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Chapter 1. IBM Tivoli Monitoring for Virtual Environments

Overview

IBM® Tivoli® Monitoring for Virtual Environments contains three components that are supported through the Tivoli Integrated Portal:

- IBM Tivoli Monitoring for Virtual Environments Dashboard
- IBM Tivoli Monitoring for Virtual Environments Performance and Capacity Management Reports
- Capacity Planner for IBM Tivoli Monitoring for Virtual Environments

Tivoli Monitoring for Virtual Environments is the rebranding of Tivoli Monitoring for Virtual Servers, which is renamed and enhanced. Tivoli Monitoring for Virtual Environments extends Tivoli Monitoring for Virtual Servers capabilities by gathering data from a variety of sources in addition to the vcenters and virtual servers, and by integrating and associating this data in context.

Tivoli Monitoring for Virtual Environments provides a comprehensive tool to monitor the availability and performance of virtual environments. In addition, Tivoli Monitoring for Virtual Environments provides performance and capacity reporting of virtual environments, and helps you with capacity planning activities to optimize, consolidate, and balance the overall capacity of the virtual environments.

Tivoli Monitoring for Virtual Environments includes the following capabilities:

- Provides comprehensive monitoring of the health of the whole virtual environment
- Provides the association of the virtual environment with the application contexts that it supports, and with the physical environment where it runs
- Provides capacity planning of various components of the virtual environment, so that you can run your applications in the most efficient and resilient way while maximizing the use of physical resources and minimizing license costs
- Provides a consumable solution with focus on customer experience and time-to-value

Tivoli Monitoring for Virtual Environments is a key component of the Integrated Services Management solution for initiatives in IBM and in the computer industry (such as IBM Smarter Planet™, cloud computing, software as a service or SaaS, and data center consolidation and optimization).

By using virtualization, you create new opportunities and needs that are addressed by Tivoli Monitoring for Virtual Environments. Tools must address new challenges brought by virtualization, as you move from traditional data centers towards more sophisticated data centers, where flexibility and mobility enabled by virtualization are key components. In such environments, the ability to determine the health and optimize the use of resources quickly will be essential for the success of any enterprise. Figure 1 on page 2 shows some of the challenges that Tivoli Monitoring for Virtual Environments helps you to address.
To help you to address the challenges of managing your virtual environment, Tivoli Monitoring for Virtual Environments provides the following benefits:

**Visibility**
End-to-end management and visualization of virtual and physical environments in context

**Control**
Analytics and reports for better understanding of the current environment, forecasting, and capacity planning

**Automation**
Automation by integrating with vendor-supplied hypervisor tools (such as VMware VirtualCenter), integrating with hardware management tools (such as IBM Systems Director and VMControl), the ability to use drill-down capability in the context of SME management tools, and association with application and services management

The main concept behind Tivoli Monitoring for Virtual Environments is to provide a solution that, firstly, brings information from a variety of sources related to the broader virtual environment into a single visualization console. The broader virtual environment includes not just the virtual part of the environment but also the physical environment, such as storage and network, related to or supporting the virtual environment. Secondly, Tivoli Monitoring for Virtual Environments shows summarized, aggregated, and correlated data in context. Thirdly, Tivoli Monitoring for Virtual Environments performs analysis of the data so that you have a better understanding of health, the key issues you should be concerned about, and the current capacity usage.

You can also complete planning activities to eliminate bottlenecks, further optimize the environment, and plan for growth. Figure 2 on page 3 provides an overview of Tivoli Monitoring for Virtual Environments, its positioning within IBM’s Integrated Service Management, and the key products that Tivoli Monitoring for Virtual Environments integrates with. The specific products listed are just examples, as it
expected that the number of products integrated with Tivoli Monitoring for Virtual Environments will grow over time. Tivoli Monitoring for Virtual Environments allows, supports, and promotes such growth by using well-identified interfaces and components to integrate with other products.

This release of Tivoli Monitoring for Virtual Environments adds four main capabilities to the Tivoli virtualization management portfolio, as well as monitoring heterogeneous hypervisors (Tivoli Monitoring for Virtual Environments agents):

- Monitoring of the physical environments associated with the virtual environment, including servers, storage, and network components of the infrastructure
- Dashboards that provide predefined contextual summary views of the health (availability, performance, capacity) of the virtual environment, including physical and virtual servers, storage, and network resources, which you can use to perform diagnostics
- Predefined capacity reports that provide a complete assessment of the capacity (including forecast) of the virtual environment based on actual historical usage, giving you a good insight into current capacity
- Capacity planning analytics and reports, which you can use to generate what-if planning scenarios, to optimize and consolidate the virtual environment

This solution is targeted at IT administrators, IT operators, and capacity planners, as described in the following use case examples:

Figure 2. Tivoli Monitoring for Virtual Environments overview

This release of Tivoli Monitoring for Virtual Environments adds four main capabilities to the Tivoli virtualization management portfolio, as well as monitoring heterogeneous hypervisors (Tivoli Monitoring for Virtual Environments agents):

- Monitoring of the physical environments associated with the virtual environment, including servers, storage, and network components of the infrastructure
- Dashboards that provide predefined contextual summary views of the health (availability, performance, capacity) of the virtual environment, including physical and virtual servers, storage, and network resources, which you can use to perform diagnostics
- Predefined capacity reports that provide a complete assessment of the capacity (including forecast) of the virtual environment based on actual historical usage, giving you a good insight into current capacity
- Capacity planning analytics and reports, which you can use to generate what-if planning scenarios, to optimize and consolidate the virtual environment

This solution is targeted at IT administrators, IT operators, and capacity planners, as described in the following use case examples:
• The IT administrator or IT operator of the virtual environment wants to know the overall health status (availability, performance, and capacity) of the virtual environment, including minimum information about the physical environment associated with the virtual environment:
  − When a problem occurs, the IT administrator wants to identify and isolate where the problem is and what is affected in the virtual environment
  − The IT administrator wants to quickly isolate the problem and transfer responsibility to others when the problem is outside the virtual environment, launching in context with other tools for problem investigation, or both
• The IT administrator of the virtual environment wants to know the current overall capacity of the virtual environment and the resource usage, including historical and forecast views:
  − The IT administrator wants to understand historical capacity usage and the trend of capacity usage, to be able to manage capacity and adjust capacity, allocation, or both, to address a capacity bottleneck
  − The IT administrator wants to keep the virtual environment running with the capacity available, and avoid problems that can be caused by capacity
  − The IT administrator wants to manage the current capacity and make the best use of the current resources of the virtual environment
• The IT administrator or capacity planner wants to complete capacity analysis for planning purposes:
  − The IT administrator or capacity planner wants to complete a simple optimization of a virtual environment by using historical data (for example, reallocating virtual machines for better load balance)
  − The IT administrator or capacity planner wants to complete a what-if analysis of a virtual environment, by using historical and other additional data (for example, server benchmark data from Standard Performance Evaluation Corporation) in order to optimize and consolidate the virtual environment
  − The IT Administrator or capacity planner wants to keep the current virtual environment optimized without changing the operating systems, hypervisor, or application stack (no new hardware is added)
  − The IT Administrator or capacity planner wants to further optimize the virtual environment without changing the operating system or hypervisor technologies (the hypervisor type and application are not changed, new hardware, hypervisor version, or both, can be used)
  − The IT Administrator or capacity planner wants to investigate, and determine possible gains offered by, migrating some workloads from current operating systems, potentially non-virtualized, hypervisors, or both, to new operating systems and hypervisors (no change in the guest operating system and application stack running on the physical server or existing virtual machine, re-optimize placement of existing workload, consider the application and operating system unchanged)

**Tivoli Monitoring for Virtual Environments structure**

Tivoli Monitoring for Virtual Environments consists of the following layers:
• Data collection
• Server
• Data analysis and presentation
Data collection layer

The data collection layer consists of Tivoli Monitoring agents, including Tivoli Monitoring for Virtual Environments agents that collect data about virtual environments, and other agents that collect data about storage, network, and guest operating systems.

For storage, Tivoli Monitoring for Virtual Environments is used to complement information about virtual storage, with minimal information about associated physical storage, and make this information available in the Virtualization Environments Dashboards:

- Information that provides a view of physical storage associated with the virtual environment
- The link between virtual and physical storage, which facilitates communication between the operator or administrator of the virtual environment and the storage administrator for problem resolution

Tivoli Monitoring for Virtual Environments provides predefined integration with IBM Tivoli Storage Productivity Center (through the Tivoli Storage Productivity Center agent) and with NetApp DataFabric Manager (through the NetApp Storage agent).

For networks, Tivoli Monitoring for Virtual Environments is used to complement information about virtual networks, with minimal information about the physical network connected to the virtual environment, and make this information available in the Dashboards:

- Information that provides a basic view of the physical network associated with the virtual environment. With this information, a customer can understand the relationship between the virtual network and the physical switches (ports) connected to the hypervisor hosts, and can monitor the switches and ports that are being used by virtual machines of interest.
- The link between the virtual and physical network, to facilitate communication between the operator or administrator of the virtual environment and the network administrator for problem resolution

For guest operating systems, Tivoli Monitoring for Virtual Environments is used to complement information about the host, the hypervisor, and the virtual machines, with minimal information about the guest operating system and its processes and services running in the virtual machines:

- Information that provides a basic view of how resources are being used by the various processes running in the guest operating system
- The link between the virtual machine and the guest operating system, to facilitate communication between the operator or administrator of the virtual environment and the application owner for problem resolution

Data analysis and presentation layer

Tivoli Monitoring for Virtual Environments provides a data analysis and presentation layer where most of the new values are displayed.

IBM Tivoli Monitoring for Virtual Environments Dashboard

The IBM Tivoli Monitoring for Virtual Environments Dashboard provides a summary view of the health of the whole environment (including the associated physical environment). You can then quickly assess problems and fix them.
The Dashboard brings together important information in context about components of the virtual environment from a variety of sources. By using the Dashboards, you can view key components of the whole environment, including server, storage, and network (both virtual and physical), how they are related, and key attributes (configuration, metrics) in the context of the problem. Instead of overwhelming the operator or IT administrator with information, the Dashboards aggregate, associate, and summarize data, showing only the key required information in context.

The Dashboards rely on situations from Tivoli Monitoring (including trending or forecasting) to determine the status of the environment being monitored. Tivoli Monitoring for Virtual Environments provides a configuration file with a list of situations that are recommended (best practices) for a given hypervisor. You can add or remove situations from the list when configuring the Dashboards. When you apply the list, all situations in the list can be received by the Dashboards.

The Dashboard destination is configured as one of the EIF destinations for the Tivoli Monitoring situations, so that situations can be forwarded by using the EIF sender tab in the Tivoli Monitoring situation editor. All preselected situations listed in the configuration of Tivoli Monitoring for Virtual Environments are forwarded. To forward any situation that is not preselected, you must set the EIF destination for the situation using the situation editor in Tivoli Monitoring, which is a standard behavior in that product.

Status in the Dashboards is organized in three columns: Server, Storage, and Network. In the data centers of most enterprises, operations and responsibilities are organized around these three areas. This determination is done by association of the attribute group related to the situation with the status column. This association is provided by Tivoli Monitoring for Virtual Environments and does not require any action from you.

From the Dashboards, you have access to other user interfaces. Two levels of UI integration exist in IBM Tivoli Monitoring for Virtual Environments Dashboards:

- The Tivoli Application Dependency Discovery Manager (TADDM) change and configuration details view can be displayed in context in the Dashboards. Tivoli Monitoring for Virtual Environments uses the TADDM console view in order to visualize change and configuration details about the resources selected in the IBM Tivoli Monitoring for Virtual Environments Dashboards. The TADDM view gets data directly from the TADDM server (configured in Tivoli Monitoring for Virtual Environments).
- You can launch in context from the Dashboards or panels into Tivoli Monitoring and the Tivoli Enterprise Portal.

Capacity management

The main goal of Tivoli Monitoring for Virtual Environments capacity management is to enable you to assess your current capacity usage, identify bottlenecks, and forecast usage constraints. You can then support your planning activities to address any issues identified, or to better consolidate and optimize environment, and plan for growth in terms of capacity.

