutes in the following categories: total ops, read ops, write ops, and other ops.

Latency - History

This view shows a trend graph of the latency for the volume over the last 60 minutes in the following categories: read latency, write latency, and other latency.

Data Transfer Rate - History

This view shows a trend graph of the data transfer rate for the volume over the last 60 minutes in the following categories: read data and write data.

Percent Used - History

This view shows a trend graph of the percent of available storage used for the volume over the last 60 minutes in the following categories: AFS[®], overwrite reserve, and snapshot reserve.

Volume

This view shows the most recent detailed data collected for the volume.

LUNs This view shows the LUNs on which this volume relies. Each LUN row has a link to the detailed workspace for that LUN. You can use the link to drill down and see the performance metrics for the LUN.

Volumes workspace

This workspace shows the performance metrics of the volumes. Each performance metric is shown in its own view, sorted with the highest operations per second, latency, percent used, or data transfer rate shown at the top of the list.

This workspace contains the following views:

Volume by Operations per Second

This view shows all the volumes in the monitored storage system. The rows are sorted so that the volume with the most operations per second sorts to the top of the list. Each row has a link to the detailed workspace for that volume.

Volumes by Latency

This view shows all the volumes in the monitored storage system. The rows are sorted so that the volume with the highest latency sorts to the top of the list. Each row has a link to the detailed workspace for that volume.

Volumes by Percent Used

This view shows all the volumes in the monitored storage system. The rows are sorted so that the volume with the highest percent used sorts to the top of the list. Each volume row has a link to the detailed workspace for that volume.

Volumes by Data Transfer Rate

This view shows all the volumes in the monitored storage system. The rows are sorted so that the volume with the highest data transfer rate sorts to the top of the list. Each volume row has a link to the detailed workspace for that volume.

Chapter 4. Attributes reference

Attributes are the application properties that are being measured and reported by the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage.

About attributes

Attributes are organized into attribute groups. Attributes in an attribute group relate to a single object such as an application, or to a single kind of data such as status information.

Attributes in a group can be used in queries, query-based views, situations, policy workflows, take action definitions, and launch application definitions. Chart or table views and situations are two examples of how attributes in a group can be used:

- Chart or table views

Attributes are displayed in chart and table views. The chart and table views use queries to specify which attribute values to request from a monitoring agent. You use the Properties editor to apply filters and set styles to define the content and appearance of a view based on an existing query.

- Situations

You use attributes to create situations that monitor the state of your operating system, database, or application. A situation describes a condition you want to test. When you start a situation, the values you have assigned to the situation attributes are compared with the values collected by the NetApp Storage agent and registers an *event* if the condition is met. You are alerted to events by indicator icons that are displayed in the Navigator.

Additional information about attributes

For more information about using attributes and attribute groups, see the *Tivoli Enterprise Portal User's Guide*.

For a list of the attribute groups, a list of the attributes in each attribute group, and descriptions of the attributes for this monitoring agent, see “Attribute groups for the monitoring agent” and “Attributes in each attribute group” on page 20.

Attribute groups for the monitoring agent

The NetApp Storage agent contains the following attribute groups. The table name depends on the maximum table name limits of the target database being used for the Tivoli Data Warehouse. If the maximum name is 30 characters, any warehouse table name longer than 30 characters is shortened to 30 characters.

- Attribute group name: Aggregates
 - Table name: KNU02AGREG
 - Warehouse table name: KNU_AGGREGATES or KNU02AGREG
- Attribute group name: Host Network Interfaces
 - Table name: KNUHOSTNIF
 - Warehouse table name: KNU_HOST_NETWORK_INTERFACES or KNUHOSTNIF
- Attribute group name: Hosts
 - Table name: KNU01HOST
 - Warehouse table name: KNU_HOSTS or KNU01HOST
- Attribute group name: LUNs

- Table name: KNU04LUN
- Warehouse table name: KNU_LUNS or KNU04LUN
- Attribute group name: Performance Object Status
 - Table name: KNUOBJST
 - Warehouse table name: KNU_PERFORMANCE_OBJECT_STATUS or KNUOBJST
- Attribute group name: Volumes
 - Table name: KNU03VOL
 - Warehouse table name: KNU_VOLUMES or KNU03VOL

Attributes in each attribute group

Attributes in each NetApp Storage agent group collect data that the agent uses for monitoring.

The descriptions of the attribute groups contain the following information:

Historical group

Whether the attribute group is a historical type that you can roll off to a data warehouse.

Attribute descriptions

Description, type, and Warehouse name (if applicable) for each attribute in the attribute group.

Some attributes are designated as key attributes. A *key attribute* is an attribute that is used in warehouse aggregation to identify rows of data that represent the same object.

Aggregates attribute group

The Aggregate attribute group contains information about aggregates. The information includes name, containing host name, operating status, transfer operation rate, percent used, file access rates, and block access rates.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the Aggregates attribute group:

Node attribute - This attribute is a key attribute.

Description

The managed system name of the agent.

Type String

Warehouse name

NODE

Timestamp attribute

Description

The local time at the agent when the data was collected.

Type String

Warehouse name

TIMESTAMP

Host Name attribute - This attribute is a key attribute.

Description

The name of the host that contains this aggregate.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
HOST_NAME

Aggregate Name attribute - This attribute is a key attribute.

Description
The name of this aggregate.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
AGGREGATE_NAME or AGGR_NAME

Aggregate Type attribute

Description
The type of this aggregate, either traditional or aggregate.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- traditional (traditional)
- aggregate (aggregate)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
AGGREGATE_TYPE or AGGR_TYPE

Run Status attribute

Description
Indicates how well this aggregate is running.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)

- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

RUN_STATUS or RUN_STS

Perf Status attribute

Description

Indicates how well this aggregate is performing.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_STATUS or PERF_STS

Composite Status attribute

Description

A composite of the status fields indicating the maximum severity of all the fields.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_STATUS or CMP_STS

Size Available attribute

Description

The number of GB available for use in this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
SIZE_AVAILABLE or SIZE_AVAIL

Size Total attribute

Description
The number of GB in this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
SIZE_TOTAL or SIZE_TOTL

Size Used attribute

Description
The number of GB in use in this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
SIZE_USED

Percent Used attribute

Description
The percentage of total GB used in this aggregate.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
PERCENT_USED or PCT_USED

Size Warehouse attribute

Description
Indicates whether the size data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
SIZE_WAREHOUSE or SIZE_WRHS

Total Space Committed attribute

Description
The total number of GB committed by this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
TOTAL_SPACE_COMMITTED or SPACE_CMTD

Committed Warehouse attribute

Description
Indicates whether the committed space data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
COMMITTED_WAREHOUSE or CMTD_WRHS

Total Transfers attribute

Description
The total number of transfers per second serviced by this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
TOTAL_TRANSFERS or TOTL_XFER

User Reads attribute

Description
The number of user reads per second from this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

USER_READS or USR_RD

User Writes attribute

Description

The number of user writes per second to this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

USER_WRITES or USR_WR

CP Reads attribute

Description

The number of reads per second done during a CP on this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

CP_READS or CP_RD

File Rate attribute

Description

The number of file-based reads and writes per second for this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

FILE_RATE

User Read Blocks attribute

Description

The number of blocks read per second from this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

USER_READ_BLOCKS or USER_RD_BLK

User Write Blocks attribute

Description

The number of blocks written per second to this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

USER_WRITE_BLOCKS or USER_WR_BLK

CP Read Blocks attribute

Description

The number of blocks read per second during a CP on this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

CP_READ_BLOCKS or CP_RD_BLK

Block Rate attribute

Description

The number of block-based reads and writes per second for this aggregate.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

BLOCK_RATE

Perf Warehouse attribute

Description

Indicates whether the performance data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)

- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_WAREHOUSE or PERF_WRHS

Host Network Interfaces attribute group

The Host Network Interfaces attribute group contains information about network interfaces for a filer, including the interface name, IP address, physical address, operational status, and packet transmission and reception counts.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the Host Network Interfaces attribute group:

Node attribute - This attribute is a key attribute.

Description

The managed system name of the agent.

Type String

Warehouse name

NODE

Timestamp attribute

Description

The local time at the agent when the data was collected.

Type String

Warehouse name

TIMESTAMP

Host Name attribute - This attribute is a key attribute.

Description

The name by which this host is known to the rest of the components of the storage system.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

HOST_NAME

Interface Name attribute - This attribute is a key attribute.

Description

The name of the network interface for which data is being displayed.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

INTERFACE_NAME or INTERFACE

Administrative Status attribute

Description

The desired status of this network interface.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- up (up)
- down (down)
- testing (testing)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

ADMINISTRATIVE_STATUS or ADM_STATUS

Operational Status attribute

Description

The current operational status of this network interface.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- up (up)
- down (down)
- testing (testing)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OPERATIONAL_STATUS or OP_STATUS

Physical Address attribute

Description

The MAC address of this network interface.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PHYSICAL_ADDRESS or PHYS_ADDR

IP Address attribute

Description

The IP address mapped to this network interface.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

IP_ADDRESS or IP_ADDR

Number IP Addresses attribute**Description**

The number of IP addresses mapped to this network interface.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

NUMBER_IP_ADDRESSES or NUM_IPADDR

Link Speed attribute**Description**

The current bandwidth of this network interface in megabits per second (mbps).

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

LINK_SPEED

Received KB Per Sec attribute**Description**

The rate at which this network interface is receiving data in kilobytes per second (KBps).

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

RECEIVED_KB_PER_SEC or KB_RECV

Transmitted KB Per Sec attribute

Description

The rate at which this network interface is transmitting data in kilobytes per second (KBps).

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

TRANSMITTED_KB_PER_SEC or KB_SENT

Packets Received Per Sec attribute**Description**

The number of packets this network interface is receiving per second.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PACKETS_RECEIVED_PER_SEC or PACK_RECV

Packets Transmitted Per Sec attribute**Description**

The number of packets this network interface is transmitting per second.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PACKETS_TRANSMITTED_PER_SEC or PACK_SENT

Multicast Received Per Sec attribute**Description**

The number of multicast packets this network interface is receiving per second.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

MULTICAST_RECEIVED_PER_SEC or MCAST_RECV

Multicast Transmitted Per Sec attribute

Description

The number of multicast packets this network interface is transmitting per second.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

MULTICAST_TRANSMITTED_PER_SEC or MCAST_SENT

Errors Received Per Sec attribute**Description**

The number of errors per second that occurred on this network interface while receiving packets.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

ERRORS_RECEIVED_PER_SEC or ERR_RECV

Errors Transmitted Per Sec attribute**Description**

The number of errors per second that occurred on this network interface while transmitting packets.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

ERRORS_TRANSMITTED_PER_SEC or ERR_SENT

Perf Warehouse attribute**Description**

Indicates whether the performance data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
PERF_WAREHOUSE or PERF_WRHS

Hosts attribute group

The Hosts attribute group typically contains information about filers, although other host types can be reported as well. The information includes name, address, operating status, operations per second, CPU percent, and data transfer rates.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the Hosts attribute group:

Node attribute - This attribute is a key attribute.

Description
The managed system name of the agent.

Type String

Warehouse name
NODE

Timestamp attribute

Description
The local time at the agent when the data was collected.

Type String

Warehouse name
TIMESTAMP

Host Name attribute - This attribute is a key attribute.

Description
The name by which this host is known to the rest of the components of the storage system.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
HOST_NAME

Host Type attribute

Description
Several different types of hosts are included. Possible values are: filer, vfiler, cache, agent, ossv, and switch.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- filer (filer)
- vfiler (vfiler)

- cache (cache)
- agent (agent)
- ossv (ossv)
- switch (switch)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
HOST_TYPE

IP Address attribute

Description

The IP address of this host.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
IP_ADDRESS

FQDN attribute

Description

The fully qualified domain name of this host.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
FQDN

Description attribute

Description

The user-written description of this host.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
DESCRIPTION or DESC

Communication Status attribute

Description

Indicates whether communication with this host is up or down.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- up (up)
- down (down)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMM_STATUS or COMM_STS

Host Status attribute

Description

Indicates whether this host is up or down.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- up (up)
- down (down)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

HOST_STATUS or HOST_STS

Run Status attribute

Description

Indicates how well this host is running.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

RUN_STATUS or RUN_STS

Perf Status attribute

Description

Indicates how well this host is performing.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_STATUS or PERF_STS

Composite Status attribute**Description**

A composite of the status fields indicating the maximum severity of all the fields.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_STATUS or CMP_STS

CPU Busy attribute**Description**

The system CPU resource utilization in percent.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

CPU_BUSY

CIFS Ops attribute**Description**

The CIFS operations per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli

Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
CIFS_OPS

FCP Ops attribute

Description
The FCP operations per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
FCP_OPS

iSCSI Ops attribute

Description
The iSCSI operations per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
ISCSI_OPS

NFS Ops attribute

Description
The NFS operations per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
NFS_OPS

Total Ops attribute

Description
The total operations per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli

Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

TOTAL_OPS

Disk Data Read attribute

Description

The disk KB read per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

DISK_DATA_READ or DSK_DTA_RD

Disk Data Written attribute

Description

The disk KB written per second.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

DISK_DATA_WRITTEN or DSK_DTA_WR

Net Data Received attribute

Description

The network KB received per second for this host.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

NET_DATA_RECV or NET_DTA_RV

Net Data Sent attribute

Description

The network KB sent per second for this host.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli

Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

NET_DATA_SENT or NET_DTA_SN

Total Data Rate attribute

Description

The sum of the other KB-per-second metrics for this host.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

TOTAL_DATA_RATE or TOTAL_RATE

Perf Warehouse attribute

Description

Indicates whether the performance data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_WAREHOUSE or PERF_WRHS

LUNs attribute group

The LUNs attribute group contains information about LUNs. The information includes path, containing volume name, containing host name, operating status, average latency, and operations per second.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the LUNs attribute group:

Node attribute - This attribute is a key attribute.

Description

The managed system name of the agent.

Type String

Warehouse name

NODE

Timestamp attribute

Description

The local time at the agent when the data was collected.

Type String

Warehouse name

TIMESTAMP

Host Name attribute - This attribute is a key attribute.

Description

The name of the host that contains this disk.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

HOST_NAME

Volume Name attribute - This attribute is a key attribute.

Description

The name of the volume that contains this LUN.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

VOLUME_NAME or VOL_NAME

LUN Path attribute - This attribute is a key attribute.