IBM Tivoli Monitoring for Virtual Environments Performance and Capacity Management Reports

Tivoli Monitoring for Virtual Environments includes predefined reports that help you to understand current capacity. The Performance and Capacity Management Reports are based on IBM Cognos® software and work with Tivoli Common Reporting. The reports are based on historical
data that is collected in the Tivoli Data Warehouse and user inputs. In addition to the predefined reports, you are also provided with a data model and tools for creating ad hoc reports. The reports are available from the Tivoli Integrated Portal tasks. The following three sets of reports are defined:

- **Workload Estimation**: Simple reports to gauge how much additional workload (virtual machines) the environment can handle, and where to place them based on demand. These reports are useful for IT engineers who deal with everyday capacity management tasks.

- **Performance Trends and Resource Forecasts**: Reports that show historical trends and future forecasts of key metrics. These reports are useful for IT engineers for comparing historical resource usage trends and identifying short term future bottlenecks.

- **Workload Right Sizing and Balancing**: Reports that provide a holistic view of the environment geared towards IT managers and IT engineers. These reports provide a high level understanding of the top or bottom resource consumers, and show how well-balanced the environment is.

With these reports provided by Tivoli Monitoring for Virtual Environments, you can answer questions such as:

- How is my environment performing overall?
- Which are my most used servers for a given resource type?
- Do bottlenecks exist in my current environment, and where?
- Am I reaching capacity on resources, and on which resource? When will I exhaust capacity?
- Which are my top or bottom virtual machine resource consumers for a given resource type?
- Which are my least used servers for a given resource type?
- Has any abnormal behavior been detected this week compared with last week (or other period)?
- Are my systems or workloads balanced or unbalanced?

**IBM Tivoli Monitoring for Virtual Environments Capacity Planner**

With the Capacity Planner tool, you can answer the following questions:

- How many more virtual machines can I add to a cluster or server, based on usage history?
- How much more resource do I need in order to add additional virtual machines to the environment?
- How and where do I add capacity if existing systems are not enough for future growth for optimized capacity usage?
- Where do I place new workloads? Must I add more resources?
- How can I optimize the virtual machine placement to maximize usage and minimize costs?
- How can I optimize the application placement to maximize usage and minimize costs?

Capacity planning involves a five-step process guided by a wizard. During these steps, you import data for analysis, select the scope of analysis (time, servers, and so on) you want to work with, understand the characteristics of the servers or virtual machines, observe trends and patterns, and so on. In the *recommendation generation* step, you define the objectives or results to achieve with planning activity, the policies (rules) to be applied during
analysis, and the analysis output characteristics (reports), and generate the recommendation. The reports can be visualized in the Dashboard (Tivoli Integrated Portal).

The IBM Tivoli Monitoring for Virtual Environments Capacity Planner tool uses usage data available in Tivoli Data Warehouse. IBM Tivoli Monitoring for Virtual Environments Capacity Planner creates a data mart in the DB2® database (the database server can be shared with Tivoli Data Warehouse). Capacity planning requires DB2 federation capability, because it is not copying utilization data from Tivoli Data Warehouse, but using data already captured in Tivoli Data Warehouse (summarized data).

**Integration with other products**

Tivoli Monitoring for Virtual Environments also functions in a broader context and integrates with the following products:

**IBM Tivoli Netcool/OMNIbus**
Tivoli Monitoring for Virtual Environments forwards situations to OMNIbus by using the Tivoli Monitoring base mechanism. You can use Tivoli Monitoring tooling to define which situations to forward. Good examples include situations about virtual machine changes, including deletion, creation, and movements of virtual machines.

**IBM Tivoli Application Dependency Discovery Manager**
Tivoli Monitoring for Virtual Environments discovery library adapters can be imported into TADDM and reconciled within TADDM with other sources, including the sensors for virtual platforms or hypervisors. A second integration with TADDM is the ability to dynamically update TADDM about virtual machine changes.

**IBM Tivoli Business Service Manager**
Tivoli Monitoring for Virtual Environments discovery library adapters can also be imported into Tivoli Business Service Manager for services management. Situations generated by Tivoli Monitoring for Virtual Environments can also be used in Tivoli Business Service Manager for services impact determination.

**IBM System Director**
From IBM Tivoli Monitoring for Virtual Environments, you can launch in context to the administration UIs of IBM Systems Director to administer and configure the VMware hypervisor. The launch in context is available from the VMware cluster, the ESX servers workspaces in the Tivoli Enterprise Portal, or both.
Chapter 2. Installing the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner

The same installer is used to install and configure the Virtual Environments Dashboard, Performance and Capacity Management Reports, and Capacity Planner.

Fresh installation

The following sections are relevant if you have not already installed the Virtual Environments Dashboard, Performance and Capacity Management Reports, and Capacity Planner.

Note: You can install Virtual Environments Dashboard, Performance and Capacity Management Reports, and Capacity Planner V7.1 Fix Pack 1 without having Version 7.1 already installed.

Installation overview

The IBM Tivoli Monitoring for Virtual Environments Dashboard installer can be run interactively or silently to install the functional components. The database schema required for the Capacity Reporting and Capacity Planner functions can be updated during or after installation.

Interactive GUI or silent installation

You can install the Virtual Environments Dashboard in two ways:

- Use the interactive graphical installer, which prompts you for required information and installs the product based on your input.
- Use a response file for a silent installation. You edit the response text file to provide the information needed for installation. You then run the installation program from the command line, giving it the response file as input. You might want to use the response file method if you are installing on a host that does not have graphical user interface support installed or you want to reuse your responses across multiple installations.

Components installed

The installer for the Virtual Environments Dashboard installs components associated with the dashboard in the Tivoli Integrated Portal Server. The following functional components are installed:

- Dashboard UI code and Dashboard provider
- Performance and Capacity Management Reports
- Capacity Planner UI and server code

Attention: Caveat on deselecting IBM Tivoli Monitoring for Virtual Environments 7.1 components already installed: You should not deselect installed IBM Tivoli Monitoring for Virtual Environments 7.1 components during the upgrade to IBM Tivoli Monitoring for Virtual Environments 7.1 Fix Pack 1. If you deselect components already installed, the installation might be in an unpredictable state and is not currently supported. For example, if IBM Tivoli Monitoring for Virtual Environments 7.1 Dashboard and Capacity Planner are installed, you must upgrade both components.
Database schema updates
The installer also provides the capability to apply database schema updates required for the Capacity Reporting and Capacity Planner functions. In certain cases, database changes must be performed by a different individual than the one installing the Tivoli software into the Tivoli Integrated Portal. Therefore, schema updates may be applied either during the installation process of the rest of the code or as a separate step.

Preparing to install
Prepare your environment before starting installation of the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner.

Prerequisite check
The Virtual Environments Dashboard installer checks for certain prerequisite packages on the target system before performing the installation. If a prerequisite is not available for a component, installation of that component does not proceed.

For a detailed list of the operating systems that are supported, see the VMware VI agent V7.1 Prerequisites. For additional information, see Tivoli Supported Platforms. For a detailed list of the operating systems that are supported, see the VMware VI agent V7.1 Prerequisites. For additional information, see Tivoli Supported Platforms.

Tivoli Integrated Portal and Tivoli Common Reporting
If you have Tivoli Common Reporting V2.1.1 installed, Tivoli Integrated Portal V2.2 is included in the installation.

To verify the installation, log in to the Tivoli Integrated Portal console with a user ID that has access to Tivoli Common Reporting. In the navigation tree, expand the Reporting section and click Common Reporting. Verify that the predefined reports are listed on the page. If the reports are not listed, the Tivoli Common Reporting Server might be unavailable. See Post-installation tasks.

Table 1. Tivoli Integrated Portal and Tivoli Common Reporting version requirements

<table>
<thead>
<tr>
<th>Virtual Environments Dashboard component</th>
<th>Tivoli Integrated Portal</th>
<th>Tivoli Common Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Environments Dashboard</td>
<td>V2.2 Fix Pack 1 (or later)(^1)</td>
<td>Not required</td>
</tr>
<tr>
<td>Capacity Reporting</td>
<td>V2.2</td>
<td>V2.1.1</td>
</tr>
<tr>
<td>Capacity Planner</td>
<td>V2.2 Fix Pack 1 (or later)(^1)</td>
<td>V2.1.1</td>
</tr>
</tbody>
</table>

\(^1\) The Dashboard requires Tivoli Integrated Portal V2.2 Fix Pack 1 or later. If this version of the Tivoli Integrated Portal is not already installed, the installer automatically installs it.

If you are installing only the VMware VI Agent Reports, then Tivoli Common Reporting V2.1 is sufficient. For more information, see the IBM Tivoli Common Reporting Information Center.

Note: If you are installing TCR reports, run the following command to check whether the default maximum Java heap setting is too low for your environment:

```
trcmd -list -reports
```
If this command fails with an OutOfMemoryError message, see “Installation and configuration problems” on page 173 for more information.

Tivoli Integrated Portal V2.2 Fix Pack 1

- If the Monitoring Agent for Windows OS is installed and running on the same system as the Tivoli Integrated Portal Server being updated, the agent might lock certain embedded WebSphere Application Server .dll files and cause the Tivoli Integrated Portal fix pack installation to fail. To avoid this problem, stop the agent before starting the installer.

- Check for processes other than the Tivoli Integrated Portal and the Tivoli Common Reporting Cognos process that are using the Java runtime environment supplied by the Tivoli Integrated Portal. You must stop these processes before installing the fix pack. Usually such processes are locally developed or customized tools.

- Ensure that you have sufficient disk space, including temporary space.

Tivoli Common Reporting for the VMware V1 and NetApp Storage agents

The reports are developed on a data model that is based on IBM Tivoli Monitoring for Virtual Servers V6.2.3 and later only. The reports do not run with earlier versions of Monitoring for Virtual Servers.

Capacity Planner database

The Capacity Planner database must be created and be empty (no tables or data) before you install the Dashboard. If the database is created on a different host system from the Tivoli Common Reporting host, it must be cataloged on the Tivoli Common Reporting host.

Configure database connections

- Tivoli Common Reporting V2.1.1 requires either a database client or a database server for access to the Tivoli Data Warehouse database.

- If you have the Tivoli Data Warehouse database on DB2, you must have a version of DB2 that can be configured for federation: V9.5 or V9.7. Review the Tivoli Supported Platforms (http://www-306.ibm.com/software/sysmgmt/products/support/Tivoli_Supported_Platforms.html) for the current list of supported versions.

- A connection must be configured to the Tivoli Data Warehouse database. If the data warehouse is running locally, this step is not required.

- Depending on which database server you are using, you will set up one of the following components:
  - DB2: Catalog the Tivoli Data Warehouse database on the client to ensure that a database alias exists to reference the Tivoli Data Warehouse database.
  - Oracle: Set up an Oracle Net Connection as found in the tnsnames.ora file.
  - SQL Server: Set up an ODBC connection to the Tivoli Data Warehouse.

- Create the Capacity Planner datamart database on the database server where federation is supported. Federation is enabled as part of federation configuration (see “Configuring Capacity Planner federation” on page 44). Note that the federation feature is supported but not enabled by default. The default database name is TADF0CDB.

Note: See Appendix C, “Capacity Planner database recommendations,” on page 199 for more information.
If the Capacity Planner database is not running on the Tivoli Common Reporting Server, you must catalog the database (TADFDCDB).

You must have the following information for the installation steps:

- Database administrator user name and password.
- The non-administrative user name and password used to access the Tivoli Data Warehouse. The default is ITMUSER.
- Local database connection information. Note the cataloged database alias for the Tivoli Data Warehouse and the database. If you are using Oracle, note the Net Connection name. If you are using Microsoft SQL Server, note the ODBC connection name.
- If you are using Oracle or Microsoft SQL Server, you must have a copy of the JDBC drivers on your Tivoli Common Reporting Server. During installation, you are prompted for the JDBC driver path.

Confirm that your database administrator passwords are valid

The Dashboard and Capacity Planner installation fails if the Capacity Planner database (TADFDCDB) user ID or password is expired or not valid. You must confirm that your user ID and password for this database are valid before starting the installation process.

Install as root or non-root user on AIX and Linux

The decision to install as the root user or a non-root user is made when you install Tivoli Common Reporting or another product that includes the Tivoli Integrated Portal software.

When installing the Virtual Environments Dashboard, you must install as the same user that you logged in as when the Tivoli Integrated Portal was installed.

AIX systems must have a bash shell installed

If you are installing on an AIX system, ensure that you have a bash shell installed for running installation and configuration scripts. See the IBM AIX Toolbox download (http://www-03.ibm.com/systems/power/software/aix/linux/toolbox/download.html).

Internet Explorer browser

If you are using the Internet Explorer browser, the following configuration settings are required for using the Capacity Planner: In Tools > Internet Options > Advanced, confirm that Security > Do not save encrypted pages to disk is disabled. In the Security tab, click Custom level and confirm that Scripting > Active scripting is set to Enable.

Installing in GUI mode

The Virtual Environments Dashboard image combines all the components of IBM Tivoli Monitoring for Virtual Environments into a set of installable packages.

The Virtual Environments Dashboard platform-specific images contain the Virtual Environments Dashboard, Performance and Capacity Management Reports, Capacity Planner, and Tivoli Integrated Portal V2.2 Fix Pack 1 (or later).

Before you begin

Each image is provided as an ISO image and either a .tar file (UNIX platforms) or .zip file (Windows). Download the Virtual Environments Dashboard image for your platform: 64-bit AIX, x86 Linux, x86_64 Linux, 64-bit zLinux, 32-bit Windows, or 64-bit Windows. Select the 32-bit or 64-bit image based on the characteristics of your Tivoli Integrated Portal installation. For example, if you have a 32-bit version
of Tivoli Integrated Portal installed on a 64-bit operating system, you need the 32-bit Virtual Environments dashboard image.

If you have the Tivoli Monitoring Windows OS agent running on the computer where the Tivoli Integrated Portal Server is installed, stop it now.

About this task

Complete these steps to install the components. The Tivoli Integrated Portal V2.2 Fix Pack 1 (or later) is installed automatically if the required version is not already installed.

Procedure

1. If you downloaded the Virtual Environments Dashboard image archive file (`itmfs.dashboard_date.platform.tar.gz`), expand the files to a temporary directory on the target system.
   - Each platform-specific Virtual Environments Dashboard image expands into three subdirectories: cdimage.fixpack contains the Tivoli Integrated Portal V2.2 Fix Pack 1 (or later) installer; ITMFVSDash contains the Virtual Environments Dashboard installer; and reports contains the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner installer.
   - If the Tivoli Integrated Portal V2.2 Fix Pack 1 or later is not installed, the installer automatically installs it. See the “Tivoli Integrated Portal fix pack installation fails” entry in “Installation and configuration problems” on page 173 if the installation fails.

2. Run the installer matching your operating system and architecture, where `tempdir` is the temporary directory you expanded the installation package into:
   - **Windows**: `tempdir\ITMFVSDash\install.bat`
   - **AIX®**: `tempdir/ITMFVSDash/install-aix`
   - **Linux (Intel)**: `tempdir/ITMFVSDash/install-linux`
   - **Linux (z Series)**: `tempdir/ITMFVSDash/install-zlinux`

3. In the IBM Tivoli Monitoring for Virtual Environments Dashboard window select your language, and click OK.

4. On the Welcome page, click Next.

5. On the Software License Agreement page, click **I accept both the IBM terms and the non-IBM terms**, and click Next. The IBM Automatic Deployment Engine is automatically configured on the local workstation so that the installation can be executed.
6. On the Configuration pages, choose the components you want to install and click Next.
   - Installing the Dashboards and Capacity Planner web applications requires that Tivoli Integrated Portal V2.2 or later be installed.
   - Installing the Capacity Reporting component requires that Tivoli Common Reporting V2.1 be installed.
   - The **Dashboard and Capacity Planner TIP Applications** option is used to install the Tivoli Integrated Portal dashboard components.
   - The **VMware VI Agent TCR Reports** options are used to install the reports and to set up the IBM_TRAM schema and the Time Dimension tables. If you have Cognos reports running against your Tivoli Data Warehouse database, you already have the schema and time dimension tables and can clear the check box.
   - The **Capacity Planner** option is used to install the Capacity Planner software. If you select this option, the Dashboard and Capacity Planner Tivoli Integrated Portal Application component will also be installed.
7. On the TIP Information page, enter your Tivoli Integrated Portal credentials. This step is required in the installation of each of the components. After you click Next, the Tivoli Integrated Portal credentials are validated. If the Tivoli Integrated Portal is not present at the required level or cannot be accessed due to permissions, a message is displayed.
8. If you selected **VMware V1 Agent TCR Reports**, complete the following steps:
   a. Select the database type of your Tivoli Data Warehouse and click **Next**.
b. On the Tivoli Data Warehouse Connectivity Setup page, enter the connection information for the Tivoli Data Warehouse used for the capacity reports. Click **Next** to validate.
On the Database Schema Update for Reporting page, enter the database administrator information for adding new tables to Tivoli Data Warehouse for capacity reports and click Next to validate. The information is used to set up the IBM_TRAM schema and Time Dimensions tables. This user must have administrative privileges in the Tivoli Data Warehouse database.
d. If you selected Oracle or Microsoft SQL Server, the JDBC Driver page is displayed for selecting the JDBC driver. The JDBC drivers must already exist on your Tivoli Integrated Portal server. After specifying the driver, click Next to validate.
If you selected Capacity Planner, use the Capacity Planner Database Connectivity Setup page to specify the user account that will access the database when running the Capacity Planner tool. This account does not need to be an administrative database account.

a. Enter the connection information for the database alias used for the capacity planning reports and click Next to validate.
b. On the Capacity Planner Database Schema Creation page, complete the fields with the database administrator information. Provide the information for the TADFDCDB database server, account information, and database name. Database administrative permissions are required.
c. Click Next to validate.

10. On the Pre-Installation Summary page, the number of components that will be installed and the required disk space are displayed. If all details are as you require, click Install. The installer installs the components specified.

What to do next

After the installation is completed, continue to “Configuring the connection to the Virtual Environments Dashboard” on page 34.

Installing in silent mode

You can also install the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner using the silent installation method.

Before you begin

The silent installation options file, installer_response_template, is included on the installation media at the root of the installation directory. You must modify this file to meet your needs.
Procedure

1. If you downloaded the Virtual Environments Dashboard image archive file (itmfs_dashboard_date.platform.tar.gz), expand the files to a temporary directory on the target system.

   * Each platform-specific Virtual Environments Dashboard image expands into three subdirectories: cdimage.fixpack contains the Tivoli Integrated Portal V2.2 Fix Pack 1 (or later) installer; ITMFVSDash contains the Virtual Environments Dashboard installer; and reports contains the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner installer.

   * If the Tivoli Integrated Portal V2.2 Fix Pack 1 or later is not installed, the installer automatically installs it. See the “Tivoli Integrated Portal fix pack installation fails” entry in “Installation and configuration problems” on page 173 if the installation fails.

2. Copy the sample response file, install_response_template.txt, from tempdir/ITMFVSDash into a new file. Edit the new file to place the values for your responses in the file.

   **Note:** You must place the Tivoli Integrated Portal administrative password in this file in clear text. Take all necessary security precautions with this file during and after the installation.

   The text of the install_response_template.txt response file is contained below. Required and optional response elements are marked.

   ```
   ########################################################################## {COPYRIGHT-TOP} ###
   ##
   ## © Copyright IBM Corp. 2011
   ##
   ## The source code for this program is not published or otherwise divested
   ## of its trade secrets, irrespective of what has been deposited with
   ## the U.S. Copyright Office.
   ########################################################################## {COPYRIGHT-END} ###
   ##########################################################################
   ## InstallAnywhere variables to configure the install of
   ## IBM Tivoli Monitoring Virtualization Dashboard components.
   ##
   ## Usage: install## available modes: silent
   ##    swing
   ##
   ## On Windows, install.exe will return immediately. To avoid this, you should
   ## use the batch file install.bat which wraps it.
   ## On other platforms use the install executable appropriate for your system.
   ##
   ## In this file, a line beginning with # is treated as a comment
   ##
   ##########################################################################
   #---- Required
   #----
   #---- Set Silent License Acceptance
   #---- To accept the license agreement: change the value to true.
   #---- example: LICENSE_ACCEPTED=true
   #---- If the LICENSE_ACCEPTED has a value other than 'true' the installation
   #---- will exit.
   #----
   #---- By changing 'false' to 'true' you mark that you agree to
   #---- the license agreement.
   LICENSE_ACCEPTED=false
   #---- Required
   #----
   #---- Choose Installation Folder
   ```
For silent installation, you must provide the fully qualified path to
the Tivoli Integrated Portal installation in which you want to use the
Virtualization Dashboard.
Examples:
- For Windows platform: C:\IBM\tivoli\tipv2
- For UNIX platform: /opt/IBM/tivoli/tipv2
Note that:
- Backslash "\" is considered to be a special character and needs to be
  escaped, so use double backslashes: "\\" when defining the path on
  Windows.

TIP_INSTALLATION_DIRECTORY=

Tivoli Integrated Portal configuration related

Enter a WebSphere Application Server administrator user name
and password. If these values are incorrect the installation
will fail.
WAS_USER_NAME=tipadmin
WAS_PASSWORD=

Optional - If omitted, the default is to install all
Selection of components to install. For each of these properties
use the following values:
0 = do not install
1 = install
Install the TIP-based web application modules for Virtualization Dashboard
and Capacity Planning
IAGLOBAL_ITMFVS_INSTALL_DASHBOARD=1
Install the Capacity historical reports
IAGLOBAL_ITMFVS_INSTALL_CAPACITY_REPORTS=1
Install the schema updates to the TDW warehouse database needed for the
Capacity historical reports,
including the Time Dimension table updates
IAGLOBAL_ITMFVS_INSTALL_CAPACITY_SCHEMA=1
Install Capacity Planning tool (if chosen, the TIP web applications are
also automatically installed)
IAGLOBAL_ITMFVS_INSTALL_ANALYTICS_COMPONENT=1

Required if Capacity reports are being installed
TDW warehouse database type
The following values are supported: DB2, ORACLE, MSSQL
IAGLOBAL_ITMFVS_CAPACITY_DBTYPE=DB2

Required if Capacity reports are being installed
Cognos TDW Datasource information.