Description

The path name of the LUN including the volume or qtree where the LUN exists.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

LUN_PATH

Run Status attribute

Description

Indicates how well this LUN is running.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

RUN_STATUS or RUN_STS

Perf Status attribute

Description

Indicates how well this LUN is performing.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_STATUS or PERF_STS

Composite Status attribute

Description

A composite of the status fields indicating the maximum severity of all the fields.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_STATUS or CMP_STS

LUN Size attribute

Description

The size of this LUN in GB.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

LUN_SIZE

Size Warehouse attribute**Description**

Indicates whether the size data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SIZE_WAREHOUSE or SIZE_WRHS

Read Ops attribute**Description**

The number of reads per second from this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

READ_OPS

Write Ops attribute**Description**

The number of writes per second to this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

WRITE_OPS

Other Ops attribute

Description

The number of other operations per second on this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OTHER_OPS

Total Ops attribute**Description**

The number of operations per second serviced by this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

TOTAL_OPS or TOTL_OPS

Read Data attribute**Description**

The KB per second read from this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

READ_DATA or RD_DATA

Write Data attribute**Description**

The KB per second written to this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

WRITE_DATA or WR_DATA

Average Latency attribute

Description

The average time in milliseconds for all operations on this LUN.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AVG_LATENCY or AVG_LATNCY

Performance Warehouse attribute**Description**

Indicates whether the performance data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_WAREHOUSE or PERF_WRHS

Performance Object Status attribute group

The Performance Object Status attribute group contains information that reflects the status of other attribute groups so you can see the status of all of the performance objects that make up this application all at once. Each of these other performance attribute groups is represented by a row in this table (or other type of view). The status for an attribute group reflects the result of the last attempt to collect data for that attribute group, which allows you to see whether the agent is performing correctly. Unlike other attribute groups, the Performance Object Status attribute group does not reflect the state of the monitored application. This attribute group is most often used to determine why data is not available for one of the performance attribute groups.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the Performance Object Status attribute group:

Node attribute - This attribute is a key attribute.

Description

The managed system name of the agent.

Type String

Warehouse name

NODE

Timestamp attribute**Description**

The local time at the agent when the data was collected.

Type String

Warehouse name
TIMESTAMP

Query Name attribute - This attribute is a key attribute.

Description
The name of the attribute group.

Type String

Warehouse name
QUERY_NAME or ATTRGRP

Object Name attribute

Description
The name of the performance object.

Type String

Warehouse name
OBJECT_NAME or OBJNAME

Object Type attribute

Description
The type of the performance object.

Type Integer with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- WMI (0)
- PERFMON (1)
- WMI ASSOCIATION GROUP (2)
- JMX (3)
- SNMP (4)
- SHELL COMMAND (5)
- JOINED GROUPS (6)
- CIMOM (7)
- CUSTOM (8)
- ROLLUP DATA (9)
- WMI REMOTE DATA (10)
- LOG FILE (11)
- JDBC (12)
- CONFIG DISCOVERY (13)
- NT EVENT LOG (14)
- FILTER (15)
- SNMP EVENT (16)
- PING (17)
- DIRECTOR DATA (18)
- DIRECTOR EVENT (19)
- SSH REMOTE SHELL COMMAND (20)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
OBJECT_TYPE or OBJTYPE

Object Status attribute

Description
The status of the performance object.

Type Integer with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- ACTIVE (0)
- INACTIVE (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
OBJECT_STATUS or OBJSTTS

Error Code attribute

Description
The error code associated with the query.

Type Integer with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- NO ERROR (0)
- GENERAL ERROR (1)
- OBJECT NOT FOUND (2)
- COUNTER NOT FOUND (3)
- NAMESPACE ERROR (4)
- OBJECT CURRENTLY UNAVAILABLE (5)
- COM LIBRARY INIT FAILURE (6)
- SECURITY INIT FAILURE (7)
- PROXY SECURITY FAILURE (9)
- NO INSTANCES RETURNED (10)
- ASSOCIATOR QUERY FAILED (11)
- REFERENCE QUERY FAILED (12)
- NO RESPONSE RECEIVED (13)
- CANNOT FIND JOINED QUERY (14)
- CANNOT FIND JOIN ATTRIBUTE IN QUERY 1 RESULTS (15)
- CANNOT FIND JOIN ATTRIBUTE IN QUERY 2 RESULTS (16)
- QUERY 1 NOT A SINGLETON (17)
- QUERY 2 NOT A SINGLETON (18)
- NO INSTANCES RETURNED IN QUERY 1 (19)
- NO INSTANCES RETURNED IN QUERY 2 (20)
- CANNOT FIND ROLLUP QUERY (21)
- CANNOT FIND ROLLUP ATTRIBUTE (22)
- FILE OFFLINE (23)
- NO HOSTNAME (24)
- MISSING LIBRARY (25)

- ATTRIBUTE COUNT MISMATCH (26)
- ATTRIBUTE NAME MISMATCH (27)
- COMMON DATA PROVIDER NOT STARTED (28)
- CALLBACK REGISTRATION ERROR (29)
- MDL LOAD ERROR (30)
- AUTHENTICATION FAILED (31)
- CANNOT RESOLVE HOST NAME (32)
- SUBNODE UNAVAILABLE (33)
- SUBNODE NOT FOUND IN CONFIG (34)
- ATTRIBUTE ERROR (35)
- CLASSPATH ERROR (36)
- CONNECTION FAILURE (37)
- FILTER SYNTAX ERROR (38)
- FILE NAME MISSING (39)
- SQL QUERY ERROR (40)
- SQL FILTER QUERY ERROR (41)
- SQL DB QUERY ERROR (42)
- SQL DB FILTER QUERY ERROR (43)
- PORT OPEN FAILED (44)
- ACCESS DENIED (45)
- TIMEOUT (46)
- NOT IMPLEMENTED (47)
- REQUESTED A BAD VALUE (48)
- RESPONSE TOO BIG (49)
- GENERAL RESPONSE ERROR (50)
- SCRIPT NONZERO RETURN (51)
- SCRIPT NOT FOUND (52)
- SCRIPT LAUNCH ERROR (53)
- CONF FILE DOES NOT EXIST (54)
- CONF FILE ACCESS DENIED (55)
- INVALID CONF FILE (56)
- EIF INITIALIZATION FAILED (57)
- CANNOT OPEN FORMAT FILE (58)
- FORMAT FILE SYNTAX ERROR (59)
- REMOTE HOST UNAVAILABLE (60)
- EVENT LOG DOES NOT EXIST (61)
- PING FILE DOES NOT EXIST (62)
- NO PING DEVICE FILES (63)
- PING DEVICE LIST FILE MISSING (64)
- SNMP MISSING PASSWORD (65)
- DISABLED (66)
- URLS FILE NOT FOUND (67)
- XML PARSE ERROR (68)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
ERROR_CODE or ERRCODE

Volumes attribute group

The Volumes attribute group contains information about volumes. The information includes name, containing aggregate name, containing host name, operating status, operations per second, latency, percent used, and data transfer rates.

Historical group

This attribute group is eligible for use with Tivoli Data Warehouse.

Attribute descriptions

The following list contains information about each attribute in the Volumes attribute group:

Node attribute - This attribute is a key attribute.

Description

The managed system name of the agent.

Type String

Warehouse name
NODE

Timestamp attribute

Description

The local time at the agent when the data was collected.

Type String

Warehouse name
TIMESTAMP

Host Name attribute - This attribute is a key attribute.

Description

The name of the host that contains this volume.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
HOST_NAME

Aggregate Name attribute - This attribute is a key attribute.

Description

The name of the aggregate that contains this volume.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name
AGGREGATE_NAME or AGGR_NAME

Volume Name attribute - This attribute is a key attribute.

Description

The name of this volume.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

VOLUME_NAME or VOL_NAME

Volume Type attribute

Description

The type of this volume, either traditional, flexible, or striped.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- traditional (traditional)
- flexible (flexible)
- striped (striped)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

VOLUME_TYPE or VOL_TYPE

Volume State attribute

Description

Indicates the state of this volume. Possible values are unavailable, initializing, failed, offline, online, partial, restricted, or unknown.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- initializing (initializing)
- failed (failed)
- offline (offline)
- online (online)
- partial (partial)
- restricted (restricted)
- unknown (unknown)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

VOLUME_STATE or VOL_STATE

Run Status attribute

Description

Indicates how well this volume is running. Possible values are unavailable, unknown, normal, information, unmanaged, warning, error, critical, or emergency.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

RUN_STATUS or RUN_STS

Perf Status attribute**Description**

Indicates how well this volume is performing. Possible values are unavailable, unknown, normal, information, unmanaged, warning, error, critical, or emergency.

Type String with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (unavailable)
- unknown (unknown)
- normal (normal)
- information (information)
- unmanaged (unmanaged)
- warning (warning)
- error (error)
- critical (critical)
- emergency (emergency)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_STATUS or PERF_STS

Composite Status attribute**Description**

A composite of the status fields indicating the maximum severity of all the fields.

Type Real number (gauge) with 1 decimal place of precision with enumerated values.

The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_STATUS or CMP_STS

Volume Size attribute

Description

The total number of GB in this volume, including the snapshot reserve.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

VOLUME_SIZE or VOL_SIZE

Size Warehouse attribute

Description

Indicates whether the size data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SIZE_WAREHOUSE or SIZE_WRHS

Maximum Size attribute

Description

The maximum size in GB to which this volume grows if autosize is enabled.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

MAXIMUM_SIZE or MAX_SIZE

Autosize Enabled attribute

Description

Indicates whether autosize is enabled and whether the maximum size data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Disabled (0)
- Enabled (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AUTOSIZE_ENABLED or AUTOSIZE

Is Dedupe Enabled attribute

Description

Specifies if deduplication is enabled on the volume.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Disabled (0)
- Enabled (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

IS_DEDUPE_ENABLED or DEDUPED

AFS Available attribute

Description

The number of GB available in the active file system of this volume. This value is (afs-total - afs-used) or the available space in the aggregate, whichever is lower.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_AVAIL

AFS Data attribute

Description

The number of GB used to hold user data in the active file system of this volume. This value matches the sum of the file sizes. This value includes data and hole reserves, if any.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_DATA

AFS Total attribute

Description

The total number of GB in the active file system of this volume (volume size minus snapshot reserve).

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_TOTAL

AFS Used attribute

Description

The number of GB used to hold the active file system data for this volume. This value is what the df command reports as used for the volume. The value includes data, hole reserves, overwrite reserves, and snapshot overflow.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_USED

AFS Percent Used attribute

Description

The percentage of the total number of GB used to hold active file system data.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_PERCENT_USED or AFS_PCT

AFS Warehouse attribute

Description

Indicates whether the AFS data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

AFS_WAREHOUSE or AFS_WRHS

Overwrite Reserve Available attribute**Description**

The number of GB available as reserved space for data overwrites on this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OVERWRITE_RESERVE_AVAIL or OVR_AVAIL

Overwrite Reserve Total attribute**Description**

Total number of GB reserved for data overwrites. This is the space reserved for overwriting LUNs and other space-reserved files when the volume has snapshots and afs-avail is zero.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OVERWRITE_RESERVE_TOTAL or OVR_TOTL

Overwrite Reserve Used attribute**Description**

Number of GB used in overwrite reserve space.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OVERWRITE_RESERVE_USED or OVR_USED

Overwrite Reserve Percent Used attribute**Description**

The percentage of the total number of GB used to hold overwrite data for this volume.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OVERWRITE_RESERVE_PERCENT_USED or OVR_PCT

Overwrite Warehouse attribute

Description

Indicates whether the overwrite reserve data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OVERWRITE_WAREHOUSE or OVR_WRHS

Snapshot Reserve Available attribute

Description

The number of available GB in the snapshot reserve for this volume. If snapshot-reserve-used is greater than snapshot-reserve-total, this value is zero.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SNAPSHOT_RESERVE_AVAIL or SNP_AVL

Snapshot Reserve Total attribute

Description

The total number of GB of snapshot reserve on this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SNAPSHOT_RESERVE_TOTAL or SNP_TOTL

Snapshot Reserve Used attribute

Description

The total number of GB used to hold snapshot data. This number can be greater than the snapshot reserve size but does not include any space used out of the Snapshot reserve.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SNAPSHOT_RESERVE_USED or SNP_USED

Snapshot Reserve Percent Used attribute

Description

The percentage of the total number of GB used to hold snapshot data for this volume.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SNAPSHOT_RESERVE_PERCENT_USED or SNP_PCT

Max Percent Used attribute

Description

The maximum percentage used from AFS, overwrite, and snapshot data for this volume.

Type Real number (gauge) with 1 decimal place of precision with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

MAX_PERCENT_USED or MAX_PCT

Snapshot Warehouse attribute

Description

Indicates whether the Snapshot reserve data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

SNAPSHOT_WAREHOUSE or SNP_WRHS

Read Ops attribute

Description

The number of reads per second from this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

READ_OPS or RD_OPS

Read Data attribute**Description**

The KB per second read from this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

READ_DATA or RD_DATA

Read Latency attribute**Description**

The average time in milliseconds for reads from this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

READ_LATENCY or RD_LATNCY

Write Ops attribute**Description**

The number of writes per second from this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

WRITE_OPS or WR_OPS

Write Data attribute

Description

The KB per second written to this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

WRITE_DATA or WR_DATA

Write Latency attribute**Description**

The average time in milliseconds for writes from this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

WRITE_LATENCY or WR_LATNCY

Other Ops attribute**Description**

The number of other operations per second on this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OTHER_OPS or OTH_OPS

Other Latency attribute**Description**

The average time in milliseconds for other operations on this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

OTHER_LATENCY or OTH_LATNCY

Composite Data Rate attribute

Description

The sum of the read and write KB-per-second metrics for this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_DATA_RATE or CMP_RATE

Composite Latency attribute**Description**

The sum of the read, write, and other latency metrics for this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

COMPOSITE_LATENCY or CMP_LATNCY

Total Ops attribute**Description**

The sum of the read, write, and other operations metrics for this volume.

Type DEFAULT with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- unavailable (-1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

TOTAL_OPS or TOTL_OPS

Perf Warehouse attribute**Description**

Indicates whether the performance data is to be ignored or included by the warehouse.

Type Integer (gauge) with enumerated values. The strings are displayed in the Tivoli Enterprise Portal. The warehouse and queries return the values shown in parentheses. The following values are defined:

- Exclude (0)
- Include (1)

Any other values will display the actual value returned by the agent in the Tivoli Enterprise Portal.

Warehouse name

PERF_WAREHOUSE or PERF_WRHS

Disk capacity planning for historical data

Disk capacity planning for a monitoring agent is a prediction of the amount of disk space to be consumed for each attribute group with historical data that is being collected. Required disk storage is an important factor when you are defining data collection rules and your strategy for historical data collection.

The Capacity planning for historical data table provides the following information required to calculate disk space for this monitoring agent:

Table Table name as it is displayed in the warehouse database, if the attribute group is configured to be written to the warehouse. The table name listed here corresponds to the table name in “Attribute groups for the monitoring agent” on page 19.

Attribute group

Name of the attribute group used to create the table in the warehouse database if it is short enough to fit in the table naming constraints of the database being used for the warehouse. The attribute group name listed here corresponds to the Warehouse table name in “Attribute groups for the monitoring agent” on page 19.

Bytes per row (agent)

Estimate of the record length for each row or instance written to the agent disk for historical data collection. This estimate can be used for agent disk space planning purposes.

Database bytes per row (warehouse)

Estimate of the record length for detailed records written to the warehouse database, if the attribute group is configured to be written to the warehouse. Detailed records are records that have been uploaded from the agent for long-term historical data collection. This estimate can be used for warehouse disk-space planning purposes.