User name for the capacity reports Cognos datasource
IAGLOBAL_ITMFVS_CAPACITY_DATASOURCE_USERNAME=itmuser
Password for the capacity reports Cognos datasource
IAGLOBAL_ITMFVS_CAPACITY_DATASOURCE_PASSWORD=
Name of the cataloged alias for the TDW warehouse database
IAGLOBAL_ITMFVS_CAPACITY_DATASOURCE_ALIASNAME=

Required if schema updates for Capacity reports are being installed
#---- User and configuration information for applying the schema updates to
#---- the warehouse database
#----
#---- User name to use for the schema update - must have authority to
#---- create tables etc
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_USERNAME=itmuser
#---- User name to use for the schema update
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_PASSWORD=
#---- Host name or IP address of the database server
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_HOST=localhost
#---- Port number to use to connect to the database server
#---- Typical values: DB2 50000, ORACLE 1521, MSSQL 1433
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_PORT=
#---- Database name for the TDW database
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_DBNAME=WAREHOUS
#----
#---- JDBC driver file(s), separated by comma
#---- The files typically needed are:
#---- DB2:  db2jcc.jar,db2jcc_license_cu.jar,db2java.zip,db2policy.jar
#---- Oracle: classes12.jar
#---- MSSQL:  sqljdbc4.jar
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_DRIVER_JARS=
#---- Fully qualified path to directory containing driver file(s)
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_DRIVER_PATH=
#----
The JDBC driver class used is based on database type as follows:
#---- DB2:  com.ibm.db2.jcc.DB2Driver
#---- Oracle: oracle.jdbc.driver.OracleDriver
#---- MSSQL:  com.microsoft.sqlserver.jdbc.SQLServerDriver
IAGLOBAL_ITMFVS_CAPACITY_SCHEMAUPDATE_DRIVER_CLASS=

# ----- Required if capacity planning component is being installed
#-----
#----- Capacity planning database type
#----- The following values are supported: DB2
IAGLOBAL_ITMFVS_ANALYTICS_DBTYPE=DB2

#----- Required if capacity planning reports are being installed
#-----
#----- Capacity Planning Cognos datasource information.
#-----
#----- User name for the capacity planning reports Cognos datasource
IAGLOBAL_ITMFVS_ANALYTICS_DATASOURCE_USERNAME=itmuser
#----- Password for the capacity planning reports Cognos datasource
IAGLOBAL_ITMFVS_ANALYTICS_DATASOURCE_PASSWORD=
#----- Name of the cataloged alias for the capacity planning database
IAGLOBAL_ITMFVS_ANALYTICS_DATASOURCE_ALIASNAME=

#----- User and configuration information for the Capacity Planning Datamart
database
#-----
#----- User name to use for the schema update - must have authority to create
tables etc
IAGLOBAL_ITMFVS_ANALYTICS_SCHEMAUPDATE_USERNAME=
#----- User name to use for the schema update
IAGLOBAL_ITMFVS_ANALYTICS_SCHEMAUPDATE_PASSWORD=
#----- Host name or IP address of the database server
IAGLOBAL_ITMFVS_ANALYTICS_SCHEMAUPDATE_HOST=localhost
#----- Port number to use to connect to the database server
#----- Typical values: DB2 50000, ORACLE 1521, MSSQL 1433
IAGLOBAL_ITMFVS_ANALYTICS_SCHEMAUPDATE_PORT=
#----- Database name for the capacity planning database
3. Run the installer matching your operating system and architecture, specifying the fully qualified name of your response file and the switch `-i silent`:

- Windows: `tempdir\ITMFVSDash\install.bat -f path -i silent`
- AIX: `tempdir/ITMFVSDash/install-aix -f path -i silent`
- Linux (Intel): `tempdir/ITMFVSDash/install-linux -f path -i silent`
- Linux (z Series): `tempdir/ITMFVSDash/install-zlinux -f path -i silent`

The installer runs without further prompts and minimal screen output.

What to do next

After the installation is completed, continue to "Configuring the connection to the Virtual Environments Dashboard" on page 34.

Upgrading from V7.1

Some specific steps are necessary when you upgrade from V7.1 to V7.1 Fix Pack 1.

Preupgrade process for Capacity Planner database - convert from non-UTF8 to UTF8

When upgrading from V7.1 to V7.1 Fix Pack 1, if the following conditions are true, you must complete the following steps before you run the installer for V7.1 Fix Pack 1.

Before you begin

All of the following conditions must be true:
- Capacity Planner for IBM Tivoli Monitoring for Virtual Environments V7.1 is installed.
- The Capacity Planner database for V7.1 is created without UTF-8 encoding. To check whether the database has UTF-8 encoding, run the following command: `db2 get db cfg for db_name | grep -i CODE`
- You plan to upgrade the version of Capacity Planner currently installed to IBM Tivoli Monitoring for Virtual Environments V7.1 Fix Pack 1.

About this task

Complete the steps at the DB2 Database for Linux, Unix, and Windows (http://publib.boulder.ibm.com/infocenter/db2luw/v9/index.jsp?topic=...
%2Fcom.ibm.db2.udb.admin.doc%2Fdoc%2Ft0024033.htm) as database administrator before you run the installer for ITMfVE7.1 Fix Pack 1. An example of the steps required follows:

**Procedure**

1. Log in as database administrator.
2. Use the `db2move` command to export Capacity Planner data:
   ```
   cd export-dir
   db2move tadfdcdb export -aw
   ```
   During this step, warnings such as the following might be displayed:
   ```
   EXPORT: 30 rows from table "TADFDC "."RULEDIM" with Warnings!
   EXPORT: 63 rows from table "TADFDC "."RULEOUTPUT" with Warnings!
   EXPORT: 0 rows from table "TADFDC "."RULESTATUS" with Warnings!
   EXPORT: 2626 rows from table "TADFDC "."USER_DEFINED_BENCHMARK" with Warnings!
   ```
   Ignore these warnings.
3. Generate a DDL script for the entire existing database (system and user tables) using the `db2look` command:
   ```
   db2look -d tadfdcdb -e -o unidb.ddl -x -f
   ```
   During this step, warnings such as the following might be displayed:
   ```
   Warning: You need to modify the db2look output script by adding AUTHORIZATION and PASSWORD to those CREATE SERVER statements that are used to define DB2 family instance as a datasource
   Warning: You need to modify the db2look output script by adding REMOTE_AUTHID to the CREATE USER MAPPING statement(s)
   ```
   Ignore these warnings.
4. Create the Unicode database:
   ```
   db2 CREATE DATABASE UNIDB USING CODESET UTF-8 territory US
   ```
5. Edit the unidb.ddl script:
   a. Change the database name to UNIDB in ddl.
   b. Replace all occurrences of GENERATED ALWAYS with GENERATED BY DEFAULT
   c. Save the unidb.ddl file.
6. Recreate your database structure by running the `ddl` script that you edited:
   ```
   db2 -tvf unidb.ddl
   ```
7. Import your data into the new Unicode database using the `db2move` command.
   Run the `db2move` command twice to handle database constraints.
   ```
   cd export-dir
   db2move unidb import -io INSERT
   ```
   During this step, warnings such as the following might be displayed:
   ```
   * IMPORT: table "TADFDC "."ANL_SERVER_TAG_MAP"
   WARNING 3107. Check message file tab6.msg!
   *** SQL Warning! SQLCODE is 3107
   *** SQL3107W There is at least one warning message in the message file.
   ```
   Ignore these warnings.
   ```
   db2move unidb import
   ```
   During this step, warnings such as the following might be displayed:
Before you start the upgrade

Before you start the upgrade from V7.1 to V7.1 Fix Pack 1, ensure that the complete V7.1 environment is backed up.

Procedure

2. Use the Tivoli Common Reporting backup instructions to back up all Tivoli Common Reporting report packages deployed.
4. If you have made any changes to Capacity Planner knowledge base csv files, ensure you back them up because the upgrade step overwrites the knowledge base files.

Upgrade

Choose what components to upgrade according to the components that were initially installed.

The following scenarios present instructions about what components to upgrade, given different examples of components that are already installed.

Attention: Do not deselect components that are already installed. See the note regarding installed components for more information.

Scenario 1

Initial Setup

In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the Dashboard component was installed.

Select one of the following options on the installer GUI

- Select Dashboard only
- Select Dashboard and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

Selection

You select to upgrade only the Dashboard component.
**Installer Behavior**

The installer should preselect the Dashboard as the installed component for upgrade. The installer upgrades only the Dashboard component.

**Scenario 2**

**Initial Setup**

In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the Dashboard component was installed.

**Select one of the following options on the installer GUI**

- Select Dashboard only
- Select Dashboard and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

**Selection**

You select to upgrade both the Dashboard and the Capacity Planner.

**Installer Behavior**

The installer should preselect the Dashboard as the installed component for upgrade. The installation of the Dashboard component for IBM Tivoli Monitoring for Virtual Environments V7.1 also deployed the Capacity Planner Web Application (WAR) file. In this case, the installer upgrades the Dashboard and the Capacity Planner Web Application (WAR) file, and then installs the 7.1 IF1 Capacity Planner Database and Reports.

**Note:** If the upgrade fails for some reason, follow the instructions in "If the upgrade fails" on page 33.

**Scenario 3**

**Initial Setup**

In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the Dashboard component was installed.

**Select one of the following options on the installer GUI**

- Select Dashboard only
- Select Dashboard and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

**Selection**

You select to upgrade the Dashboard, the Capacity Planner, and the VMWare reports.

**Installer Behavior**

The installer should preselect the Dashboard as the installed component for upgrade. The installation of the Dashboard component for IBM Tivoli Monitoring for Virtual Environments V7.1 also deployed the Capacity Planner Web Application (WAR) file. In this case, the installer upgrades the Dashboard and the Capacity Planner Web Application (WAR) file, and then installs the 7.1 IF1 Capacity Planner Database and Reports, as well as the VMWare Reports.

**Note:** If the upgrade fails for some reason, follow the instructions in "If the upgrade fails" on page 33.
Scenario 4
Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the Capacity Planner component was installed.

Select one of the following options on the installer GUI
- Select Capacity Planner only
- Select Dashboard and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the either the Capacity Planner only, or the Dashboard and the Capacity Planner.

Installer Behavior
The installer should preselect the Capacity Planner as the installed component for upgrade. Although you only chose to install the Capacity planner, the Dashboard was also installed. The installer should preselect the Capacity Planner as the installed component for upgrade. Do not deselect components that are already installed. The installer upgrades both the Dashboard and the Capacity Planner components regardless of which option you select.

Note: If the upgrade fails for some reason, follow the instructions in "If the upgrade fails" on page 33.

Scenario 5
Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the Capacity Planner component was installed.

Select one of the following options on the installer GUI
- Select Capacity Planner only
- Select Dashboard and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the Dashboard, the Capacity Planner, and the VMWare reports.

Installer Behavior
Although you only chose to install the Capacity planner, the Dashboard was also installed. The installer should preselect the Capacity Planner as the installed component for upgrade. Do not deselect components that are already installed. The installer upgrades both the Dashboard and the Capacity Planner components regardless of which option you select. VMWare agent reports are also installed.

Note: If the upgrade fails for some reason, follow the instructions in "If the upgrade fails" on page 33.

Scenario 6
Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, the Dashboard and Capacity Planner components were installed.
Select one of the following options on the installer GUI
  • Select Dashboard and Capacity Planner
  • Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the Dashboard and the Capacity Planner.

Installer Behavior
The installer should preselect the installed components for upgrade. The installer upgrade both the Dashboard and the Capacity Planner.

Note: If the upgrade fails for some reason, follow the instructions in “If the upgrade fails” on page 33.

Scenario 7

Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, the Dashboard and Capacity Planner components were installed.

Select one of the following options on the installer GUI
  • Select Dashboard and Capacity Planner
  • Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the Dashboard, the Capacity Planner, and the VMWare reports.

Installer Behavior
The installer should preselect the installed components for upgrade. The installer upgrades both the Dashboard and the Capacity Planner, and installs the VMWare reports.

Note: If the upgrade fails for some reason, follow the instructions in “If the upgrade fails” on page 33.

Scenario 8

Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, the Dashboard, Capacity Planner, and VMWare reports were installed.

Select one of the following options on the installer GUI
  • Select Dashboard and Capacity Planner
  • Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the Dashboard, the Capacity Planner, and the VMWare reports.

Installer Behavior
The installer should preselect the installed components for upgrade. The installer upgrades the Dashboard, the Capacity Planner, and the VMWare Reports.

Note: If the upgrade fails for some reason, follow the instructions in “If the upgrade fails” on page 33.
Scenario 9

Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the VMWare agent reports were installed.

Customization: You scheduled the reports to run.

Select one of the following options on the installer GUI
- Select Reports only
- Select Reports & Dashboard
- Select Reports and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade only the reports.

Installer Behavior
The installer should preselect the VMware agent reports as the installed component for upgrade. The installer upgrades only the reports.

Scenario 10

Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V7.1, only the VMWare agent reports were installed.

Customization: You scheduled the reports to run.

Select one of the following options on the installer GUI
- Select Reports only
- Select Reports & Dashboard
- Select Reports and Capacity Planner
- Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the reports and install the Dashboard and the Capacity planner (Reports are already preselected).

Installer Behavior
The installer should preselect the VMware agent reports as the installed component for upgrade. The installer installs the Dashboard and the Capacity Planner.

Note: If the upgrade fails for some reason, follow the instructions in "If the upgrade fails" on page 33.