Aggregate bytes per row (warehouse)

Estimate of the record length for aggregate records written to the warehouse database, if the attribute group is configured to be written to the warehouse. Aggregate records are created by the Summarization agent for attribute groups that have been configured for summarization. This estimate can be used for warehouse disk-space planning purposes.

In addition to the information in the tables, you must know the number of rows of data that you plan to collect. An attribute group can have single or multiple rows of data depending on the application environment that is being monitored. For example, if your attribute group is monitoring each processor in your computer and you have a dual processor computer, the number of rows is two.

Table 1. Capacity planning for historical data logged by the NetApp Storage agent

Table	Attribute group	Bytes per row (agent)	Database bytes per row (warehouse)	Aggregate bytes per row (warehouse)
KNU02AGREG	KNU_AGGREGATES	376	511	1418
KNU01HOST	KNU_HOSTS	865	931	1567
KNUHOSTNIF	KNU_HOST_NETWORK_INTERFACES	351	460	1022
KNU04LUN	KNU_LUNS	376	464	1038
KNUPOBJST	KNU_PERFORMANCE_OBJECT_STATUS	288	289	326
KNU03VOL	KNU_VOLUMES	560	842	2580

For more information about historical data collection, see the *IBM Tivoli Monitoring Administrator's Guide*.

Chapter 5. Situations reference

A situation is a logical expression involving one or more system conditions. Situations are used to monitor the condition of systems in your network. You can manage situations from the Tivoli Enterprise Portal by using the Situation Editor or from the command-line interface using the `tacmds` for situations. You can manage private situations in the private configuration XML file.

About situations

The monitoring agents that you use to monitor your system environment include a set of predefined situations that you can use as-is. You can also create new situations to meet your requirements.

Predefined situations contain attributes that check for system conditions common to many enterprises. Using predefined situations can improve the speed with which you can begin using the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage. You can change the conditions or values being monitored by a predefined situation to the conditions or values best suited to your enterprise.

You can display predefined situations and create your own situations using the Situation editor. The left panel of the Situation editor initially lists the situations associated with the Navigator item that you selected. When you click a situation name or create a situation, the right panel opens with the following tabs:

Formula

Formula describing the condition being tested.

Distribution

List of managed systems (operating systems, subsystems, or applications) to which the situation can be distributed. All the NetApp Storage agent managed systems are assigned by default.

Expert advice

Comments and instructions to be read in the event workspace.

Action

Command to be sent to the system.

EIF Customize forwarding of the event to an Event Integration Facility receiver. (Available when the Tivoli Enterprise Monitoring Server has been configured to forward events.)

Until Options to close the event after a period of time, or when another situation becomes true.

Additional information about situations

The *Tivoli Enterprise Portal User's Guide* contains more information about predefined and custom situations and how to use them to respond to alerts.

For a list of the predefined situations and information about each individual situation for this monitoring agent, see "Predefined situations."

Predefined situations

The monitoring agent contains predefined situations, which are organized by Navigator item.

- NetApp Storage
 - Not applicable
- Aggregates
 - KNU_AggregateRunStatusAbnormal

- Hosts
 - KNU_HostRunStatusAbnormal
 - KNU_HostOffLine
- LUNs
 - KNU_LUNRunStatusAbnormal
- Volumes
 - KNU_VolumeRunStatusAbnormal

Situation descriptions

Each situation description provides information about the situation that you can use to monitor the condition of systems in your network.

The situation descriptions provide the following information:

Description

Information about the conditions that the situation tests.

Formula

Syntax that contains one or more logical expressions describing the conditions for the situation to monitor.

Distribution

Whether the situation is automatically distributed to instances of the agent or is available for manual distribution.

Run at startup

Whether the situation starts monitoring when the agent starts.

Sampling interval

Number of seconds that elapse between one sample of data that the monitoring agent collects for the server and the next sample.

Situation persistence

Whether the conditions specified in the situation evaluate to "true" for the defined number of occurrences in a row before the situation is raised. The default of one means that no persistence-checking takes place.

Severity

Severity of the predefined events: Warning, Informational, or Critical.

Clearing conditions

Controls when a true situation closes: after a period of time, when another situation is true, or whichever occurs first if both are selected.

NetApp Storage Navigator item

No predefined situations are included for this Navigator item.

Aggregates Navigator item

The situation descriptions are organized by the Navigator item to which the situations are relevant.

KNU_AggregateRunStatusAbnormal situation

Description

The run status of this aggregate is not normal.

The situation is evaluated for each distinct value of the HOST_NAME attribute.

Formula

```
*IF *VALUE KNU_AGGREGATES.Run_Status *NE 'unavailable' *AND *VALUE
KNU_AGGREGATES.Run_Status *NE 'normal' *AND *VALUE KNU_AGGREGATES.Run_Status *NE
'information'
```

See “Attributes in each attribute group” on page 20 for descriptions of the attributes in this formula.

Distribution

This situation is automatically distributed to instances of this agent.

Run at startup

Yes

Sampling interval

30 seconds

Situation persistence

The number of times the conditions of the situation must occur for the situation to be true is 1.

Error conditions

Warning

Clearing conditions

The situation clears when the condition becomes false.

Hosts Navigator item

The situation descriptions are organized by the Navigator item to which the situations are relevant.

KNU_HostRunStatusAbnormal situation**Description**

The run status for this host is not normal.

The situation is evaluated for each distinct value of the HOST_NAME attribute.

Formula

```
*IF *VALUE KNU_HOSTS.Run_Status *NE 'unavailable' *AND *VALUE
KNU_HOSTS.Run_Status *NE 'normal' *AND *VALUE KNU_HOSTS.Run_Status *NE
'information'
```

See “Attributes in each attribute group” on page 20 for descriptions of the attributes in this formula.

Distribution

This situation is automatically distributed to instances of this agent.

Run at startup

Yes

Sampling interval

30 seconds

Situation persistence

The number of times the conditions of the situation must occur for the situation to be true is 1.

Error conditions

Warning

Clearing conditions

The situation clears when the condition becomes false.

KNU_HostOffLine situation

Description

The host is off-line.

The situation is evaluated for each distinct value of the HOST_NAME attribute.

Formula

*IF *VALUE KNU_HOSTS.Host_Status *NE 'up'

See “Attributes in each attribute group” on page 20 for descriptions of the attributes in this formula.

Distribution

This situation is automatically distributed to instances of this agent.

Run at startup

Yes

Sampling interval

30 seconds

Situation persistence

The number of times the conditions of the situation must occur for the situation to be true is 1.

Error conditions

Warning

Clearing conditions

The situation clears when the condition becomes false.

LUNs Navigator item

The situation descriptions are organized by the Navigator item to which the situations are relevant.

KNU_LUNRunStatusAbnormal situation**Description**

The run status of this LUN is not normal.

The situation is evaluated for each distinct value of the HOST_NAME attribute.

Formula

*IF *VALUE KNU_LUNS.Run_Status *NE 'unavailable' *AND *VALUE KNU_LUNS.Run_Status *NE 'normal' *AND *VALUE KNU_LUNS.Run_Status *NE 'information'

See “Attributes in each attribute group” on page 20 for descriptions of the attributes in this formula.

Distribution

This situation is automatically distributed to instances of this agent.

Run at startup

Yes

Sampling interval

30 seconds

Situation persistence

The number of times the conditions of the situation must occur for the situation to be true is 1.

Error conditions

Warning

Clearing conditions

The situation clears when the condition becomes false.

Volumes Navigator item

The situation descriptions are organized by the Navigator item to which the situations are relevant.

KNU_VolumeRunStatusAbnormal situation

Description

The run status of this volume is not normal.

The situation is evaluated for each distinct value of the HOST_NAME attribute.

Formula

```
*IF *VALUE KNU_VOLUMES.Run_Status *NE 'unavailable' *AND *VALUE  
KNU_VOLUMES.Run_Status *NE 'normal' *AND *VALUE KNU_VOLUMES.Run_Status *NE  
'information'
```

See “Attributes in each attribute group” on page 20 for descriptions of the attributes in this formula.

Distribution

This situation is automatically distributed to instances of this agent.

Run at startup

Yes

Sampling interval

30 seconds

Situation persistence

The number of times the conditions of the situation must occur for the situation to be true is 1.

Error conditions

Warning

Clearing conditions

The situation clears when the condition becomes false.

Chapter 6. Take Action commands reference

Take Action commands can be run from the portal client or included in a situation or a policy.

About Take Action commands

When included in a situation, the command runs when the situation becomes true. A Take Action command in a situation is also referred to as *reflex automation*. When you enable a Take Action command in a situation, you automate a response to system conditions. For example, you can use a Take Action command to send a command to restart a process on the managed system or to send a text message to a cell phone.

In advanced automation, policies are used to take actions, schedule work, and automate manual tasks. A policy comprises a series of automated steps called activities that are connected to create a workflow. After an activity is completed, the Tivoli Enterprise Portal receives return-code feedback, and advanced automation logic responds with subsequent activities that are prescribed by the feedback.

A basic Take Action command shows the return code of the operation in a message box that is displayed after the action is completed or in a log file. After you close this window, no further information is available for this action.

Additional information about Take Action commands

For more information about working with Take Action commands, see the *Tivoli Enterprise Portal User's Guide*.

Predefined Take Action commands

Not all agents have predefined Take Action commands. But you can create Take Action commands for any agent.

The IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage does not provide predefined Take Action commands.

Chapter 7. Policies reference

Policies are used as an advanced automation technique for implementing more complex workflow strategies than you can create through simple automation. All agents do not provide predefined policies, but you can create policies for any agent.

About policies

A *policy* is a set of automated system processes that can take actions, schedule work for users, or automate manual tasks. You use the Workflow Editor to design policies. You control the order in which the policy executes a series of automated steps, which are also called *activities*. Policies are connected to create a workflow. After an activity is completed, the Tivoli Enterprise Portal receives return-code feedback, and advanced automation logic responds with subsequent activities prescribed by the feedback.

Additional information about policies

This monitoring agent does not provide predefined policies. For more information about working with policies, see the *Tivoli Enterprise Portal User's Guide*.

For information about using the Workflow Editor, see the *IBM Tivoli Monitoring Administrator's Guide* or the Tivoli Enterprise Portal online help.

Chapter 8. Troubleshooting

Problems can be related to IBM Tivoli Monitoring or the specific agent that you are using.

See the *IBM Tivoli Monitoring Troubleshooting Guide* for general troubleshooting information. Also see “Support information” on page 94 for other problem-solving options.

You can resolve some problems by ensuring that your system matches the system requirements listed in the Prerequisites topic for the agent in the information center.

The following activities can help you find a solution to the problem you are having:

- “Gathering product information for IBM Software Support”
- “Using logging” on page 72
- “Consulting the lists of identified problems and workarounds” on page 72

Gathering product information for IBM Software Support

Before contacting IBM Software Support about a problem you are experiencing with this product, gather the information shown in Table 2.

Table 2. Information to gather before contacting IBM Software Support

Information type	Description
Log files	Collect trace log files from failing systems. Most logs are located in a logs subdirectory on the host computer. See “Principal trace log files” on page 73 for lists of all trace log files and their locations. See the <i>Tivoli Enterprise Portal User's Guide</i> for general information about the IBM Tivoli Monitoring environment.
Operating system	Operating system version number and patch level
Messages	Messages and other information displayed on the screen
Version numbers for IBM Tivoli Monitoring	Version number of the following members of the monitoring environment: <ul style="list-style-type: none">• IBM Tivoli Monitoring. Also provide the patch level, if available.• IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage
Screen captures	Screen captures of incorrect output, if any
(UNIX systems only) Core dump files	If the system stops on UNIX systems, collect the core dump file from the <i>install_dir/bin</i> directory, where <i>install_dir</i> is the directory where you installed the monitoring agent.

You can use the `pdcollect` tool to collect the most commonly used information from a system. This tool gathers log files, configuration information, version information, and other data. See the “`pdcollect` tool” section in the “Tools” chapter of the *IBM Tivoli Monitoring Troubleshooting Guide* for more information about using this tool.

See [http://www.ibm.com/support/entry/portal/Open_service_request/Software/Software_support_\(general\)](http://www.ibm.com/support/entry/portal/Open_service_request/Software/Software_support_(general)) for information about working with IBM Software Support.

Using logging

Logging is the primary troubleshooting feature in the NetApp Storage agent. *Logging* refers to the text messages and trace data that is generated by the NetApp Storage agent. Messages and trace data are sent to a file.

Trace data captures transient information about the current operating environment when a component or application fails to operate as designed. IBM Software Support personnel use the captured trace information to determine the source of an error or unexpected condition. See “Trace logging” for more information.

Consulting the lists of identified problems and workarounds

Known problems have been organized into types such as those in the following list to make them easier to locate:

- Installation and configuration
- General usage and operation
- Display of monitoring data
- Take Action commands

Information about symptoms and detailed workarounds for these types of problems is located in “Problems and workarounds” on page 83.

See the *IBM Tivoli Monitoring Troubleshooting Guide* for general troubleshooting information.

Trace logging

Trace logs are used to capture information about the operating environment when component software fails to operate as designed.

The principal log type is the RAS (Reliability, Availability, and Serviceability) trace log. These logs are in the English language only. The RAS trace log mechanism is available for all components of IBM Tivoli Monitoring. Most logs are located in a logs subdirectory on the host computer. See the following information to learn how to configure and use trace logging:

- “Principal trace log files” on page 73
- “Examples: Using trace logs” on page 76
- “Setting RAS trace parameters by using the GUI” on page 78

Note: The documentation refers to the RAS facility in IBM Tivoli Monitoring as “RAS1.”

IBM Software Support personnel use the information captured by trace logging to trace a problem to its source or to determine why an error occurred. All components in the IBM Tivoli Monitoring environment have a default tracing level. The tracing level can be changed on a per-component level to adjust the type of trace information collected, the degree of trace detail, the number of trace logs to be kept, and the amount of disk space used for tracing.

Overview of log file management

Log files have naming conventions.

Log file naming conventions

Table 3 on page 73 provides the names, locations, and descriptions of RAS1 log files. The log file names adhere to the following naming convention:

Windows systems

hostname_productcode_program_HEXtimestamp-nn.log

Linux and UNIX systems

hostname_productcode_HEXtimestamp-nn.log

where:

hostname

Host name of the computer where the monitoring component is running.

productcode

Two-character product code. For IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage, the product code is nu.

program

Name of the program being run.

HEXtimestamp

Hexadecimal time stamp representing the time at which the program started.

nn

Rolling log suffix.

Principal trace log files

Trace log files are located on various systems.

Table 3 contains locations, file names, and descriptions of trace logs that can help determine the source of problems with agents.