Scenario 11

Initial Setup
In the installation of IBM Tivoli Monitoring for Virtual Environments V6.2.3, only the VMWare agent reports were installed.

Customization: You scheduled the reports to run.

Select one of the following options on the installer GUI
- Select Reports only
- Select Reports & Dashboard
- Select Reports and Capacity Planner
Select Dashboard, Capacity Planner, and VMWare Reports

Selection
You select to upgrade the reports only.

Installer Behavior
The installer should preselect the VMware agent reports as the installed component for upgrade. The installer upgrades only the reports.

If the upgrade fails
If the IBM Tivoli Monitoring for Virtual Environments V7.1 Fix Pack 1 upgrade fails, complete the following steps before you run the IBM Tivoli Monitoring for Virtual Environments V7.1 Fix Pack 1 installer again.

About this task
You must be the database instance owner to follow these steps.

Procedure
1. If you have not backed up the capacity planner database, run the db2 backup command to back up the existing capacity planner database: db2 backup database db-name TO file path to store backup
2. Drop the capacity planner database: db2 drop database db-name
5. Drop the capacity planner database created by the installer: db2 drop database db-name-new
6. Run the db2 command to restore from the backup database: db2 restore database db-name from file path of backup file
7. Run the federation scripts. See Configuring Capacity Planner federation on page 44.

Postupgrade Capacity Planner configuration
After you upgrade from V7.1 to V7.1 Fix Pack 1, you must upload the latest benchmark file in Capacity Planner.

About this task
The latest benchmark file is available in the installer at $TIP_HOME\ITMFVSDash\dbinstaller\samples\USER_DEFINED_BENCHMARK.csv.

Procedure
1. Open the Edit Current Environment window, as shown in Figure 33 on page 134.
2. Click the Load Knowledge Data icon, which is in the upper-right corner of the window. The Refresh Knowledge Base Content window opens, as shown in Figure 12 on page 34.
3. Select **Benchmark**. In the corresponding field, enter the path of the CSV file that contains the benchmark.
4. Click **Upload**.

## Configuring the Virtual Environments Dashboard

The Virtual Environments Dashboard displays information from multiple sources (Tivoli Application Dependency Discovery Manager and Tivoli Monitoring). Configure your Tivoli Monitoring environment to enable event flows to the dashboard; and configure the Dashboard to take data from the Tivoli Monitoring and TADDM environments.

**Note:** The default maximum Java heap setting might be too low for most environments. See “Virtualization Environments Dashboard problems” on page 188 for more information.

### Configuring the connection to the Virtual Environments Dashboard

You must configure the Virtual Environments Dashboard to communicate with the IBM Tivoli Monitoring for Virtual Environments (ITMfVE) Provider for data retrieval to the Dashboards.

You must also configure a connection with the ITMfVE Datamart if you are using the Performance and Capacity Management Reports and Capacity Planner.

**Procedure**

1. Log in to the Tivoli Integrated Portal console. Your user ID must have the Administrator role (such as tipadmin with password tippass).
2. Select **Settings > Connections**.
3. In the Connections table, select the **ITMfVE Provider** row and click **Edit**.
4. Enter the configuration details:
   a. Enter the connection details for the Tivoli Enterprise Portal Server in your monitored network. All fields are required:
      
      **TEPS Hostname** is the fully qualified host name or IP address of the computer where the portal server is installed.
**TEPS Port** has a default of 1920.

**TEPS Username** has a default of *sysadmin*. Minimally, the user must have Tivoli Monitoring authority to view the VMware VI and VMware VI Agent applications. Optionally, the user should also have authority to view the NetApp Storage agent, Network Devices agent, and IBM Tivoli Storage Productivity Center. In addition, if Tivoli Monitoring situations should be automatically updated to forward EIF (Event Integration Facility) events to the Dashboard, the user name requires IBM Tivoli Monitoring authority to Modify situations.

**TEPS Password** is the user password.

b. If you want to enable the launch-in-context links in the Virtualization Dashboard to launch the Tivoli Enterprise Portal Java Web Start client instead of the Tivoli Enterprise Portal browser client, enter the **TEPS Java Webstart Port** number (default is 15200) and select the **Launch TEP using Java Webstart** check box. Otherwise, the Tivoli Enterprise Portal browser client is started in the user’s default browser. Note that Firefox 3.6 does not support launch of the Tivoli Enterprise Portal browser client, but it does support launch using Java Web Start.

c. If situation events are forwarded to the Tivoli Integrated Portal server for display in the scorecards, enter the **EIF Port** number. The default EIF port is 5429. When creating an event destination that does not use port 5429, change the EIF Port value to the correct port. (See “Configuring event forwarding to the Virtual Environments Dashboard” on page 37.)

d. If your environment has a Tivoli Application Dependency Discovery Manager server that discovered the Virtual Environments Dashboard infrastructure, the dashboards can use information from the server to display the change history for selected resources. Enter the TADDM server connection details:

   - **TADDM Hostname**
   - **TADDM Port**
   - **TADDM Username**
   - **TADDM Password**
5. Click OK to save the connection configuration to the Dashboard and return to the Connections table.

6. If you intend to use the Capacity Planner, in the Connections table, select the **ITMfVE Datamart** row, click **Edit**, and complete the following fields:
   a. Enter the Hostname for the database. This field is required. The default is localhost.
   b. Enter the Port number for the database. This field is required. The default Port number is 50000.
   c. Enter the Name of the database. This field is required. The default is TADFDCDB.
   d. Enter the name of Capacity Planner database Schema. This field is required. The default is TADFDC.
   e. Enter the Username to connect to the database. This field is required.
   f. Enter the Password for the username entered to connect to the target database. This field is required.
7. After you are finished defining the connection, click **OK** to save it. After the status changes to **Working**, the VMware situations specified for event forwarding to the Dashboard are updated and restarted.

8. Log out and restart the Tivoli Integrated Portal Server for the changes to go into effect. Subsequent updates to the connection information (such as a change of host name, user name, password, or port number) also require that you log out and restart the Tivoli Integrated Portal Server.

**Results**

The next time users log in to the Tivoli Integrated Portal, they can view data in the Virtual Environments Dashboards.

**Configuring event forwarding to the Virtual Environments Dashboard**

The Tivoli Event Integration Facility is used to support situation event flows from Tivoli Monitoring to the Virtual Environments Dashboard. Configure Tivoli Monitoring to send EIF events to the Virtual Environments Dashboard.

**About this task**

Take these steps to enable forwarding of situation events.

**Procedure**

1. If your hub Tivoli Enterprise Monitoring Server is not set to forward events, configure it now. If the Tivoli Monitoring environment does not have EIF configured, the tacmd command to create an event destination (next step) cannot be started. (See the **IBM Tivoli Monitoring Installation and Setup Guide** to enable situation event forwarding.)
2. Create an event destination for the dashboard with the following command, where IBM-04048509ABB is the host name for the Tivoli Integrated Portal server. Optionally replace the port number (5429), id (542), or name (VOCDashboard) for the destination.

    tacmd createEventDest -f -i 542 -p host1=IBM-04048509ABB:5429 name=VOCDashboard

After the event destination is successfully created, you should see this message:

    KUIICCE007I: The event destination server definition VOCDashboard with server ID 542 was successfully created on the server at https://IBM-04048509ABB:3661. Note that Hub TEMS needs to be recycled or refreshed for this to take effect.

To refresh the hub Tivoli Enterprise Monitoring Server without having to recycle it, run the following command:

    tacmd refreshTECInfo -t eif

3. Complete one of the following steps to enable situations to forward events to the dashboard destination.

   • To update situations automatically, edit the following file on the Tivoli Integrated Portal Server to specify the situations to update:

     ITMFVSDash/integration/etc/itmfvs.situations

     After the ITMfVE Provider establishes a connection to the Tivoli Enterprise Portal Server, the situations listed in this file are updated and restarted to send EIF events to the Dashboard.

**Note:** The itmfvs.situations file contains the following set of Tivoli Monitoring situations that are modified to forward EIF events to the portal server:

- VMware Default Situations
  - KVM_Cluster_CPU_Util_High
  - KVM_Cluster_Effective_Svrs_Low
  - KVM_Cluster_Effective_CPU_Low
  - KVM_Cluster_Effective_Mem_Low
  - KVM_Cluster_Memory_Util_High
  - KVM_Datastore_Bad_Status
  - KVM_Datastore_Inaccessible
  - KVM_Datastore_Usage_High
  - KVM_Server_CPU_Util_High
  - KVM_Server_Datastore_Free_Low
  - KVM_Server_Disk_Reads_High
  - KVM_Server_Disk_Writes_High
  - KVM_Server_HBA_Fault
  - KVM_Server_Memory_Util_High
  - KVM_Server_NIC_Down
  - KVM_Server_Receive_Rate_High
  - KVM_Server_Transmit_Rate_High
  - KVM_VM_CPU_Ready_High
  - KVM_VM_CPU_Util_High
  - KVM_VM_Disk_Free_Low
  - KVM_VM_Guest_Memory_Util_TTCT_1W
  - KVM_VM_Guest_Memory_Util_TTWT_1W
  - KVM_VM_Host_Memory_Util_High
  - KVM_VM_Powered_Off
  - KVM_VM_Receive_Rate_High
  - KVM_VM_Transmit_Rate_High

- # NetApp Default Situations
  - KNU_VolumeRunStatusAbnormal

- # ITPA Default VMware Situations
  - VM_CPU_Utilization_TTWT_1W
  - VM_Memory_Guest_Util_TTCT_1W
  - VM_Memory_Guest_Util_TTWT_1W
  - VM_Memory_Host_Util_TTCT_1W
To update a situation manually, open it in the Tivoli Enterprise Portal Situation Editor, select the EIF tab, and ensure the Forward Events to an EIF Receiver check box is selected and the Dashboard destination is in the list of Assigned EIF Receivers. For more information, see Forwarding the event to an EIF receiver in the IBM Tivoli Monitoring Tivoli Enterprise Portal User’s Guide or online help.

Results

Any standard situation (not embedded or correlated situations) can be used by the Dashboard to determine the status of the environment if it samples one of the following attribute groups. You can see the event indicators from situations defined for any of these attribute groups in the Server, Storage, and Network columns of the Cluster Scorecard and Server Scorecard:

**VMware attribute groups**

**Server column**
- KVM_CLUSTERS
- KVM_CLUSTERED_RESOURCE_POOLS
- KVM_CLUSTERED_SERVERS
- KVM_CLUSTERED_VIRTUAL_MACHINES
- KVM_RESOURCE_POOL_CPU
- KVM_RESOURCE_POOL_GENERAL
- KVM_RESOURCE_POOL_MEMORY
- KVM_SERVER KVM_SERVER_CPU
- KVM_SERVER_DISK KVM_SERVER_HBA
- KVM_SERVER_HEALTH KVM_SERVER_MEMORY
- KVM_SERVER_SAN KVM_VM_CPU
- KVM_VM_DISK
- KVM_VM_MEMORY
- KVM_VIRTUAL_MACHINES

**Storage column**
- KVM_CLUSTERED_DATASTORES
- KVM_DATASTORES
KVM_DATASTORE_HOST_DISKS
KVM_SERVER_DATASTORE
KVM_SERVER_VM_DATASTORE_UTILIZATION
KVM_VM_DATASTORE_UTILIZATION
KVM_VM_PARTITION

Network column
KVM_SERVER_NETWORK
KVM_VM_NETWORK

NetApp Storage

Storage column
KNU_VOLUMES

IT Performance Analyzer

Server column
VMware_Server_CPU_LT_Status
VMware_Server_Memory_LT_Status
VMware_VM_CPU_LT_Status
VMware_VM_Memory_LT_Status

Storage column
VMware_Datastore_LT_Status
VMware_VM_Partition_LT_Status

Network column
VMware_Network_LT_Status
VMware_VM_Network_LT_Status

What to do next

You can see the attribute group that a situation samples in the Tivoli Enterprise Portal Situation Editor: In the Formula tab, click Advanced > Display Item or Add Condition or Show Formula.