Table 3. Trace log files for troubleshooting agents

System where log is located	File name and path	Description
On the Tivoli Enterprise Monitoring Server	<ul style="list-style-type: none">• Windows: The file in the <i>install_dir\InstallITM</i> path• UNIX: The <i>candle_installation.log</i> file in the <i>install_dir/logs</i> path• Linux: The <i>candle_installation.log</i> file in the <i>install_dir/logs</i> path	Provides details about products that are installed. Note: Trace logging is enabled by default. A configuration step is not required to enable this tracing.
On the Tivoli Enterprise Monitoring Server	The <i>Warehouse_Configuration.log</i> file is in the following location on Windows systems: <i>install_dir\InstallITM</i>	Provides details about the configuration of data warehousing for historical reporting.

Table 3. Trace log files for troubleshooting agents (continued)

System where log is located	File name and path	Description
On the Tivoli Enterprise Monitoring Server	<p>The name of the RAS log file is as follows:</p> <ul style="list-style-type: none"> • Windows: <i>install_dir\logs\hostname_ms_timestamp-nn.log</i> • UNIX: <i>install_dir/logs/hostname_ms_timestamp-nn.log</i> • Linux: <i>install_dir/logs/hostname_ms_timestamp-nn.log</i> <p>Note: File names for RAS1 logs include a hexadecimal time stamp.</p> <p>Also on UNIX systems, a log with a decimal time stamp is provided: <i>hostname_productcode_timestamp.log</i> and <i>hostname_productcode_timestamp.pid nnnnn</i> in the <i>install_dir/logs</i> path, where <i>nnnnn</i> is the process ID number.</p>	Traces activity on the monitoring server.
On the Tivoli Enterprise Portal Server	<p>The name of the RAS log file is as follows:</p> <ul style="list-style-type: none"> • Windows: <i>install_dir\logs\hostname_cq_HEXtimestamp-nn.log</i> • UNIX: <i>install_dir/logs/hostname_cq_HEXtimestamp-nn.log</i> • Linux: <i>install_dir/logs/hostname_cq_HEXtimestamp-nn.log</i> <p>Note: File names for RAS1 logs include a hexadecimal time stamp.</p> <p>Also on UNIX systems, a log with a decimal time stamp is provided: <i>hostname_productcode_timestamp.log</i> and <i>hostname_productcode_timestamp.pidnnnnn</i> in the <i>install_dir/logs</i> path, where <i>nnnnn</i> is the process ID number.</p>	Traces activity on the portal server.
On the Tivoli Enterprise Portal Server	<p>The teps_odbc.log file is located in the following path:</p> <ul style="list-style-type: none"> • Windows: <i>install_dir\Install\ITM</i> • UNIX: <i>install_dir/logs</i> • Linux: <i>install_dir/logs</i> 	When you enable historical reporting, this log file traces the status of the warehouse proxy agent.

Table 3. Trace log files for troubleshooting agents (continued)

System where log is located	File name and path	Description
On the computer that hosts the monitoring agent	<p>The RAS1 log files are as follows:</p> <ul style="list-style-type: none"> • Windows: <i>hostname_nu_instance_name_knuagent_HEXtimestamp-nn.log</i> in the <i>install_dir\tmaitm6\logs</i> directory • UNIX: <i>hostname_nu_instance_name_knuagent_HEXtimestamp-nn.log</i> in the <i>install_dir/logs</i> directory • Linux: <i>hostname_nu_instance_name_knuagent_HEXtimestamp-nn.log</i> in the <i>install_dir/logs</i> directory <p>These logs are in the following directories:</p> <ul style="list-style-type: none"> • Windows: <i>install_dir\tmaitm6\logs</i> • UNIX: <i>install_dir/logs</i> • Linux: <i>install_dir/logs</i> <p>On Linux systems, the following additional logs are provided:</p> <ul style="list-style-type: none"> – <i>hostname_nu_timestamp.log</i> – <i>hostname_nu_timestamp.pidnnnnn</i> in the <i>install_dir/logs</i> path, where <i>nnnnn</i> is the process ID number 	Traces activity of the monitoring agent.
On the computer that hosts the monitoring agent	<p>The agent operations log files are as follows:</p> <p><i>instance_hostnameNU.LG0</i> is the current log created when the agent was started.</p> <p><i>instance_hostname_NU.LG1</i> is the backup of the previous log.</p> <p>These logs are in the following directory depending on the operating system that you are using:</p> <ul style="list-style-type: none"> • Windows: <i>install_dir\tmaitm6\logs</i> • Linux: <i>install_dir/logs</i> • UNIX: <i>install_dir/logs</i> 	<p>Shows whether the agent could connect to the monitoring server. Shows which situations are started and stopped, and shows other events while the agent is running. A new version of this file is generated every time the agent is restarted.</p> <p>IBM Tivoli Monitoring generates one backup copy of the *.LG0 file with the tag .LG1. View the .LG1 tag to learn the following details regarding the <i>previous</i> monitoring session:</p> <ul style="list-style-type: none"> • Status of connectivity with the monitoring server • Situations that were running • The success or failure status of Take Action commands

Table 3. Trace log files for troubleshooting agents (continued)

System where log is located	File name and path	Description
On the computer that hosts the monitoring agent	<p>The Take Action command log files are as follows:</p> <ul style="list-style-type: none"> <i>host_nu_instance_takeactioncommand.log</i> <p>The logs are in the following directories:</p> <ul style="list-style-type: none"> Windows: <i>install_dir\tmaitm6\logs</i> UNIX: <i>install_dir /logs</i> Linux: <i>install_dir /logs</i> 	Traces activity each time a Take Action command runs. For example, when a hypothetical start_command Take Action command runs, IBM Tivoli Monitoring generates a <i>start_command.log</i> file.
On the computer that hosts the monitoring agent	<p>The data provider log files are as follows:</p> <ul style="list-style-type: none"> <i>knu_data_provider_instance_startup.log</i> <i>knu_data_provider_instance_n.log</i> <p>The logs are in the following directories:</p> <ul style="list-style-type: none"> Windows: <i>install_dir\tmaitm6\logs</i> Linux: <i>install_dir/logs</i> 	Traces monitoring agent data provider state and operations.
<p>Definitions of variables:</p> <ul style="list-style-type: none"> <i>timestamp</i> is a time stamp with a format that includes year (y), month (m), day (d), hour (h), and minute (m), as follows: yyymmdd hhmm <i>HEXtimestamp</i> is a hexadecimal representation of the time at which the process was started. <i>install_dir</i> represents the directory path where you installed the IBM Tivoli Monitoring component. <i>install_dir</i> can represent a path on the computer that hosts the monitoring system, the monitoring agent, or the portal. <i>instance</i> refers to the name of the database instance that you are monitoring. <i>instance_name</i> refers to the name of the agent instance. <i>hostname</i> refers to the name of the computer on which the IBM Tivoli Monitoring component runs. <i>nn</i> represents the circular sequence in which logs are rotated. this value includes a range from 1 - 5, by default. The first is always retained because it includes configuration parameters. <i>productcode</i> specifies the product code, for example, um for Universal Agent or nt for Windows systems. 		

See the *IBM Tivoli Monitoring Installation and Setup Guide* for more information about the complete set of trace logs that are maintained on the monitoring server.

Examples: Using trace logs

You can open trace logs in a text editor to learn some basic facts about your IBM Tivoli Monitoring environment.

IBM Software Support applies specialized knowledge to analyze trace logs to determine the source of problems. The following examples are from the Tivoli Enterprise Monitoring Server log.

Example one

This excerpt shows the typical log for a failed connection between a monitoring agent and a monitoring server with the host name **server1a**:

```
(Thursday, August 11, 2005, 08:21:30-{94C}kdc10cl.c,105,"KDC10_ClientLookup") status=1c020006,
"location server unavailable", ncs/KDC1_STC_SERVER_UNAVAILABLE
(Thursday, August 11, 2005, 08:21:35-{94C}kraarreg.cpp,1157,"LookupProxy") Unable to connect to
broker at ip.pipe:: status=0, "success", ncs/KDC1_STC_OK
(Thursday, August 11, 2005, 08:21:35-{94C}kraarreg.cpp,1402,"FindProxyUsingLocalLookup") Unable
to find running CMS on CT_CMSLIST <IP.PIPE:#server1a>
```

Example two

The following excerpts from the trace log *for the monitoring server* show the status of an agent, identified here as "Remote node." The name of the computer where the agent is running is **SERVER5B**:

```
(42C039F9.0000-6A4:kpxreqhb.cpp,649,"HeartbeatInserter") Remote node SERVER5B:NU is ON-LINE.
. . .
(42C3079B.0000-6A4:kpxreqhb.cpp,644,"HeartbeatInserter") Remote node SERVER5B:NU is OFF-LINE.
```

See the following key points about the preceding excerpts:

- The monitoring server appends the **NU** product code to the server name to form a unique name (SERVER5B:NU) for this instance of the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage. By using this unique name, you can distinguish multiple monitoring products that might be running on **SERVER5B**.
- The log shows when the agent started (ON-LINE) and later stopped (OFF-LINE) in the environment.
- For the sake of brevity, an ellipsis (...) represents the series of trace log entries that were generated while the agent was running.
- Between the ON-LINE and OFF-LINE log entries, the agent was communicating with the monitoring server.
- The ON-LINE and OFF-LINE log entries are always available in the trace log. All trace levels that are described in "Setting RAS trace parameters by using the GUI" on page 78 provide these entries.

On Windows systems, you can use the following alternate method to view trace logs:

1. In the Windows **Start** menu, click **Program Files > IBM Tivoli Monitoring > Manage Tivoli Enterprise Monitoring Services**. The Manage Tivoli Enterprise Monitoring Services window is displayed.
2. Right-click a component and click **Advanced > View Trace Log** in the menu. For example, if you want to view the trace log of the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage, right-click the name of that agent in the window. You can also use the viewer to access remote logs.

Note: The viewer converts time stamps in the logs to a format that is easier to read.

RAS trace parameters

Pinpoint a problem by setting detailed tracing of individual components of the monitoring agent and modules

See "Overview of log file management" on page 72 to ensure that you understand log rolling and can reference the correct log files when you manage log file generation.

In the log monitoring component of the PeopleSoft Application Domain agent and PeopleSoft Process Scheduler agent, a file name-based scheme is used to determine the newest PeopleSoft log file to monitor. For example, the APPSRV_1016 log file from October 16 appears to be newer than the APPSRV_0218 file from February 18; thus, the APPSRV_1016 file is monitored. This scheme becomes a problem when the date rolls over from December to January upon a new year. The log monitoring incorrectly identifies

APPSRV_1231 as a newer log file than APPSRV_0101. The suggested solution is to archive log files from the previous year into a different location. Keep only files from the current year in the directories containing the PeopleSoft domain and scheduler log files.

Setting RAS trace parameters by using the GUI

On Windows systems, you can use the graphical user interface to set trace options.

About this task

The IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage uses RAS1 tracing and generates the logs described in Table 3 on page 73. The default RAS1 trace level is ERROR. The default RAS1 trace level is ERROR.

Procedure

1. Open the Manage Tivoli Enterprise Monitoring Services window.
 2. Select **Advanced > Edit Trace Parm.** The Tivoli Enterprise Monitoring Server Trace Parameters window is displayed.
 3. Select a new trace setting in the pull-down menu in the **Enter RAS1 Filters** field or type a valid string.
 - General error tracing. KBB_RAS1=ERROR
 - Intensive error tracing. KBB_RAS1=ERROR (UNIT:kqz ALL)
 - Maximum error tracing. KBB_RAS1=ERROR (UNIT:kqz ALL) (UNIT:kra ALL)
- Note:** As this example shows, you can set multiple RAS tracing options in a single statement.
4. Modify the value for Maximum Log Size Per File (MB) to change the log file size (changes LIMIT value).
 5. Modify the value for Maximum Number of Log Files Per Session to change the number of log files per startup of a program (changes COUNT value).
 6. Modify the value for Maximum Number of Log Files Total to change the number of log files for all startups of a program (changes MAXFILES value).
 7. Optional: Click Y (Yes) in the **KDC_DEBUGd Setting** menu to log information that can help you diagnose communications and connectivity problems between the monitoring agent and the monitoring server. The **KDC_DEBUG** setting and the **Maximum error tracing** setting can generate a large amount of trace logging. Use these settings only temporarily, while you are troubleshooting problems. Otherwise, the logs can occupy excessive amounts of hard disk space.
 8. Click **OK**. You see a message reporting a restart of the monitoring agent so that your changes take effect.

What to do next

Monitor the size of the logs directory. Default behavior can generate a total of 45 - 60 MB for each agent that is running on a computer. For example, each database instance that you monitor can generate 45 - 60 MB of log data. See the "Procedure" section to learn how to adjust file size and numbers of log files to prevent logging activity from occupying too much disk space.

Regularly prune log files other than the RAS1 log files in the logs directory. Unlike the RAS1 log files that are pruned automatically, other log types can grow indefinitely, for example, the logs in Table 3 on page 73 that include a process ID number (PID).

Use collector trace logs as an additional source of troubleshooting information.

Note: The **KDC_DEBUG** setting and the **Maximum error tracing** setting can generate a large amount of trace logging. Use these settings only temporarily while you are troubleshooting problems. Otherwise, the logs can occupy excessive amounts of hard disk space.

Manually setting RAS trace parameters

You can manually edit the RAS1 trace logging parameters.

About this task

The IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage uses RAS1 tracing and generates the logs described in Table 3 on page 73. The default RAS1 trace level is ERROR. The default RAS1 trace level is ERROR.

Procedure

1. Open the trace options file.
 - **Windows:**
`install_dir\tmaitm6\KNUENV`
 - `install_dir /config/nu.ini`
 2. Edit the line that begins with **KBB_RAS1=** to set trace logging preferences. For example, if you want detailed trace logging, set the **Maximum Tracing** option: **KBB_RAS1=ERROR (UNIT:kqz ALL) (UNIT:kra ALL)**
 3. Edit the line that begins with **KBB_RAS1_LOG=** to manage the generation of log files:
 - **MAXFILES:** The total number of files that are to be kept for all startups of a given program. When this value is exceeded, the oldest log files are discarded. The default value is 9.
 - **LIMIT:** The maximum size, in megabytes (MB) of a RAS1 log file. The default value is 5.
 - IBM Software Support might guide you to modify the following parameters:
 - **COUNT:** The number of log files to keep in the rolling cycle of one program startup. The default is 3.
 - **PRESERVE:** The number of files that are not to be reused in the rolling cycle of one program startup. The default value is 1.
- Note:** The **KBB_RAS1_LOG** parameter also provides for the specification of the log file directory, log file name, and the inventory control file directory and name. Do not modify these values or log information can be lost.
4. Restart the monitoring agent so that your changes take effect.

What to do next

Monitor the size of the logs directory. Default behavior can generate a total of 45 - 60 MB for each agent that is running on a computer. For example, each database instance that you monitor can generate 45 - 60 MB of log data. See the "Procedure" section to learn how to adjust file size and numbers of log files to prevent logging activity from occupying too much disk space.

Regularly prune log files other than the RAS1 log files in the logs directory. Unlike the RAS1 log files that are pruned automatically, other log types can grow indefinitely, for example, the logs in Table 3 on page 73 that include a process ID number (PID).

Use collector trace logs as an additional source of troubleshooting information.

Note: The **KDC_DEBUG** setting and the **Maximum error tracing** setting can generate a large amount of trace logging. Use these settings only temporarily while you are troubleshooting problems. Otherwise, the logs can occupy excessive amounts of hard disk space.

Dynamic modification of trace settings

You can dynamically modify the trace settings for an IBM Tivoli Monitoring component, such as, Tivoli Enterprise Monitoring Server, Tivoli Enterprise Portal Server, most monitoring agents, and other components. You can access these components, with the exception of a few monitoring agents, from the tracing utility.

Dynamic modification of the trace settings is the most efficient method, because you can do it without restarting the component. Settings take effect immediately. Modifications by this method are not persistent.

Note: When the component is restarted, the trace settings are read again from the `.env` file. Dynamically modifying these settings does not change the settings in the `.env` files. To modify these trace settings permanently, modify them in the `.env` files.

ras1

Run this command to modify the trace settings for a Tivoli Monitoring component.

The syntax is as follows:

```
ras1 set|list (UNIT|COMP: class_name ANY|ALL|Detail|ERROR|Flow|INPUT|Metrics|OUTPUT|STATE)
{(UNIT|COMP: class_name ANY|ALL|Detail|ERROR|Flow|INPUT|Metrics|OUTPUT|STATE)}
```

You can specify more than one component class to which to apply the trace settings.

Command options

set

Turns on or off tracing depending upon the value of its parameters. If the parameter is **ANY**, it turns it off. All other parameters turn on tracing based on the specified type or level.

list

Displays the default level and type of tracing that is set by default.

Parameters

The parameters that determine the component classes to which to apply the trace settings are as follows:

COMP: *class_name*

Modifies the trace setting for the name of the component class, as specified by *class_name*, for example, COMP:KDH. The output contains trace for the specified class.

UNIT: *class_name*

Modifies the trace setting for any unit that starts with the specified *class_name* value, for example, UNIT: kra. The output contains trace for any unit that begins with the specified filter pattern.

The parameters that determine the trace level and type are as follows:

ALL

Displays all trace levels, including every trace point defined for the component. This setting might result in a large amount of trace, so specify other parameters to exclude unwanted trace. You might require the **ALL** parameter to isolate a problem. It is the equivalent to setting "Error Detail Flow State Input Output Metrics".

ANY

Turns off tracing.

Detail

Displays detailed information about each function.

When entered with the list option, the trace is tagged with Det.

ERROR

Logs internal error conditions.

When entered with the list option, the trace is tagged with ER. The output can also be tagged with EVERYE+EVERYU+ER.

Flow

Displays control flow data for each function entry and exit.

When entered with the list option, the trace is tagged with Fl.

INPUT

Displays input data for each function.

When entered with the list option, the trace is tagged with IN.

Metrics

Displays metrics on each function.

When entered with the list option, the trace is tagged with ME.

OUTPUT

Displays output data for each function.

When entered with the list option, the trace is tagged with OUT.

State

Displays the status for each function.

When entered with the list option, the trace is tagged with St.

Example

If you enter `ras1 set (COMP:KDH ALL) (COMP:ACF1 ALL) (COMP:KDE ALL)`, the trace utility turns on all levels of tracing for all the files and functions for which KDH, ACF1, and KDE are the classes.

```
kbbcre1.c, 400, May 29 2007, 12:54:43, 1.1, *
kbbcrn1.c, 400, May 29 2007, 12:54:42, 1.1, *
kdhb1de.c, 400, May 29 2007, 12:59:34, 1.1, KDH
kdh0med.c, 400, May 29 2007, 12:59:24, 1.1, KDH
kdhsrej.c, 400, May 29 2007, 13:00:06, 1.5, KDH
kdhb1fh.c, 400, May 29 2007, 12:59:33, 1.1, KDH
kdhb1oe.c, 400, May 29 2007, 12:59:38, 1.2, KDH
kdhs1ns.c, 400, May 29 2007, 13:00:08, 1.3, KDH
kbbacd1.c, 400, May 29 2007, 12:54:27, 1.2, ACF1
kbbac1c.c, 400, May 29 2007, 12:54:27, 1.4, ACF1
kbbac1i.c, 400, May 29 2007, 12:54:28, 1.11, ACF1
vkdhscfn.c, 400, May 29 2007, 13:00:11, 1.1, KDH
kdhserq.c, 400, May 29 2007, 12:59:53, 1.1, KDH
kdhb1pr.c, 400, May 29 2007, 12:59:39, 1.1, KDH
kdhsgh.c, 400, May 29 2007, 12:59:49, 1.1, KDH
kdh0uts.c, 400, May 29 2007, 12:59:23, 1.1, KDH
kdhsrsp.c, 400, May 29 2007, 13:00:13, 1.2, KDH
kdhs1rp.c, 400, May 29 2007, 13:00:12, 1.1, KDH
kdhs1rp.c, 400, May 29 2007, 12:59:58, 1.9, KDH
kdebbac.c, 400, May 29 2007, 12:56:50, 1.10, KDE
...
```

Turning on tracing

To use the tracing utility, you must use a local logon credential for the computer. This tracing method uses the IBM Tivoli Monitoring Service Console. Access the Service Console by using a web browser.

About this task

When you start the Service Console, it displays the information about the components that are currently running on that computer. For example, these components are listed as follows:

- Tivoli Enterprise Portal Server: `cnp`
- Monitoring Agent for Windows OS: `nt`
- Tivoli Enterprise Monitoring Server: `ms`

After you log on, you can type `?` to display a list of the supported commands. **ras1** is the command to modify trace settings. If you type it in the field at the bottom of the window, the help for this command is displayed.

Procedure

1. Open a web browser and enter the URL to access the Service Console.

`http://hostname:1920`

where *hostname* is the IP address or host name of the computer on which the Tivoli Monitoring component is running.

2. Click the hyperlink associated with the component for which you want to modify its trace settings.

Note: In the previous view, if you want to modify tracing for the Tivoli Enterprise Monitoring Server, select **IBM Tivoli Monitoring Service Console** under **Service Point: system.your host name_ms**.

3. Enter a user ID and password to access the system. This ID is any valid user that has access to the system.
4. Enter the command to turn on the required level of trace for the specified component classes or units.

```
ras1 set (UNIT|COMP: class_name ALL|Flow|ERROR|Detail|INPUT|Metrics|OUTPUT|STATE)
{(UNIT|COMP: class_name ALL|Flow|ERROR|Detail|INPUT|Metrics|OUTPUT|STATE)}
```

For example, to turn on the control flow trace for the KDE, the command is:

```
ras1 (COMP:KDE Flow)
```

Turning off tracing

You can use the IBM Tivoli Monitoring Service Console to run the **ras1** command and dynamically turn off tracing.

Procedure

1. Open a web browser and enter the URL to access the Service Console.

`http://hostname:1920`

where *hostname* is the IP address or host name of the computer on which the Tivoli Monitoring component is running.

2. Click the hyperlink associated with the component for which you want to modify its trace settings.
3. Enter a user ID and password to access the system. This ID is any valid user that has access to the system.
4. Enter the command to turn off the required level of trace for the specified component classes or units.

```
ras1 set (UNIT|COMP: class_name ANY)
{(UNIT|COMP: class_name ANY)}
```

For example, to turn off tracing for the `kbbcrd` class of the Windows OS agent, the command is:

```
ras1 set (UNIT:kbbcrd ANY)
```

Setting trace parameters for the Tivoli Enterprise Console server

In addition to the trace information captured by IBM Tivoli Monitoring, you can also collect additional trace information for the Tivoli Enterprise Console components that gather event server metrics.

About this task

To collect this information, modify the `.tec_diag_config` file on the Tivoli Enterprise Console event server. Use the steps in the following procedure to modify the event server trace parameters.

Procedure

1. Open the `$BINDIR/TME/TEC/.tec_diag_config` file in an ASCII editor.
2. Locate the entries that configure trace logging for the agent components on the event server. Two entries are included, one for `tec_reception` and one for `tec_rule`:

```
# to debug Agent Utils
tec_reception Agent_Utills  error   /tmp/tec_reception
SP
# to debug Agent Utils
tec_rule Agent_Utills  error   /tmp/tec_rule
```

3. To gather additional trace information, modify these entries to specify a trace level of `trace2`:

```
# to debug Agent Utils
tec_reception Agent_Utills  trace2  /tmp/tec_reception
SP
# to debug Agent Utils
tec_rule Agent_Utills      trace2  /tmp/tec_rule
```

4. In addition, modify the `Highest_level` entries for `tec_rule` and `tec_reception`:

```
tec_reception Highest_level trace2
SP
tec_rule Highest_level trace2
```

Problems and workarounds

The known problems and workarounds are organized into types of problems that might occur with the NetApp Storage agent, for example installation and configuration problems and workspace problems.

Note: You can resolve some problems by ensuring that your system matches the system requirements listed in the Prerequisites topic for the agent in the information center.

See the *IBM Tivoli Monitoring Troubleshooting Guide* for general troubleshooting information.

Installation and configuration troubleshooting

Problems can occur during installation, configuration, and uninstallation of the agent.

The problems and solutions in Table 4 on page 84 can occur during installation, configuration, and uninstallation of the agent.

Table 4. Problems and solutions for installation and configuration

Problem	Solution
<p>(UNIX only) During a command-line installation, you choose to install a component that is currently installed, and you see the following warning: WARNING - you are about to install the SAME version of "component_name" where component_name is the name of the component that you are attempting to install.</p> <p>Note: This problem affects UNIX command-line installations. If you monitor only Windows environments, you see this problem if you choose to install a product component (for example, a monitoring server) on a UNIX system.</p>	<p>You must exit and restart the installation process. You cannot return to the list where you selected components to install. When you run the installer again, do not attempt to install any component that is currently installed.</p>
<p>Diagnosing problems with product browse settings (Windows systems only).</p>	<p>When you have problems with browse settings, complete the following steps:</p> <ol style="list-style-type: none"> 1. Click Start > Programs > IBM Tivoli Monitoring > Manage Tivoli Enterprise Monitoring Services. The Manage Tivoli Enterprise Monitoring Services window is displayed. 2. Right-click the Windows agent and select Browse Settings. A text window is displayed. 3. Click Save As and save the information in the text file. <p>If requested, you can forward this file to IBM Software Support for analysis.</p>
<p>A message similar to "Unable to find running CMS on CT_CMSLIST" in the log file is displayed.</p>	<p>If a message similar to "Unable to find running CMS on CT_CMSLIST" is displayed in the log file, the agent cannot connect to the monitoring server. Confirm the following points:</p> <ul style="list-style-type: none"> • Do multiple network interface cards (NICs) exist on the system? • If multiple NICs exist on the system, find out which one is configured for the monitoring server. Ensure that you specify the correct host name and port settings for communication in the IBM Tivoli Monitoring environment.
<p>The system is experiencing high CPU usage.</p>	<p>Agent process: View the memory usage of the KNUCMA process. If CPU usage seems to be excessive, restart the monitoring agent.</p> <p>Network cards: The network card configurations can decrease the performance of a system. Each stream of packets that a network card receives (assuming that it is a broadcast or destined for the under-performing system) must generate a CPU interrupt and transfer the data through the I/O bus. If the network card in question is a bus-mastering card, work can be offloaded and a data transfer between memory and the network card can continue without using CPU processing power. Bus-mastering cards are 32-bit and are based on PCI or EISA bus architectures.</p>

Table 5. General problems and solutions for uninstallation

Problem	Solution
On Windows systems, uninstallation of IBM Tivoli Monitoring fails to uninstall the entire environment.	<p>Be sure that you follow the general uninstallation process described in the <i>IBM Tivoli Monitoring Installation and Setup Guide</i>:</p> <ol style="list-style-type: none"> 1. Remove Tivoli Enterprise Monitoring Server Application support by completing the following steps: <ol style="list-style-type: none"> a. Use Manage Tivoli Enterprise Monitoring Services. b. Select Tivoli Enterprise Monitoring Server. c. Right-click and select Advanced. d. Select Remove TEMS application support. e. Select the agent to remove its application support. 2. Uninstall the monitoring agents first, as in the following examples: <ul style="list-style-type: none"> • Uninstall a single monitoring agent for a specific database. -OR- • Uninstall all instances of a monitoring product, such as IBM Tivoli Monitoring for Databases. 3. Uninstall IBM Tivoli Monitoring.
The way to remove inactive managed systems (systems whose status is OFFLINE) from the Navigator tree in the portal is not obvious.	<p>Use the following steps to remove, but not uninstall, an offline managed system from the Navigator tree:</p> <ol style="list-style-type: none"> 1. Click the Enterprise icon in the Navigator tree. 2. Right-click, and then click Workspace > Managed System Status. 3. Right-click the offline managed system, and select Clear offline entry. <p>To uninstall the monitoring agent, use the procedure described in the <i>IBM Tivoli Monitoring Installation and Setup Guide</i>.</p>

Table 5. General problems and solutions for uninstallation (continued)

Problem	Solution
IBM Tivoli Monitoring might not be able to generate a unique name for monitoring components because of the truncation of names that the product automatically generates.	<p>If the agent supports multiple instances, IBM Tivoli Monitoring automatically creates a name for each monitoring component by concatenating the subsystem name, host name, and product code separated by colons (<i>subsystem_name:hostname:KNU</i>).</p> <p>Note: When you monitor a multinode system, such as a database, IBM Tivoli Monitoring adds a subsystem name to the concatenated name, typically a database instance name.</p> <p>The length of the name that IBM Tivoli Monitoring generates is limited to 32 characters. Truncation can result in multiple components having the same 32-character name. If this problem happens, shorten the <i>hostname</i> portion of the name as follows:</p> <ol style="list-style-type: none"> 1. Open the configuration file for the monitoring agent, which is located in the following path: <ul style="list-style-type: none"> • On Windows: <i>install_dir\tmaitm6\Kproduct_codeCMA.INI</i>. For example, the product code for the Monitoring Agent for Windows OS is NT. The file name is KNTCMA.INI. • On UNIX and Linux: <i>itm_home/config/product_code.ini</i> and <i>product_code.config</i>. For example, the file names for the Monitoring Agent for UNIX OS is <i>ux.ini</i> and <i>ux.config</i>. 2. Find the line that begins with CTIRA_HOSTNAME=. 3. Type a new name for host name that is a unique, shorter name for the host computer. The final concatenated name including the subsystem name, new host name, and KNU, cannot be longer than 32 characters. <p>Note: You must ensure that the resulting name is unique with respect to any existing monitoring component that was previously registered with the Tivoli Enterprise Monitoring Server.</p> 4. Save the file. 5. Restart the agent.
The NetApp Storage agent does not appear to be collecting any data. In the data provider log file, the following message is displayed: Class loading error; cannot continue. Ensure that manageontap.jar is in the data provider's classpath.	Ensure that the NetApp Manageability SDK JAR file has been copied into the lib directory for the data provider.
The software inventory tag for the agent on UNIX and Linux systems is not removed during uninstallation of the agent.	After uninstalling the agent, manually remove the file named <i>full name of agent.cmptag</i> from the <i>\$CANDLEHOME/properties/version/</i> directory.