You can also use the command-line interface tacmd viewSit command to see which attribute group a situation samples. In the sample command and output below, the formula shows that the VM_CPU_Utilization_TTCT_1W situation samples the VMware_VM_CPU_LT_Status attributes:

C:\>tacmd viewsit --situation VM_CPU_Utilization_TTCT_1W
Name : VM_CPU_Utilization_TTCT_1W
Full Name : VM_CPU_Utilization_TTCT_1W
Description : Kpa:KPA4060
Type : Performance Analyzer Warehouse Agent
Formula : *IF *VALUE VMware_VM_CPU_LT_Status.Time_To_Critical_.Threshold >GT 0 *AND *VALUE VMware_VM_CPU_LT_Status.Time_To_Critical_.Threshold <LE 7 *AND *VALUE VMware_VM_CPU_LT_Status.Strength <GE 3
Sampling Interval : 0:1:0:0
Run At Start Up : Yes
Distribution : *AFT_PERF_ANALYZER_WHSE_AGENT
Text : ADVICE("kpa:"+$ISITSTSH.SITNAME$);
Action Location : Agent
Action Selection : System Command
System Command : NONE
Tivoli Integrated Portal authorizations

The IBM Tivoli Monitoring for Virtual Environments Dashboard module defines a Tivoli Integrated Portal role VMwareAdministrator. Only Tivoli Integrated Portal users who have been assigned this role or users in groups assigned this role can view or customize the Virtual Environments Dashboard pages. Similarly, only those users or groups assigned this role are shown the links to the Virtualization Reports.

The Tivoli Integrated Portal User ID specified during installation of the Dashboard is assigned to the VMwareAdministrator role. For example, if you installed using the Tivoli Integrated Portal User ID tipadmin, the next time you log in to the Tivoli Integrated Portal with the tipadmin user ID, you can view the Virtual Environments pages and navigation items. You do not see them if you log in with another user ID. To view the Virtual Environments Dashboard, a user must be assigned the VMwareAdministrator role and the chartViewer role; to access the Virtualization Reports, a user must be assigned the VMwareAdministrator role and the tcrPortalOperator role.

Method: Select the role and select the user IDs to assign

Use the Users and Groups > Roles Tivoli Integrated Portal application to manage the users and groups that are assigned to roles. In order to permit additional users to view the Virtual Environments pages and navigation items, take the following steps:

1. Log on to https://host_name:16311/ibm/console/logon.jsp using the Tivoli Integrated Portal admin user ID and password.
2. In the navigation tree, select Users and Groups > Roles. The Roles page opens.
3. Click the VMwareAdministrator role in the list.
4. In the properties page that opens, expand Users and Groups to reveal the users and groups currently assigned the role.
5. Click the Add Users button to display a user search dialog.
6. Enter the search criteria, and click Search.
7. In the list of users that appears, select the users you want to add to the VMwareAdministrator role, and click Add.
8. Click Save on the Roles page to store the updated access list.
9. Repeat steps 3 to 8 as required for the chartViewer role, as well as for other roles needed, such as the tcrPortalOperator role.
10. Close the Roles application.

Method: Select the user ID and select the roles to assign

You can use the User Roles application as an alternative to the Roles application if you want to start with a User ID and assign the roles. To add the roles using User Roles, take the following steps:

1. Log on to https://host_name:16311/ibm/console/logon.jsp using the Tivoli Integrated Portal admin user ID and password.
2. In the navigation pane, select Users and Groups > User Roles. The User Roles page opens.
3. Click **Search** to display a list of users.
4. Click the User ID you want to work with.
5. In the list of Available Roles, ensure that tcrPortalOperator, VMwareAdministrator, and chartViewer are selected.
6. Click **Save**.
7. Repeat steps 3 to 6 as required for other users.
8. Close the User Roles application.

**Method: Select the user group and select the roles to assign**

The Group Roles application works in a similar way to the User Roles application. Users and Groups are added using the Manage Users and Manage Groups applications.

**Method: Command-line interface**

The Tivoli Integrated Portal command line can also be used to assign roles. For example, this command gives the user "test1" the required roles:

```
./tipcli.sh MapRolesToUser --username tipadmin --password tippass --userID "uid=test1,o=defaultWIMFileBasedRealm" --rolesList VMwareAdministrator,tcrPortalOperator,chartViewer
```

See the [Command reference](#) topics in the Tivoli Integrated Portal information center.

**Security**

If your organization's security policy requires forced lockouts after several failed log in attempts, you must enable lockouts by using an LDAP (Lightweight Directory Access Protocol) registry or other password control software that supports account lockout.

See the [Central user registry](#) topics in the Tivoli Integrated Portal information center.

**Portlet resizing**

Users can select the Personalize Page action to move and resize the portlets on the dashboard pages to fit their browser window size. Users with Editor permission can change the layout for all users who can view the page with **Select action > Edit page**. After the changes are saved, the next time users log in they will see the new layout.

---

### Configuring historical data collection for the Performance and Capacity Management Reports

Provided with the Virtual Environments Dashboard, Capacity Reporting, and Capacity Planner installation media are scripts to configure historical data collection and summarization and pruning for all the attribute groups that are referenced by the Tivoli Common Reporting Performance and Capacity Management Reports.

These scripts include best practice recommendations for data collection used for reporting and capacity planning.

**About this task**

The `vmware_hist_config` script uses the command-line interface `tacmd` commands to set up the historical collections. When executing the script, you will pass in some parameters. The commands and parameters are listed in the procedure.
Procedure

- **Linux or UNIX**

1. Locate the following scripts on the installation media and copy to a temporary directory on the computer where a Tivoli Enterprise Monitoring Agent, a Tivoli Enterprise Monitoring Server, or Tivoli Enterprise Portal Server is installed: `vmware_hist_config.sh` and `vmware_check_hist_config.sh`.

2. Change to the directory where you copied the scripts and enter the following command: `.\vmware_hist_config.sh <TEPS hostname> <username> <password> [ITM installation path]`

   By default, the script uses the default Tivoli Monitoring path of `/opt/IBM/ITM`. To specify a different path, type the relative path after the password. If you want to modify any of the settings, edit the script. Comments at the beginning of the script describe the parameters. Each attribute group has a parameter for configuring the historical collection interval and upload times.

   In the following example, the `-i` parameter specifies that data should be uploaded to the data warehouse every hour. The `-c` parameter specifies that historical data should be collected every 15 minutes.

   `$CANDLEHOME/bin/tacmd histcreatecollection -a "KVM_DISTRIBUTED_VIRTUAL_SWITCHES" -t "vm" -o "KVM DISTRIBUTED VIRTUAL SWITCHES" -i 1h -l TEMA -c 15m -e "historical collection for Distributed Virtual Switches"

   A statement for each attribute group defines the summarization and pruning intervals. The `-d` parameter specifies which summarization intervals to configure. In the following example, `D` specifies Daily Summarization. (To configure Hourly and Daily summarization, specify `DH`.) The `-p` flag specifies the pruning intervals. In our example, `D=30d,R=3d` indicates that the Daily Summarization data will be pruned after 30 days and the Raw (detailed) data will be pruned after 3 days. Each pruning interval must be specified in a comma separated list with no spaces between the pruning intervals.

   `$CANDLEHOME/bin/tacmd histconfiguregroups -t "vm" -o "KVM DISTRIBUTED VIRTUAL SWITCHES" -m -d D -p D=30d,R=3d`

- **Windows**

1. Locate the following script on the installation media and copy to a temporary directory on the computer where a Tivoli Enterprise Monitoring Agent, a Tivoli Enterprise Monitoring Server, or Tivoli Enterprise Portal Server is installed: `vmware_hist_config.cmd`

2. Change to the directory where you copied the script and enter the following command: `vmware_hist_config.cmd <TEPS hostname> <username> <password> [ITM installation path]`

   By default, the script uses the `C:\IBM\ITM` path for Tivoli Monitoring. To specify a different path, type the relative path after the password. If you want to modify any of the settings, edit the script. Comments at the beginning of the script describe the parameters. Each attribute group has one entry for configuring the historical collection interval and upload times and the summarization and pruning intervals.

   In the following example, the first parameter is the attribute group. The `-d` parameter specifies which summarization intervals to configure. In the following example, `D` specifies Daily Summarization. (To configure Hourly and Daily summarization, specify `DH`.) The `-p` flag specifies the pruning intervals. In our example, `D=30d,R=3d` indicates that the Daily Summarization data will be pruned after 30 days and the Raw (detailed) data will be pruned after 3 days. Each pruning interval must be specified in a comma separated list with no spaces between the pruning intervals.
Configuring Capacity Planner federation

During installation, the schema and tables were created in the database. You must also set up federation from the Capacity Planner database to the Tivoli Data Warehouse server.

The Tivoli Monitoring for Virtual Environments V7.1 release supports the Tivoli Data Warehouse on DB2 only.

Before you begin

The database administrator (DBA) must complete the federation procedure, which requires knowledge and familiarity with database administration.

Important: All of the following prerequisite steps must be completed successfully before you start the federation configuration procedure. Otherwise, one or more steps in the procedure might fail.

1. The federation procedure must be performed on the host running the database server that is hosting the Capacity Planner database. Copy the entire dbinstaller directory from install_host to database_host. After copying the directory, ensure that the database instance owner has full read, write, and execute rights for the copied directory/files on the database host. By default, the dbinstaller directory is located at /opt/IBM/tivoli/ITMFVSDash/dbinstaller on the install host. Also, the procedure must be completed by a user account that has instance owner authority or permissions on the database instance under which the Capacity Planner database was created. Hence, you need to log in as such an instance owner (when using Windows remote desktop, as well).

Note: It is assumed that the Capacity Planner database was created using the same instance owner. Typically, the instance owner on Linux and UNIX operating systems is db2inst1, and on Windows it is db2admin. Failures might be observed if you attempt to complete these steps as a user with non-compliant authorization levels. Also, on Windows, all the commands must be run in a DB2 Command Prompt window.

2. Ensure that your database is not set up with Automated Statistics Profiling. If statistics profiling is enabled when you enable federation, you can no longer log in to the database. You can check the parameter setting by connecting to the database and typing db2 get db cfg | grep AUTO_STATS_PROF. Confirm that it is set to OFF: (AUTO_STATS_PROF) = OFF.

3. The database manager configuration must have federated mode turned on. Confirm that the database is set up with federation by connecting to the database and entering db2 get dbm cfg | grep -i federated. If the database is not federated (parameter is set to no), enter db2 update dbm cfg using federated yes. Stop and restart DB2 using db2stop followed by db2start.

4. Summarization must be enabled on at least one of the attribute groups required by the Capacity Planner. A script is provided for configuring historical data collection and summarization and pruning on the attributes used by the Capacity Planner. If you use the provided script, all the historical data that you need is available from the Tivoli Data Warehouse.
5. On UNIX platforms, the federation set up script tadfrc_setup_fed.sh must be run from a bash shell. The default path is /opt/IBM/tivoli/ITMFVSDash/dbinstaller.

About this task

The following instructions for configuring Capacity Planner federation are also in the TIP_dir/ITMFVSDash/dbinstaller/Readme_Federation.txt file.

The examples in the procedure use TADFDCDB for the Capacity Planner database name, TADFDC for the schema name, and db2inst1 for the database owner. Use commas and quotations (double and single) as shown. Specify the schema name in uppercase letters.

Procedure

1. Catalog the Tivoli Data Warehouse database server:
   
   ```
   db2 "catalog tcpip node node_id remote remote_host server remote_port"
   ```
   
   where:
   
   - `node_id` is the node ID, such as WHNODE.
   - `remote_host` is the host name of the remote Tivoli Data Warehouse database server, such as testwarehouse1.
   - `remote_port` is the port number of the remote Tivoli Data Warehouse database server, such as 50001.