Remote deployment troubleshooting

Problems can occur with remote deployment and removal of agent software using the Agent Remote Deploy process.

Table 6 on page 87 contains problems and solutions related to remote deployment.

Table 6. Remote deployment problems and solutions

Problem	Solution
While you are using the remote deployment feature to install the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage, an empty command window is displayed on the target computer. This problem occurs when the target of remote deployment is a Windows computer. (See the <i>IBM Tivoli Monitoring Installation and Setup Guide</i> for more information about the remote deployment feature.)	Do not close or modify this window. It is part of the installation process and is dismissed automatically.
The removal of a monitoring agent fails when you use the remote removal process in the Tivoli Enterprise Portal desktop or browser.	This problem might occur when you attempt the remote removal process immediately after you have restarted the Tivoli Enterprise Monitoring Server. You must allow time for the monitoring agent to refresh its connection with the Tivoli Enterprise Monitoring Server before you begin the remote removal process.
Remote deployment of the agent to a 64-bit Windows server fails with a "time out" problem. Subsequent retries fail with a "file not transmitted" error.	The 64-bit Windows OS agent was installed at the endpoint using the local installer instead of the IBM Tivoli Monitoring createNode command. If an addSystem command is used to deploy a 64-bit agent, the installation process loops continuously. This looping is caused by a perceived 32/64 bit compatibility (AC) component not being installed correctly. The install process running at the endpoint must be manually terminated. The remote deployment can now be executed by installing the AC component either locally or remotely. The agent can now be successfully deployed by running the addSystem command. If the agent installation is done locally, a pop-up menu is displayed indicating the 32/64 compatibility component must be installed.

Agent troubleshooting

A problem can occur with the agent after it has been installed.

Table 7 contains problems and solutions that can occur with the agent after it has been installed.

Table 7. Agent problems and solutions

Problem	Solution
Log data accumulates too rapidly.	Check the RAS trace option settings, which are described in "Setting RAS trace parameters by using the GUI" on page 78. The trace option settings that you can set on the KBB_RAS1= and KDC_DEBUG= lines potentially generate large amounts of data.
When using the itmcmd agent commands to start or stop this monitoring agent, you receive the following error message: MKCIIN0201E Specified product is not configured.	Include the command option -o to specify the instance to start or stop. The instance name must match the name used for configuring the agent. For example: ./itmcmd agent -o Test1 start nu For more information about using the itmcmd commands, see the <i>IBM Tivoli Monitoring Command Reference</i> .

Table 7. Agent problems and solutions (continued)

Problem	Solution
A configured and running instance of the monitoring agent is not displayed in the Tivoli Enterprise Portal, but other instances of the monitoring agent on the same system are displayed in the portal.	<p>Tivoli Monitoring products use Remote Procedure Call (RPC) to define and control product behavior. RPC is the mechanism that a client process uses to make a subroutine call (such as GetTimeOfDay or ShutdownServer) to a server process somewhere in the network. Tivoli processes can be configured to use TCP/UDP, TCP/IP, SNA, and SSL as the protocol (or delivery mechanism) for RPCs that you want.</p> <p>IP.PIPE is the name given to Tivoli TCP/IP protocol for RPCs. The RPCs are socket-based operations that use TCP/IP ports to form socket addresses. IP.PIPE implements virtual sockets and multiplexes all virtual socket traffic across a single physical TCP/IP port (visible from the netstat command).</p> <p>A Tivoli process derives the physical port for IP.PIPE communications based on the configured, well-known port for the hub Tivoli Enterprise Monitoring Server. (This well-known port or BASE_PORT is configured by using the 'PORT:' keyword on the KDC_FAMILIES / KDE_TRANSPORT environment variable and defaults to '1918'.)</p> <p>The physical port allocation method is defined as $(BASE_PORT + 4096 * N)$, where $N=0$ for a Tivoli Enterprise Monitoring Server process and $N=\{1, 2, \dots, 15\}$ for another type of monitoring server process. Two architectural limits result as a consequence of the physical port allocation method:</p> <ul style="list-style-type: none"> • No more than one Tivoli Enterprise Monitoring Server reporting to a specific Tivoli Enterprise Monitoring Server hub can be active on a system image. • No more than 15 IP.PIPE processes can be active on a single system image. <p>A single system image can support any number of Tivoli Enterprise Monitoring Server processes (address spaces) if each Tivoli Enterprise Monitoring Server on that image reports to a different hub. By definition, one Tivoli Enterprise Monitoring Server hub is available per monitoring enterprise, so this architecture limit has been simplified to one Tivoli Enterprise Monitoring Server per system image.</p> <p>No more than 15 IP.PIPE processes or address spaces can be active on a single system image. With the first limit expressed above, this second limitation refers specifically to Tivoli Enterprise Monitoring Agent processes: no more than 15 agents per system image.</p> <p>Continued on next row.</p>

Table 7. Agent problems and solutions (continued)

Problem	Solution
Continued from previous row.	This limitation can be circumvented (at current maintenance levels, IBM Tivoli Monitoring V6.1, Fix Pack 4 and later) if the Tivoli Enterprise Monitoring Agent process is configured to use the EPHEMERAL IP.PIPE process. (This process is IP.PIPE configured with the 'EPHEMERAL:Y' keyword in the KDC_FAMILIES / KDE_TRANSPORT environment variable). The number of ephemeral IP.PIPE connections per system image has no limitation. If ephemeral endpoints are used, the Warehouse Proxy Agent is accessible from the Tivoli Enterprise Monitoring Server associated with the agents using ephemeral connections either by running the Warehouse Proxy Agent on the same computer or by using the Firewall Gateway feature. (The Firewall Gateway feature relays the Warehouse Proxy Agent connection from the Tivoli Enterprise Monitoring Server computer to the Warehouse Proxy Agent computer if the Warehouse Proxy Agent cannot coexist on the same computer.)

Workspace troubleshooting

Problems can occur with general workspaces and agent-specific workspaces.

Table 8 contains problems and solutions related to workspaces.

Table 8. Workspace problems and solutions

Problem	Solution
The process application components are available, but the Availability status shows PROCESS_DATA_NOT_AVAILABLE.	<p>This problem occurs because the PerfProc performance object is disabled. When this condition exists, IBM Tivoli Monitoring cannot collect performance data for this process. Use the following steps to confirm that this problem exists and to resolve it:</p> <ol style="list-style-type: none"> 1. In the Windows Start menu, click Run. 2. Type perfmon.exe in the Open field of the Run window. The Performance window is displayed. 3. Click the plus sign (+) in the toolbar located above the right pane. The Add Counters window is displayed. 4. Look for Process in the Performance object menu. 5. Complete one of the following actions: <ul style="list-style-type: none"> • If you see Process in the menu, the PerfProc performance object is enabled and the problem is coming from a different source. You might need to contact IBM Software Support. • If you do not see Process in the menu, use the Microsoft utility from the Microsoft.com Operations website to enable the PerfProc performance object. The Process performance object becomes visible in the Performance object menu of the Add Counters windows, and IBM Tivoli Monitoring is able to detect Availability data. 6. Restart the monitoring agent.

Table 8. Workspace problems and solutions (continued)

Problem	Solution
The name of the attribute does not display in a bar chart or graph view.	When a chart or graph view that includes the attribute is scaled to a small size, a blank space is displayed instead of a truncated name. To see the name of the attribute, expand the view of the chart until sufficient space is available to display all characters of the attribute name.
At the bottom of each view, you see the following Historical workspace KFWITM220E error: Request failed during execution.	Ensure that you configure all groups that supply data to the view. In the Historical Configuration view, ensure that data collection is started for all groups that supply data to the view.
You start collection of historical data but the data cannot be seen.	<p>Use the following managing options for historical data collection:</p> <ul style="list-style-type: none"> • Basic historical data collection populates the Warehouse with raw data. This type of data collection is turned off by default. See the <i>IBM Tivoli Monitoring Administrator's Guide</i> for information about managing this feature including how to set the interval at which data is collected. By setting a more frequent interval for data collection, you reduce the load on the system incurred every time data is uploaded. • Use the Summarization and Pruning agent to collect specific amounts and types of historical data. Historical data is not displayed until the Summarization and Pruning monitoring agent begins collecting the data. By default, this agent begins collection at 2 a.m. daily. At that point, data is visible in the workspace view. See the <i>IBM Tivoli Monitoring Administrator's Guide</i> to learn how to modify the default collection settings.
Historical data collection is unavailable because of incorrect queries in the Tivoli Enterprise Portal.	<p>The Sort By, Group By, and First/Last functions column are not compatible with the historical data collection feature. Use of these advanced functions makes a query ineligible for historical data collection.</p> <p>Even if data collection has been started, you cannot use the time span feature if the query for the chart or table includes column functions or advanced query options (Sort By, Group By, First / Last).</p> <p>To ensure support of historical data collection, do not use the Sort By, Group By, or First/Last functions in your queries.</p> <p>See the <i>IBM Tivoli Monitoring Administrator's Guide</i> or the Tivoli Enterprise Portal online help for information about the Historical Data Collection function.</p>
When you use a long process name in the situation, the process name is truncated.	Truncation of process or service names for situations in the Availability table in the portal display is the expected behavior. The maximum name length is 100 bytes.
Regular (non-historical) monitoring data fails to be displayed.	Check the formation of the queries you use to gather data. For example, look for invalid SQL statements.
No row of data for 64-bit applications is displayed in the workspaces when the monitoring agent is running on a 64-bit operating system.	The Tivoli Enterprise Portal shows data only for 32-bit applications. No solution is available for this problem at this time.

Table 8. Workspace problems and solutions (continued)

Problem	Solution
Navigator items and workspace titles are labeled with internal names such as Kxx:KXX0000 instead of the correct names (such as Disk), where XX and xx represent the two-character agent code.	<p>Ensure that application support has been added on the monitoring server, portal server, and portal client.</p> <p>For more information about installing application support, see "Installing and enabling application support" in the <i>IBM Tivoli Monitoring Installation and Setup Guide</i>.</p>

Situation troubleshooting

Problems can occur with situations and situation configuration.

Table 9 contains problems and solutions for situations.

Table 9. Situation problems and solutions

Problem	Solution
Monitoring activity requires too much disk space.	Check the RAS trace logging settings that are described in "Setting RAS trace parameters by using the GUI" on page 78. For example, trace logs grow rapidly when you apply the ALL logging option.
Monitoring activity requires too many system resources.	"Disk capacity planning for historical data" on page 59 describes the performance impact of specific attribute groups. If possible, decrease your use of the attribute groups that require greater system resources.
A formula that uses mathematical operators appears to be incorrect. For example, if you were monitoring a Linux system, the formula that calculates when Free Memory falls under 10 percent of Total Memory does not work: LT #'Linux_VM_Stats.Total_Memory' / 10	<p>This formula is incorrect because situation predicates support only logical operators. Your formulas cannot have mathematical operators.</p> <p>Note: The Situation Editor provides alternatives to math operators. In the example, you can select the % Memory Free attribute and avoid the need for math operators.</p>
You want to change the appearance of situations when they are displayed in the navigation tree.	<ol style="list-style-type: none"> 1. Right-click an item in the navigation tree. 2. Click Situations in the menu. The Situation Editor window is displayed. 3. Select the situation that you want to modify. 4. Use the State menu in the lower right of the window to set the status and appearance of the Situation when it triggers. <p>Note: The State setting is not related to severity settings in IBM Tivoli Enterprise Console.</p>
When a situation is triggered in the Event Log attribute group, it remains in the Situation Event Console as long as the event ID entry is present in the Event Log workspace. When this event ID entry is removed from the Event Log workspace on the Tivoli Enterprise Portal, the situation is also cleared even if the actual problem that caused the event is not resolved, and the event ID entry is also present in the Windows Event Viewer.	<p>A timeout occurs on the cache of events for the NT Event Log group. Increase the cache time of Event Log collection to meet your requirements by adding the following variable and timeout value to the KpcENV file for the agent (where <i>pc</i> is the two-letter product code):</p> <pre>CDP_NT_EVENT_LOG_CACHE_TIMEOUT=3600</pre> <p>This variable determines how long events from the NT Event Log are kept.</p>
If the Expert Advice for a situation contains a hyperlink to an external website (for example, a Microsoft TechNet website) and you click the hyperlink, the website opens in an external window. However, the external window stops responding.	The external window responds after you close the Preview window and Situation Editor window.

Table 9. Situation problems and solutions (continued)

Problem	Solution
The situation for a specific agent is not visible in the Tivoli Enterprise Portal.	Open the Situation Editor. Access the All managed servers view. If the situation is not displayed, confirm that the monitoring server has been seeded for the agent. If not, seed the server, as described in the <i>IBM Tivoli Monitoring Installation and Setup Guide</i> .
The monitoring interval is too long.	Access the Situation Editor view for the situation that you want to modify. Check the Sampling interval area in the Formula tab. Adjust the time interval as required.
The situation did not activate at startup.	Manually recycle the situation as follows: 1. Right-click the situation and select Stop Situation . 2. Right-click the situation and select Start Situation . Note: You can permanently avoid this problem by selecting the Run at Startup check box of the Situation Editor view for a specific situation.
The situation is not displayed.	Click the Action tab and check whether the situation has an automated corrective action. This action can occur directly or through a policy. The situation might be resolving so quickly that you do not see the event or the update in the graphical user interface.
An Alert event did not occur even though the predicate was correctly specified.	Check the logs, reports, and workspaces.
A situation fires on an unexpected managed object.	Confirm that you distributed and started the situation on the correct managed system.
The product did not distribute the situation to a managed system.	Click the Distribution tab and check the distribution settings for the situation.

Table 9. Situation problems and solutions (continued)

Problem	Solution
The situation does not fire.	<p>This problem can be caused when incorrect predicates are present in the formula that defines the situation. For example, the managed object shows a state that normally triggers a monitoring event, but the situation is not true because the wrong attribute is specified in the formula.</p> <p>In the Formula tab, analyze predicates as follows:</p> <ol style="list-style-type: none"> 1. Click the fx icon in the upper-right corner of the Formula area. The Show formula window is displayed. <ol style="list-style-type: none"> a. Confirm the following details in the Formula area at the top of the window: <ul style="list-style-type: none"> • The attributes that you intend to monitor are specified in the formula. • The situations that you intend to monitor are specified in the formula. • The logical operators in the formula match your monitoring goal. • The numeric values in the formula match your monitoring goal. b. (Optional) Select the Show detailed formula check box in the lower left of the window to see the original names of attributes in the application or operating system that you are monitoring. c. Click OK to dismiss the Show formula window. 2. (Optional) In the Formula area of the Formula tab, temporarily assign numeric values that immediately trigger a monitoring event. The triggering of the event confirms that other predicates in the formula are valid. <p>Note: After you complete this test, you must restore the numeric values to valid levels so that you do not generate excessive monitoring data based on your temporary settings.</p> <p>See the <i>IBM Tivoli Monitoring Troubleshooting Guide</i> for additional information about situations that do not fire.</p>
Situation events are not displayed in the Events Console view of the workspace.	<p>Associate the situation with a Navigator item.</p> <p>Note: The situation does not need to be displayed in the workspace. It is sufficient that the situation is associated with any Navigator item.</p>
You do not have access to a situation.	<p>Note: You must have administrator privileges to complete these steps.</p> <ol style="list-style-type: none"> 1. Click Edit > Administer Users to access the Administer Users window. 2. In the Users area, select the user whose privileges you want to modify. 3. In the Permissions tab, Applications tab, and Navigator Views tab, select the permissions or privileges that correspond to the user role. 4. Click OK.

Table 9. Situation problems and solutions (continued)

Problem	Solution
A managed system seems to be offline.	<ol style="list-style-type: none"> 1. Select Physical View and click the Enterprise Level of the navigator tree. 2. Click View > Workspace > Managed System Status to see a list of managed systems and their status. 3. If a system is offline, check network connectivity and the status of the specific system or application.

Take Action commands troubleshooting

Problems can occur with Take Action commands.

Table 10 contains problems and solutions that can occur with Take Action commands.

When each Take Action command runs, it generates a log file listed in Table 3 on page 73.

Table 10. Take Action commands problems and solutions

Problem	Solution
Take Action commands often require several minutes to complete.	Allow several minutes. If you do not see a message advising you of completion, try to run the command manually.
Situations fail to trigger Take Action commands.	Attempt to manually run the Take Action command in the Tivoli Enterprise Portal. If the Take Action command works, look for configuration problems in the situation. See "Situation troubleshooting" on page 91. If the Take Action command fails, see <i>IBM Tivoli Monitoring Troubleshooting Guide</i> for general information about troubleshooting Take Action commands.

Support information

If you have a problem with your IBM software, you want to resolve it quickly.

IBM provides the following ways for you to obtain the support you need:

Online

The following websites contain troubleshooting information:

- Go to the IBM Software Support website and follow the instructions.
- Go to the IBM Tivoli Distributed Monitoring and Application Management Wiki. Feel free to contribute to this wiki.

IBM Support Assistant

The IBM Support Assistant (ISA) is a free local software serviceability workbench that helps you resolve questions and problems with IBM software products. The ISA provides quick access to support-related information and serviceability tools for problem determination. To install the ISA software, go to the IBM Support Assistant website.

Appendix A. IBM Tivoli Enterprise Console event mapping

Each event class corresponds to an attribute group in the IBM Tivoli Enterprise Console.

A description of the event slots for each event class is provided. For more information about mapping attribute groups to event classes, see the *IBM Tivoli Monitoring Administrator's Guide*.

Generic event mapping provides useful event class and attribute information for situations that do not have specific event mapping defined. BAROC files are found on the Tivoli Enterprise Monitoring Server in the installation directory in TECLIB (that is, *install_dir/cms/TECLIB* for Windows systems and *install_dir/tables/TEMS_hostname /TECLIB* for UNIX systems). IBM Tivoli Enterprise Console event synchronization provides a collection of ready-to-use rule sets that you can deploy with minimal configuration. Be sure to install Tivoli Enterprise Console event synchronization to access the correct *Sentry.baroc* file, which is automatically included during base configuration of Tivoli Enterprise Console rules if you indicate that you want to use an existing rule base. See the *IBM Tivoli Monitoring Installation and Setup Guide* for details.

Each of the event classes is a child of KNU_Base and is defined in the *knu.baroc* (version 07.10.00) file. The KNU_Base event class can be used for generic rules processing for any event from the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage.

For events generated by situations in the Aggregates attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_AGGREGATES class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- host_name: STRING
- host_name_enum: STRING
- aggregate_name: STRING
- aggregate_name_enum: STRING
- aggregate_type: STRING
- aggregate_type_enum: STRING
- run_status: STRING
- run_status_enum: STRING
- perf_status: STRING
- perf_status_enum: STRING
- composite_status: INTEGER
- composite_status_enum: STRING
- size_available: REAL
- size_available_enum: STRING
- size_total: REAL
- size_total_enum: STRING
- size_used: REAL
- size_used_enum: STRING
- percent_used: REAL
- percent_used_enum: STRING
- size_warehouse: INTEGER
- size_warehouse_enum: STRING

- total_space_committed: REAL
- total_space_committed_enum: STRING
- committed_warehouse: INTEGER
- committed_warehouse_enum: STRING
- total_transfers: REAL
- total_transfers_enum: STRING
- user_reads: REAL
- user_reads_enum: STRING
- user_writes: REAL
- user_writes_enum: STRING
- cp_reads: REAL
- cp_reads_enum: STRING
- file_rate: REAL
- file_rate_enum: STRING
- user_read_blocks: REAL
- user_read_blocks_enum: STRING
- user_write_blocks: REAL
- user_write_blocks_enum: STRING
- cp_read_blocks: REAL
- cp_read_blocks_enum: STRING
- block_rate: REAL
- block_rate_enum: STRING
- perf_warehouse: INTEGER
- perf_warehouse_enum: STRING

For events generated by situations in the Host Network Interfaces attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_HOST_NETWORK_INTERFACES class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- host_name: STRING
- host_name_enum: STRING
- interface_name: STRING
- interface_name_enum: STRING
- administrative_status: STRING
- administrative_status_enum: STRING
- operational_status: STRING
- operational_status_enum: STRING
- physical_address: STRING
- physical_address_enum: STRING
- ip_address: STRING
- ip_address_enum: STRING
- number_ip_addresses: INTEGER
- number_ip_addresses_enum: STRING
- link_speed: INTEGER
- link_speed_enum: STRING

- received_kb_per_sec: REAL
- received_kb_per_sec_enum: STRING
- transmitted_kb_per_sec: REAL
- transmitted_kb_per_sec_enum: STRING
- packets_received_per_sec: REAL
- packets_received_per_sec_enum: STRING
- packets_transmitted_per_sec: REAL
- packets_transmitted_per_sec_enum: STRING
- multicast_received_per_sec: REAL
- multicast_received_per_sec_enum: STRING
- multicast_transmitted_per_sec: REAL
- multicast_transmitted_per_sec_enum: STRING
- errors_received_per_sec: REAL
- errors_received_per_sec_enum: STRING
- errors_transmitted_per_sec: REAL
- errors_transmitted_per_sec_enum: STRING
- perf_warehouse: INTEGER
- perf_warehouse_enum: STRING

For events generated by situations in the Hosts attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_HOSTS class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- host_name: STRING
- host_name_enum: STRING
- host_type: STRING
- host_type_enum: STRING
- ip_address: STRING
- ip_address_enum: STRING
- fqdn: STRING
- fqdn_enum: STRING
- description: STRING
- description_enum: STRING
- comm_status: STRING
- comm_status_enum: STRING
- host_status: STRING
- host_status_enum: STRING
- run_status: STRING
- run_status_enum: STRING
- perf_status: STRING
- perf_status_enum: STRING
- composite_status: INTEGER
- composite_status_enum: STRING
- cpu_busy: REAL
- cpu_busy_enum: STRING

- cifs_ops: REAL
- cifs_ops_enum: STRING
- fcp_ops: REAL
- fcp_ops_enum: STRING
- iscsi_ops: REAL
- iscsi_ops_enum: STRING
- nfs_ops: REAL
- nfs_ops_enum: STRING
- total_ops: REAL
- total_ops_enum: STRING
- disk_data_read: INTEGER
- disk_data_read_enum: STRING
- disk_data_written: INTEGER
- disk_data_written_enum: STRING
- net_data_recv: INTEGER
- net_data_recv_enum: STRING
- net_data_sent: INTEGER
- net_data_sent_enum: STRING
- total_data_rate: INTEGER
- total_data_rate_enum: STRING
- perf_warehouse: INTEGER
- perf_warehouse_enum: STRING

For events generated by situations in the LUNs attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_LUNS class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- host_name: STRING
- host_name_enum: STRING
- volume_name: STRING
- volume_name_enum: STRING
- lun_path: STRING
- lun_path_enum: STRING
- run_status: STRING
- run_status_enum: STRING
- perf_status: STRING
- perf_status_enum: STRING
- composite_status: REAL
- composite_status_enum: STRING
- lun_size: REAL
- lun_size_enum: STRING
- size_warehouse: INTEGER
- size_warehouse_enum: STRING
- read_ops: REAL
- read_ops_enum: STRING

- write_ops: REAL
- write_ops_enum: STRING
- other_ops: REAL
- other_ops_enum: STRING
- total_ops: REAL
- total_ops_enum: STRING
- read_data: REAL
- read_data_enum: STRING
- write_data: REAL
- write_data_enum: STRING
- avg_latency: REAL
- avg_latency_enum: STRING
- perf_warehouse: INTEGER
- perf_warehouse_enum: STRING

For events generated by situations in the Performance Object Status attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_PERFORMANCE_OBJECT_STATUS class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- query_name: STRING
- object_name: STRING
- object_type: INTEGER
- object_type_enum: STRING
- object_status: INTEGER
- object_status_enum: STRING
- error_code: INTEGER
- error_code_enum: STRING

For events generated by situations in the Volumes attribute group, Tivoli Enterprise Console events are sent using the ITM_KNU_VOLUMES class. This class contains the following slots:

- node: STRING
- timestamp: STRING
- host_name: STRING
- host_name_enum: STRING
- aggregate_name: STRING
- aggregate_name_enum: STRING
- volume_name: STRING
- volume_name_enum: STRING
- volume_type: STRING
- volume_type_enum: STRING
- volume_state: STRING
- volume_state_enum: STRING
- run_status: STRING
- run_status_enum: STRING
- perf_status: STRING

- perf_status_enum: STRING
- composite_status: REAL
- composite_status_enum: STRING
- volume_size: REAL
- volume_size_enum: STRING
- size_warehouse: INTEGER
- size_warehouse_enum: STRING
- maximum_size: REAL
- maximum_size_enum: STRING
- autosize_enabled: INTEGER
- autosize_enabled_enum: STRING
- is_dedupe_enabled: INTEGER
- is_dedupe_enabled_enum: STRING
- afs_avail: REAL
- afs_avail_enum: STRING
- afs_data: REAL
- afs_data_enum: STRING
- afs_total: REAL
- afs_total_enum: STRING
- afs_used: REAL
- afs_used_enum: STRING
- afs_percent_used: REAL
- afs_percent_used_enum: STRING
- afs_warehouse: INTEGER
- afs_warehouse_enum: STRING
- overwrite_reserve_avail: REAL
- overwrite_reserve_avail_enum: STRING
- overwrite_reserve_total: REAL
- overwrite_reserve_total_enum: STRING
- overwrite_reserve_used: REAL
- overwrite_reserve_used_enum: STRING
- overwrite_reserve_percent_used: REAL
- overwrite_reserve_percent_used_enum: STRING
- overwrite_warehouse: INTEGER
- overwrite_warehouse_enum: STRING
- snapshot_reserve_avail: REAL
- snapshot_reserve_avail_enum: STRING
- snapshot_reserve_total: REAL
- snapshot_reserve_total_enum: STRING
- snapshot_reserve_used: REAL
- snapshot_reserve_used_enum: STRING
- snapshot_reserve_percent_used: REAL
- snapshot_reserve_percent_used_enum: STRING
- max_percent_used: REAL
- max_percent_used_enum: STRING

- snapshot_warehouse: INTEGER
- snapshot_warehouse_enum: STRING
- read_ops: REAL
- read_ops_enum: STRING
- read_data: REAL
- read_data_enum: STRING
- read_latency: REAL
- read_latency_enum: STRING
- write_ops: REAL
- write_ops_enum: STRING
- write_data: REAL
- write_data_enum: STRING
- write_latency: REAL
- write_latency_enum: STRING
- other_ops: REAL
- other_ops_enum: STRING
- other_latency: REAL
- other_latency_enum: STRING
- composite_data_rate: REAL
- composite_data_rate_enum: STRING
- composite_latency: REAL
- composite_latency_enum: STRING
- total_ops: REAL
- total_ops_enum: STRING
- perf_warehouse: INTEGER
- perf_warehouse_enum: STRING

Appendix B. Documentation library

A variety of publications are relevant to the use of the IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage.

The *IBM Tivoli Monitoring, OMEGAMON XE, and Composite Application Manager products: Documentation Guide*, SC23-8816, contains information about accessing and using publications. You can find the Documentation Guide in the following information centers:

- IBM Tivoli Monitoring and OMEGAMON® XE
- IBM Tivoli Composite Application Manager

To open the Documentation Guide in the information center, select **Using the publications** in the **Contents** pane.

To find a list of new and changed publications, click **What's new in the information center** on the Welcome page of the IBM Tivoli Monitoring and OMEGAMON XE Information Center.

To find publications from the previous version of a product, click **Previous versions** under the name of the product in the **Contents** pane.

IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage library

The documentation for this agent and other product components is located in the IBM Tivoli Monitoring for Virtual Environments information center.

One document is specific to the NetApp Storage agent: *IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage User's Guide*. This publication provides agent-specific information for configuring, using, and troubleshooting the NetApp Storage agent.

The **Prerequisites** topic in the information center contains information about the prerequisites for each component.

Use the information in this guide with the *Tivoli Enterprise Portal User's Guide* to monitor NetApp resources.

Prerequisite publications

To use the information in this publication effectively, you must have some prerequisite knowledge.

See the following publications to gain the required prerequisite knowledge:

- *IBM Tivoli Monitoring Readme First*
- *Exploring IBM Tivoli Monitoring*
- *IBM Tivoli Monitoring Administrator's Guide*
- *IBM Tivoli Monitoring Agent Builder User's Guide*
- *IBM Tivoli Monitoring Command Reference*
- *Configuring IBM Tivoli Enterprise Monitoring Server on z/OS*
- *IBM Tivoli Monitoring Installation and Setup Guide*
- *IBM Tivoli Monitoring: Messages*
- *IBM Tivoli Monitoring, OMEGAMON XE, and Composite Application Manager products: Documentation Guide*

- *IBM Tivoli Monitoring Troubleshooting Guide*
- *IBM Tivoli Monitoring Universal Agent User's Guide*
- *IBM Tivoli Universal Agent API and Command Programming Reference Guide*
- *IBM Tivoli Monitoring: Upgrading from Tivoli Distributed Monitoring*
- *IBM Tivoli Monitoring: Upgrading from V5.1.2*
- *IBM Tivoli Monitoring: i5/OS® Agent User's Guide*
- *IBM Tivoli Monitoring: Linux OS Agent User's Guide*
- *IBM Tivoli Monitoring: UNIX OS Agent User's Guide*
- *IBM Tivoli Monitoring: UNIX Logs OS Agent User's*
- *IBM Tivoli Monitoring: Windows OS Agent User's Guide*
- *Tivoli Enterprise Portal User's Guide*

Related publications

The publications in related information centers provide useful information.