   Example: db2 "catalog tcpip node WHNODE remote testwarehouse1 server 50001"

2. Catalog the Tivoli Data Warehouse database:

   ```
   db2 "catalog database remote_db as local_db at node node_id authentication server"
   ```
   
   where:
   
   - `remote_db` is the name of the remote Tivoli Data Warehouse database, such as warehous.
   - `local_db` is the name of the remote Tivoli Data Warehouse database, such as WHDB.
   - `node_id` is the node ID, such as WHNODE.

   Example: db2 "catalog database warehous as WHDB at node WHNODE authentication server"

3. Connect to the Capacity Planner database instance:

   ```
   db2 connect to instance_name
   ```
   
   where `instance_name` is the Capacity Planner instance name, such as tadfdcdb.

   Example: db2 connect to tadfdcdb

4. Create the DRDA wrapper:

   ```
   db2 "create wrapper DRDA"
   ```
   
   If the command fails, take the following steps:
   
   a. Check that the database manager configuration has federated mode enabled: db2 get dbm cfg | grep -i federated
   
   b. If federated mode is set to “no”, enable it: update dbm cfg using federated yes; db2stop; db2start
c. Retry creating the wrapper.
d. If the retry fails with an error similar to, “this instance is not set for this operation...”, restart the database manager: db2stop; db2start
e. If DB2 restarts successfully, reconnect to the Capacity Planner database: db2 connect to tadfdcdb

5. Register a DB2 server definition to the DRDA wrapper to enable access to the Tivoli Data Warehouse:
   a. Start the db2 command-line prompt:
      
   b. Describe the federated server to access:
      
      CREATE SERVER server_name TYPE server_type VERSION version_number WRAPPER wrapper_name AUTHORIZATION "user_id" PASSWORD "password"
      OPTIONS (DBNAME 'db_name')

      where:
      
      server_name is the name to give to the Tivoli Data Warehouse DB2 server, such as WHSERVER.
      server_type is the type of Tivoli Data Warehouse source server to which you are configuring access, such as DB2/CS.
      version_number is the version of the database server that you want to access, such as 9.5. Currently versions 9.5 and 9.7 are supported.
      wrapper_name is the name that you specified in the create wrapper statement, such as DRDA.
      user_id is the authorization ID at the data source, typically your remote DB2 instance owner, such as "db2inst1".
      password is the password of the remote DB2 authorization ID, such as "db2inst1".
      db_name is your locally cataloged Tivoli Data Warehouse database name, such as 'WHDB'.

      Example: CREATE SERVER WHSERVER TYPE DB2/CS VERSION 9.5 WRAPPER DRDA AUTHORIZATION "db2inst1" PASSWORD "db2inst1" OPTIONS (DBNAME 'WHDB')

c. Define an association between a user ID and password at the federated server (Capacity Planner end) and the corresponding user ID and password at the data source Tivoli Data Warehouse:
   
   CREATE USER MAPPING FOR instance_owner SERVER server_name OPTIONS
   (REMOTE_AUTHID 'user_id', REMOTE_PASSWORD 'password')

   where:
   
   instance_owner is the local DB2 instance owner, such as db2inst1.
   server_name is the name of the Tivoli Data Warehouse server, such as WHSERVER.
   user_id is the remote Tivoli Data Warehouse instance owner, such as 'db2inst1'.
   password is the password of the remote DB2 authorization ID, such as "db2inst1".

   Example: CREATE USER MAPPING FOR db2inst1 SERVER WHSERVER OPTIONS
   (REMOTE_AUTHID 'db2inst1', REMOTE_PASSWORD 'db2inst1')

d. Test the connection between Capacity Planner database and Tivoli Data Warehouse databases. Example:
6. Set up federation using the tadfdc_setup_fed utility:
   - This utility (tadfdc_setup_fed.sh on Linux or UNIX; tadfdc_setup_fed.bat on Windows) helps configure federation between Tivoli Data Warehouse measurement data tables and the Capacity Planner database. Capacity Planner uses different metrics of physical servers (CPU, memory, IO, network) and virtual machines (CPU, memory, IO, network and datastore) to compute the workload sizes and the resource demands.
   - Each argument to the tadfdc_setup_fed utility helps federate a Capacity Planner measurement table to a corresponding Tivoli Data Warehouse metric table. A layer of database views defined over such federated tables then build a uniform data access layer for the Capacity Planner.
   - Arguments are of the form:
     \[ \text{computer}_\text{component}[\_\text{aggregation}\_\text{level}] \]
     
     where
     - \text{computer} can be a physical server (PS) or virtual machine (VM).
     - \text{component} can be CPU (CPU), memory (MEM), IO (IO), network (NET), or datastore (DS).
     - \text{aggregation}\_\text{level}, if specified, can be Hourly (\_H), Daily (\_D), Weekly (\_W), Monthly (\_M), Quarterly (\_Q), or Yearly (\_Y).
   - The utility generates a log of its operations in file setup.log in its working directory. Any errors are indicated only in this log. To determine whether the script was successful, check the messages in setup.log for any possible errors that the utility might have encountered during its operations.

Results

The Capacity Planner database is now configured.

Example

On Unix, make tadfdc_setup_fed.sh executable
   ```bash
   chmod u+x tadfdc_setup_fed.sh
   ```

Quickstart setup

To federate all tables, use the following command:
   ```bash
   tadfdc_setup_fed.sh -server WHSERVER -dm TADFDODB -dmschema TADFDC -add all
   ```

Getting help on the utility

Configures federation between remote metrics data sources and the Capacity Planner database.

Usage: `./tadfdc_setup_fed.sh -help`
Database tuning


- Ensure that buffer pools are at a minimum of 1 GB.
- For information about tuning the Tivoli Data Warehouse, see "Database Tuning" in the IBM Tivoli Monitoring Installation and Setup Guide.

Uninstalling the Virtual Environments Dashboard

If you are no longer using the Virtual Environments Dashboard, you can uninstall it from your environment.
Procedure

1. Start the uninstall procedure:
   • On Windows, select **Add/Remove Programs** from the Control Panel. Click **IBM Tivoli Virtual Environments Dashboard** > **Change/Remove** and respond to the prompts to complete the uninstallation.
   • Alternatively on Windows, run the following command:
     
     ```
     TIP_dir\..\ITMfVSDash\uninst\ITMfVEDashboard\uninstall.bat
     ```
   • On operating systems such as AIX or Linux, run the following command:
     
     ```
     TIP_dir/..\ITMfVSDash/uninst/ITMfVEDashboard/uninstall.sh
     ```

   If you originally installed the Virtual Environments Dashboard by using the interactive installer, you are prompted to confirm Tivoli Integrated Portal information before completing the uninstallation. If you originally installed the dashboard by using the response file installer, the uninstallation continues.

   If the uninstall fails, it might be because the password for the user ID has changed. See the “Response File Uninstall authentication failure entry in the Installation and configuration problems” on page 173 topic for more information.

2. After the uninstallation completes, update the Tivoli Monitoring environment to stop the event flow to the Virtual Environments Dashboard:
   a. Log on to the Tivoli Enterprise Portal.
   b. Click **Situation Editor**.

3. For each situation that was forwarding events to the Dashboard, take the following steps:
   a. Click the situation name in the tree to select it.
   b. Click the **EIF** tab.
   c. Select the **ITMfVEDashboard** destination and move it from the **Assigned EIF Receivers** list to the **Available EIF Receivers** list.
   d. Click **Apply**.

4. Click **OK** when you are finished removing situation event forwarding to the Dashboard.

5. At the command line, run the following command:

   ```
   tacmd deleteEventDest -i 542
   ```

   If you used an ID other than 542 when "Configuring event forwarding to the Virtual Environments Dashboard" on page 37, substitute that ID. For more information about tacmds, see the [IBM Tivoli Monitoring Command Reference](#).

What to do next

The uninstallation procedure reverses the operations done by the installer. The uninstaller removes the Tivoli Integrated Portal application modules from the server and the files associated with the application; the uninstaller does not remove the Tivoli Common Reporting reports or any information in the Tivoli Data Warehouse or Capacity Planner databases.
Chapter 3. Using the VMware Cluster Dashboard

Use the VMware Cluster Dashboard to determine the health of your clusters and all associated components. You can investigate any storage, server, or network issues that the cluster might have.

Logging on to the Cluster Dashboard

Log on to the Tivoli Common Reporting or Tivoli Integrated Portal console in your web browser to use the Cluster Dashboard.

Procedure

2. In the navigation tree, select System Status and Health > VMware Cluster Dashboard to open the Cluster Dashboard page.

Cluster Dashboard

The Cluster Dashboard page shows each VMware-defined cluster in the environment in a Cluster Scorecard.

You control the context of the charts and views on this page by selecting a row in Cluster Scorecard. When you select a new row in the scorecard, the other charts update with information about the cluster you selected.

Tip: Use the Select time range button to set the time range for the chart portlets. This setting does not affect the Cluster Scorecard or any portlets other than the charts.

Note: A for a chart legend symbol instead of a color (such as ) means that either no data is available to plot or the values are 0. For example, if the selected virtual machine is powered off (Power Status column of the scorecard in the Server Details dashboard shows ), the utilization metric values are 0.

Cluster Scorecard

The Cluster Scorecard contains an entry for each VMware defined cluster in the environment.

The top cluster in the list is preselected. When you select a cluster in the scorecard, all other views in the Cluster Dashboard are displayed in the context of the cluster selected.

Note: For rows to appear in the Cluster Scorecard table, the VMware VI agent must be configured to monitor a VMware Virtual Center.

By default, the clusters are sorted by severity of health status: Clusters with the most severe situation events are at the top. The Datacenter column displays the data center relating to the cluster. You can sort by another column in the scorecard by moving the mouse pointer over a column heading and clicking the sort direction on the right.
To filter the rows, click inside the **filter box**, and type the partial or full text to filter by. Click **⪪** to clear the filter.

You can launch reports from the Cluster Scorecard table by right-clicking inside a row and clicking **Reports** to display the available choices.

The **Server**, **Storage**, and **Network** status columns show one of three status icons: normal, ⚠️ warning, and ⚠️ critical. Each status is a composite of availability and performance metrics that provide indications of the health for that cluster. If you move the mouse pointer over a warning or critical icon, the hover help displays information about the IBM Tivoli Monitoring situations that are causing the warning or critical events.

**Server**  To view more details about the servers in a cluster, click the **Server** status icon for the cluster. The Server Details page for the cluster is displayed. See “Server Details” on page 55 for more information about this page.

**Storage**  To view more details about the storage in a cluster, click the **Storage** status icon for the cluster. The Storage Details page for the cluster is displayed. See “Storage Details” on page 58 for more information about this page.

**Network**  To view more details about cluster network utilization, click the **Network** status icon for the cluster. This displays the Network Details page for the cluster. See “Network Details” on page 61 for more information about this page.

**Related tasks:**

- Determining the health of your clusters
- “Isolating problems for a cluster” on page 54

Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected cluster.

### Cluster CPU

The Cluster CPU portlet shows a graph of the total, effective, and used CPU for the selected cluster. The CPU usage is displayed in GHz.

- The **Total** bar shows the total CPU resources that are defined to the cluster.
- The **Effective** bar shows the amount of the total CPU that is available to run virtual machines for the selected cluster.
- The **Used** bar shows the amount of the effective CPU that is being used.

The effective CPU resources do not include CPU resources associated with hosts that are not responding or hosts in VMware maintenance mode.

Move the mouse pointer over a bar to view an exact value in GHz. If you selected a historical time period with the **Select time range** button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

### Cluster Memory

The Cluster Memory portlet shows a graph of the total, effective, used, and allocated memory for the selected cluster.

Memory is displayed in GB (gigabytes).
The Allocated bar shows the memory resources that have been allocated to the cluster.

The Used bar shows the amount of the effective memory that is being used.

The Effective bar shows the amount of the memory available to run virtual computers for the cluster. The effective memory resources do not include memory resources associated with hosts that are not responding or hosts in VMware maintenance mode.

The Total bar shows the total memory resources that are defined to the cluster.

Move the mouse pointer over a bar to see the exact value in GB. If you selected a historical time period with the Select time range button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

Cluster Storage Capacity
The Cluster Storage Capacity portlet shows a graph of the allocated, used, and free data store capacity for servers in the selected cluster.