See the following information centers, which you can find by accessing Tivoli Documentation Central:

- IBM Tivoli Monitoring
- IBM Tivoli Netcool/OMNIBus
- IBM Tivoli Application Dependency Discovery Manager (TADDM)
- IBM Tivoli Enterprise Console

Other sources of documentation

You can obtain additional technical documentation about monitoring products from other sources.

See the following sources of technical documentation about monitoring products:

- IBM Integrated Service Management Library is an online catalog that contains integration documentation as well as other downloadable product extensions.
- IBM Redbook publications (Redbooks® publications, Redpapers, and Redbooks technotes) provide information about products from platform and solution perspectives.
- Technotes, which are found through the IBM Software Support website, provide the latest information about known product limitations and workarounds.
- Tivoli wikis

Tivoli Wiki Central is the home for interactive wikis that offer best practices and scenarios for using Tivoli products. The wikis contain white papers contributed by IBM employees, and content created by customers and business partners.

Two of these wikis are of particular relevance to IBM Tivoli Monitoring:

- Tivoli Distributed Monitoring and Application Management Wiki provides information about IBM Tivoli Monitoring and related distributed products, including IBM Tivoli Composite Application Management products.
- Tivoli System z® Monitoring and Application Management Wiki provides information about the OMEGAMON XE products, Tivoli NetView® for z/OS®, Tivoli Monitoring Agent for z/TPF, and other System z monitoring and application management products.

Accessibility

Accessibility features help users with physical disabilities, such as restricted mobility or limited vision, to use software products successfully.

The major accessibility features in this product enable users in the following ways:

- Use assistive technologies, such as screen-reader software and digital speech synthesizer, to hear what is displayed on the screen. Consult the product documentation of the assistive technology for details on using those technologies with this product.
- Operate specific or equivalent features using only the keyboard.
- Magnify what is displayed on the screen.

In addition, the product documentation was modified to include the following features to aid accessibility:

- All documentation is available in both HTML and convertible PDF formats to give the maximum opportunity for users to apply screen-reader software.
- All images in the documentation are provided with alternative text so that users with vision impairments can understand the contents of the images.

Navigating the interface using the keyboard

Standard shortcut and accelerator keys are used by the product and are documented by the operating system. See the documentation provided by your operating system for more information.

Magnifying what is displayed on the screen

You can enlarge information in the product windows using facilities provided by the operating systems on which the product is run. For example, in a Microsoft Windows environment, you can lower the resolution of the screen to enlarge the font sizes of the text on the screen. See the documentation provided by your operating system for more information.

Notices

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785 U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
1623-14, Shimotsuruma, Yamato-shi
Kanagawa 242-8502 Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement might not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
2Z4A/101
11400 Burnet Road
Austin, TX 78758 U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

© IBM 2009. Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. 2009. All rights reserved.

If you are viewing this information in softcopy form, the photographs and color illustrations might not be displayed.

Trademarks

IBM, the IBM logo, and `ibm.com`[®] are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at www.ibm.com/legal/copytrade.shtml.

Intel, Intel logo, and Intel Xeon, are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.



Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Index

A

- accessibility 105
- additional information
 - attributes 19
 - situations 61
 - Take Action commands 67
 - Workspaces 13
- Administrative Status attribute 28
- AFS Available attribute 51
- AFS Data attribute 51
- AFS Percent Used attribute 52
- AFS Total attribute 52
- AFS Used attribute 52
- AFS Warehouse attribute 52
- agent
 - functions 1
 - problems and workarounds 87
- Agent Management Services 3
- Aggregate Detail workspace 14
- Aggregate Name attribute 21, 47
- Aggregate Type attribute 21
- Aggregates
 - situations 62
 - workspaces
 - descriptions 14
- Aggregates attribute group 20
- Aggregates workspace 15
- application support 8
- attribute group 20
- attribute groups
 - Aggregates 20
 - Host Network Interfaces 27
 - Hosts 32
 - list of all 19
 - LUNs 38
 - overview 19
 - Performance Object Status 43
 - Volumes 47
- attributes 20
 - additional information 19
 - Administrative Status 28
 - AFS Available 51
 - AFS Data 51
 - AFS Percent Used 52
 - AFS Total 52
 - AFS Used 52
 - AFS Warehouse 52
 - Aggregate Name 21, 47
 - Aggregate Type 21
 - Aggregates 20
 - Autosize Enabled 50
 - Average Latency 43
 - Block Rate 26
 - CIFS Ops 35
 - Committed Warehouse 24
 - Communication Status 33
 - Composite Data Rate 58
 - Composite Latency 58
 - Composite Status 22, 35, 40, 49
 - CP Read Blocks 26
 - CP Reads 25

- attributes (*continued*)
 - CPU Busy 35
 - Description 33
 - Disk Data Read 37
 - Disk Data Written 37
 - Error Code 45
 - Errors Received Per Sec 31
 - Errors Transmitted Per Sec 31
 - FCP Ops 36
 - File Rate 25
 - FQDN 33
 - Host Name 20, 27, 32, 39, 47
 - Host Network Interfaces 27
 - Host Status 34
 - Host Type 32
 - Hosts 32
 - Interface Name 27
 - IP Address 29, 33
 - Is Dedupe Enabled 51
 - iSCSI Ops 36
 - Link Speed 29
 - LUN Path 39
 - LUN Size 41
 - LUNs 38
 - Max Percent Used 55
 - Maximum Size 50
 - Multicast Received Per Sec 30
 - Multicast Transmitted Per Sec 31
 - Net Data Received 37
 - Net Data Sent 37
 - NFS Ops 36
 - Node 20, 27, 32, 38, 43, 47
 - Number IP Addresses 29
 - Object Name 44
 - Object Status 45
 - Object Type 44
 - Operational Status 28
 - Other Latency 57
 - Other Ops 42, 57
 - overview 19
 - Overwrite Reserve Available 53
 - Overwrite Reserve Percent Used 53
 - Overwrite Reserve Total 53
 - Overwrite Reserve Used 53
 - Overwrite Warehouse 54
 - Packets Received Per Sec 30
 - Packets Transmitted Per Sec 30
 - Percent Used 23
 - Perf Status 22, 35, 40, 49
 - Perf Warehouse 26, 31, 38, 58
 - Performance Object Status 43
 - Performance Warehouse 43
 - Physical Address 28
 - Query Name 44
 - Read Data 42, 56
 - Read Latency 56
 - Read Ops 41, 56
 - Received KB Per Sec 29
 - Run Status 21, 34, 39, 49
 - Size Available 22
 - Size Total 23

- attributes (*continued*)
 - Size Used 23
 - Size Warehouse 23, 41, 50
 - Snapshot Reserve Available 54
 - Snapshot Reserve Percent Used 55
 - Snapshot Reserve Total 54
 - Snapshot Reserve Used 54
 - Snapshot Warehouse 55
 - Timestamp 20, 27, 32, 39, 43, 47
 - Total Data Rate 38
 - Total Ops 36, 42, 58
 - Total Space Committed 24
 - Total Transfers 24
 - Transmitted KB Per Sec 30
 - User Read Blocks 25
 - User Reads 24
 - User Write Blocks 26
 - User Writes 25
 - Volume Name 39, 48
 - Volume Size 50
 - Volume State 48
 - Volume Type 48
 - Volumes 47
 - Write Data 42, 57
 - Write Latency 57
 - Write Ops 41, 56
- Autosize Enabled attribute 50
- Average Latency attribute 43

B

- Block Rate attribute 26

C

- calculate historical data disk space 59
- capacity planning for historical data 59
- CIFS Ops attribute 35
- commands
 - tacmd addSystem 10
 - Take Action 67
- Committed Warehouse attribute 24
- Communication Status attribute 33
- components 2
 - IBM Tivoli Monitoring 2
- Composite Data Rate attribute 58
- Composite Latency attribute 58
- Composite Status attribute 22, 35, 40, 49
- configuration 8
 - agent 5
 - fields 9
 - problems and workarounds 83
 - remote 10
 - values 9
- configuring the monitoring agent 5
- CP Read Blocks attribute 26
- CP Reads attribute 25
- CPU Busy attribute 35

D

- Description attribute 33
- descriptions 62
- developerWorks website 104
- disk capacity planning for historical data 59
- Disk Data Read attribute 37

- Disk Data Written attribute 37
- documentation
 - See* publications

E

- enhancements 2
- Error Code attribute 45
- Errors Received Per Sec attribute 31
- Errors Transmitted Per Sec attribute 31
- event
 - mapping 95

F

- FCP Ops attribute 36
- File Rate attribute 25
- files
 - manageontap.jar 9
 - NetApp Manageability SDK JAR file 9
- FQDN attribute 33

H

- historical data
 - calculate disk space 59
 - disk capacity planning 59
- Host Detail workspace 15
- Host Name attribute 20, 27, 32, 39, 47
- Host Network Interfaces attribute group 27
- Host Status attribute 34
- Host Type attribute 32
- Hosts
 - situations 63
 - workspaces
 - descriptions 15
- Hosts attribute group 32
- Hosts workspace 16

I

- IBM Tivoli Enterprise Console
 - event mapping 95
- IBM Tivoli Monitoring 2
 - overview 1
- installation 8
 - agent 5
 - problems and workarounds 83
 - remote 10
- installing language packs 5
- installing the monitoring agent 5
- instances
 - number 8
- Integrated Service Management Library documentation 104
- interface
 - user 3
- Interface Name attribute 27
- IP Address attribute 29, 33
- Is Dedupe Enabled attribute 51
- iSCSI Ops attribute 36

K

- KNU_AggregateRunStatusAbnormal situation 62
- KNU_HostOffLine situation 64

KNU_HostRunStatusAbnormal situation 63
KNU_LUNRunStatusAbnormal situation 64
KNU_VolumeRunStatusAbnormal situation 65

L

language packs 5
 installing 5
 silent installation 5
Link Speed attribute 29
LUN Detail workspace 16
LUN Path attribute 39
LUN Size attribute 41
LUNs
 situations 64
 workspaces
 descriptions 16
LUNs attribute group 38
LUNs workspace 16

M

manageontap.jar 9
Max Percent Used attribute 55
Maximum Size attribute 50
Multicast Received Per Sec attribute 30
Multicast Transmitted Per Sec attribute 31

N

Net Data Received attribute 37
Net Data Sent attribute 37
NetApp Manageability SDK JAR file 9
NetApp Storage
 situations 62
 workspaces
 descriptions 14
NetApp Storage agent
 performance considerations 91
NetApp Storage workspace 14
new in this release 2
NFS Ops attribute 36
Node attribute 20, 27, 32, 38, 43, 47
Number IP Addresses attribute 29
number of instances 8

O

Object Name attribute 44
Object Status attribute 45
Object Type attribute 44
Operational Status attribute 28
Other Latency attribute 57
Other Ops attribute 42, 57
overview
 IBM Tivoli Monitoring 1
Overwrite Reserve Available attribute 53
Overwrite Reserve Percent Used attribute 53
Overwrite Reserve Total attribute 53
Overwrite Reserve Used attribute 53
Overwrite Warehouse attribute 54

P

Packets Received Per Sec attribute 30
Packets Transmitted Per Sec attribute 30
Percent Used attribute 23
Perf Status attribute 22, 35, 40, 49
Perf Warehouse attribute 26, 31, 38, 58
performance considerations 91
Performance Object Status attribute group 43
Performance Warehouse attribute 43
Physical Address attribute 28
policies 69
prerequisite publications 103
problems and workarounds 83
 agent-specific 87
 agent-specific workspaces 89
 configuration 83
 install 83
 remote deployment 86
 situations 91
 Take Action commands 94
 workspaces 89
publications 103, 104
 developerWorks website 104
 IBM Tivoli Monitoring 103
 Integrated Service Management Library 104
 prerequisite 103
 Redbooks 104
 related 104
 Technotes 104
 wikis 104

Q

queries, using attributes 19
Query Name attribute 44

R

rasl 80
Read Data attribute 42, 56
Read Latency attribute 56
Read Ops attribute 41, 56
Received KB Per Sec attribute 29
Redbooks 104
remote
 installation and configuration 10
remote deployment
 problems and workarounds 86
response file template 5
Run Status attribute 21, 34, 39, 49

S

silent installation 5
silent installation of language packs 5
situations 62
 additional information
 predefined, defined 61
KNU_AggregateRunStatusAbnormal 62
KNU_HostOffLine 64
KNU_HostRunStatusAbnormal 63
KNU_LUNRunStatusAbnormal 64
KNU_VolumeRunStatusAbnormal 65
overview 61
predefined 61

- situations (*continued*)
 - problems and workarounds 91
 - Situation Editor 61
- situations, using attributes 19
- Size Available attribute 22
- Size Total attribute 23
- Size Used attribute 23
- Size Warehouse attribute 23, 41, 50
- Snapshot Reserve Available attribute 54
- Snapshot Reserve Percent Used attribute 55
- Snapshot Reserve Total attribute 54
- Snapshot Reserve Used attribute 54
- Snapshot Warehouse attribute 55

T

- tacmd addSystem command 10
- Take Action commands
 - additional information 67
 - overview 67
 - predefined 67
 - problems and workarounds 94
- Technotes 104
- Timestamp attribute 20, 27, 32, 39, 43, 47
- Total Data Rate attribute 38
- Total Ops attribute 36, 42, 58
- Total Space Committed attribute 24
- Total Transfers attribute 24
- trace
 - turn off 82
 - turn on 82
- trace settings 80
- Transmitted KB Per Sec attribute 30
- troubleshooting 71
 - agent-specific 87
 - agent-specific workspaces 89
 - installation 83
 - problems and workarounds 83
 - remote deployment 86
 - situations 91
 - Take Action commands 94
 - turn off trace 82
 - turn on trace 82
 - uninstallation 83
 - workspaces 89

U

- user ID 8
- user interface options 3
- User Read Blocks attribute 25
- User Reads attribute 24
- User Write Blocks attribute 26
- User Writes attribute 25

V

- views
 - Aggregate Detail workspace 14
 - Aggregates workspace 15
 - Host Detail workspace 15
 - Hosts workspace 16
 - LUN Detail workspace 16
 - LUNs workspace 16
 - NetApp Storage workspace 14
 - Volume Detail workspace 17

- views (*continued*)
 - Volumes workspace 17
- Volume Detail workspace 17
- Volume Name attribute 39, 48
- Volume Size attribute 50
- Volume State attribute 48
- Volume Type attribute 48
- Volumes
 - situations 65
 - workspaces
 - descriptions 17
- Volumes attribute group 47
- Volumes workspace 17

W

- wikis 104
- workarounds 83
- workspaces
 - Aggregate Detail 14
 - Aggregates 14, 15
 - descriptions 14
 - Host Detail 15
 - Hosts 15, 16
 - LUN Detail 16
 - LUNs 16
 - NetApp Storage 14
 - predefined 13
 - problems and workarounds 89
 - Volume Detail 17
 - Volumes 17
- Workspaces
 - additional information 13
 - overview 13
- Write Data attribute 42, 57
- Write Latency attribute 57
- Write Ops attribute 41, 56



Printed in USA

SC14-7489-00