Storage capacity is displayed in GB (gigabytes).

- The Allocated bar is the data store capacity allocated to virtual machines in the cluster.
- The Used bar is the data store capacity currently being used by the servers in the cluster.
- The Free bar is the available data store capacity for servers in the cluster.
- The Total bar shows the total amount of storage capacity available in the cluster.

Move the mouse pointer over a bar to view an exact value in GB. If you selected a historical time period with the Select time range button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

Cluster Servers
The Cluster Servers portlet displays a graph showing the numbers of servers in the cluster, as well as the number of these servers that are effective, unavailable, and in maintenance mode.

- The Unavailable bar is the number of servers defined for the cluster that are not available to run virtual computers.
- The Effective bar is the number of servers defined for the cluster that are available to run virtual computers.
- The Maintenance bar is the number of these unavailable servers that are in maintenance mode.
- The Total bar represents the total number of servers defined for the cluster.

If you selected a historical time period with the Select time range button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

Cluster Architecture View
The Cluster Architecture View displays a representative image and data from the components of the VMware infrastructure for the selected cluster: Guests, Data Stores, VMs, Physical Storage, ESX Servers, and Virtual Network.
- The **Guests** component displays the number of Windows Guests, Linux Guests, Other Guests (Guest OS is not Linux or Windows), and Unknown (Guest OS cannot be determined because VMware Tools is not installed there).
- The **Data Stores** component displays the number of Data Stores, NFS, and VMFS. The view shows any data store in your environment that is supported by VMware as reported by the VMware agent.
- The **VMs** component displays the number of Virtual Machines and how many of them are Powered On.
- The **Physical Storage** component displays SAN Volumes, NAS Volumes, and Total Volumes. The Physical Storage information is provided by the Storage Productivity Center agent.
- The **ESX Servers** component displays the number of Servers, the number of Effective Servers, and the number of servers in Maintenance Mode.
- The **Virtual Network** component displays the number of Physical NICs and the number of Physical NICs Down.

---

**Isolating problems for a cluster**

Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected cluster.

**Procedure**

1. In the navigation tree of the Tivoli Integrated Portal console, click **System Status and Health** > **VMware Cluster Dashboard** to open the Cluster Dashboard page.
2. In the **Cluster Scorecard**, click a status icon in the **Server**, **Storage**, or **Network** column to open a page of details for the selected cluster. The **Situations Events List** portlet shows the situation events related to the server, storage, or network that have opened for the cluster, with highest priority first.
3. In the table portlet, click a row to see the details in the surrounding charts:
   - **Server Details page**: The **Virtual Machines** portlet shows a list of the virtual machines and the server situation events, with highest priority problems first. Select a virtual machine to refresh the other portlets in the Server Details page with data in the context of the selected virtual machine.
   - **Storage Details page**: In the **Data Stores** portlet, select a data store with a critical status problem. Use the launch-in-context operation to open the Tivoli Monitoring VMware VI agent data store workspaces for more information about the data store problem.
   - **Network Details page**: The **Virtual Machines** portlet shows each virtual machine on the server and vital statistics. Select a row to refresh the other portlets in the Network Details page with data in the context of the selected virtual machine.
Related concepts:

“Server Details”
The Server Details page shows views containing information about server components of a cluster.

“Storage Details” on page 58
The Storage Details page shows views containing information about storage components associated with a cluster or server. Views of storage components (data stores, physical volumes) for the cluster or server are displayed with key performance indicators. The views in the page are displayed in the context of the data store or data stores selected in the Data Stores portlet.

“Network Details” on page 61
The Network Details page allows you to identify and isolate network problems affecting the VMs running in the environment.

Server Details

The Server Details page shows views containing information about server components of a cluster.

You can view information on virtual machines, guest OS, server metrics, and situations affecting the servers in the cluster. The views in the page are displayed in the context of the server or servers selected in the ESX Servers portlet.

Note: A for a chart legend symbol instead of a color (such as ) means that either there is no data to plot or the values are 0. For example, if the selected virtual machine is powered off ( column of the scorecard in the Server Details dashboard shows ), the utilization metric values are 0.

Related tasks:

“Isolating problems for a cluster” on page 54
Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected cluster.

Virtual Machines

The Virtual Machines portlet shows a table of the virtual machines that are members of the context cluster or server.

The name of the context object is shown in the banner above the Virtual Machines table.

The Virtual Machines table has columns for VM Name, Server, Hostname, Overall Status, Power Status (whether the VM is powered on or off), CPU Utilization (percentage of allocated CPU utilized), CPU Used (the fractional number of physical CPUs utilized: CPU Utilization divided by 100. For example, if CPU Utilization shows up as 27%, CPU Used reports as 0.27.number of physical CPUs utilized), Memory Utilization (percentage of allocated memory utilized), Memory Used (amount of memory used in MB), and VM Percent Ready for the selected ESX server.

Select an alert indicator in the Overall Status or Power Status column to change to populate the line graph in the VM Utilization portlet. You can launch reports or the Tivoli Enterprise Portal console from the Virtual Machines table: Right-click inside a row and click TEP and Reports to display the available choices.
**VM Utilization**

The VM Utilization portlet shows a graph of selected metrics for the selected virtual machine.

The following metrics are available:

- **CPU Utilization** is the percentage of the allocated CPU that has been consumed.
- **CPU Used** is the number of physical CPUs that have been used.
- **VM Percent Ready** is the percentage of time that the virtual machine was ready before it could be scheduled on a CPU.

Click the **Chart Options** bar to select which of these metrics you want to display in the chart. Select the virtual machines to graph in the Virtual Machines scorecard. Click **Select time range** to choose real-time or a historic time period for the data to plot in the chart.

**Guest OS**

The Guest OS portlet shows a table of guest operating systems for the selected virtual machine.

The Guest OS table has columns for Operating System, Logical Disk Total, Logical Disk Used, Available Memory, Cache Memory, Memory Commit Limit, and Committed Memory.

The information is from the Tivoli Monitoring OS agent that is running on the guest. If the agent is not installed or not running, no guest OS information is available and the table displays no rows. (See also [I see no data in the Guest OS and Guest OS Utilization portlets of the Server Details dashboard](#).)

**Guest OS Utilization**

The Guest OS Utilization portlet shows in a line-graph of selected metrics for the guest OS.

The following metrics are available:

- Disk Usage (Logical Disk percent used)
- Disk Total (Total logical disk size in MB)
- Available Memory (Memory available in GB)
- Cache Memory (Cache memory in GB)
- Committed Memory Limit (Committed memory limit in GB)
- Committed Memory (Committed Memory in GB)
- Disk Transfer Rate (Total physical disk transfer rate in ms)
- CPU Usage

Click the **Chart Options** bar to see and select the metrics to display in the chart; click **Chart Options** again to plot the chosen metrics. Select the Guest OS to graph in the Guest OS Utilization portlet. Click the **Select time range** button to choose real-time or a historic time period for the data to plot in the chart.

The information is from the Tivoli Monitoring OS agent that is running on the guest. If the agent is not installed or not running, no guest OS information is available and the table displays no rows.
**ESX Servers**

The ESX Servers portlet shows a table of servers in the selected cluster.

The ESX Servers table has columns for Server Hostname, Overall Status, CPU Utilization (percentage of allocated CPU utilized), CPU Used (number of physical CPUs utilized), Memory Utilization (percentage of allocated memory utilized), Memory Used (amount of memory used in MB), Average VM Percent Ready for the selected ESX server, and Connection State.

The Utilization portlet shows a graph of metrics for the server you have selected in the ESX Servers table. Use the Select time range button to specify the time period to display in this graph. You can launch reports or the Tivoli Enterprise Portal console from the ESX Servers table: Right-click inside a row and click TEP and Reports to display the available choices.

**Server Utilization**

The Server Utilization portlet shows a graph of metrics about the server selected in the ESX Servers table.

Click the Chart Options bar to choose one or more of the following metrics: CPU Utilization, CPU Used, Memory Utilization, Memory Used, and Average VM Percent Ready.

Select the servers to graph in the ESX Servers portlet. Click the Select time range button to choose real-time or a historic time period for the data to plot in the chart.

**Situation Event List**

The Situation Event List portlet shows a table of situation events for the selected ESX server.

Events that caused a critical problem status are sorted first. The table contains the following columns:

- The **Severity** column shows the severity of the situation event: Unknown, Informational, Harmless, Warning, Minor, Critical, or Fatal.
- The **Situation Name** column shows the short name given to the situation.
- If the situation is for a multiple-row attribute group and a display item was chosen, the **Display Item** column shows the attribute name.
- The **Timestamp** column shows in MM/DD/YY HH:MM:SS format when the event occurred or the condition was observed by the originating managed system.

**Virtualization Change History**

The Virtualization Change History portlet shows a table that lists the changes associated with the selected server as provided by the Tivoli Application Dependency Discovery Manager.

For detailed information, see the Tivoli Application Dependency Discovery Manager Information Center.
Storage Details

The Storage Details page shows views containing information about storage components associated with a cluster or server. Views of storage components (data stores, physical volumes) for the cluster or server are displayed with key performance indicators. The views in the page are displayed in the context of the data store or data stores selected in the Data Stores portlet.

Note: A ▼ for a chart legend symbol instead of a color (such as ▼) means that either there is no data to plot or the values are 0. For example, if the selected virtual machine is powered off (Power Status column of the scorecard in the Server Details dashboard shows ▼), the utilization metric values are 0.

Related tasks:
“Isolating problems for a cluster” on page 54
Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected cluster.

Data Stores

The Data Stores portlet shows a table listing the data stores that are connected to the context server or cluster.

The name of the context object is shown just above the Data Stores portlet. Click in the Name field of a data store with a critical problem status to view additional details and problem resolution in the IBM Tivoli Monitoring VMware VI agent data store workspaces.

- The Status column shows the overall status for the data store. The status is either available or unavailable. Hover over the status icon to show the name and description of the VMware alarm that determined the status value.
- The Used Space column shows the percentage of used space in the data store.
- The Used column shows the amount of used space in GB.
- The Total Capacity column shows the total capacity for all the servers connected to the data store.
- The Percent overcommitted column shows the level of overcommitment on the data store.

You can select a data store and metrics to be shown in a line-graph in the Data Store Metrics portlet. Click the Select time span button to define the period of time to be displayed in this graph. You can launch reports or the Tivoli Enterprise Portal console from the ESX Servers table. Right-click inside a row and click TEP and Reports to display the available choices.

Data Store Metrics

The Data Store Metrics portlet shows a graph of chosen metrics for the selected data store.

Select the data stores to graph in the Data Stores portlet. The following metrics are available:

- Space Used (GB) is the used space for the selected data store.
- Capacity is the storage capacity in GB of the selected data store.
Click the **Chart Options** bar to select which of these metrics you want to display in the chart. Click the **Select time range** button to choose real-time metrics or a historic time period to display.

**Virtual Machines**

The Virtual Machines portlet shows a table of virtual machines for the data store selected in the Data Stores portlet.

The Virtual Machines table has columns for VM Name, Server, Hostname, Overall Status, Provisioned (Used memory in MB for the virtual machine), Committed (Committed memory for the virtual machine), and Uncommitted (Uncommitted memory for the virtual machine).

You can launch reports or the Tivoli Enterprise Portal console from the Virtual Machines table. Right-click inside a row and click **TEP and Reports** to display the available choices.

**Note:** If **Provisioned (MB)** and **Uncommitted (MB)** show a dash (–), it means that during Virtual Machine creation the administrator selected the check box to allow unlimited growth of the Virtual Machine’s memory. If **Hostname** shows a dash (–), it means that the Virtual Machine is in the powered **off** state or VMware tools have not been installed on the guest operating system.

**Virtual Machine Metrics**

The Virtual Machine Metrics portlet shows a graph of metrics for the selected virtual machine.

Select the virtual machines to graph in the Virtual Machines portlet. The metrics available are:

- **Uncommitted (MB)** is the uncommitted memory for this virtual machine.
- **Committed (MB)** is the memory committed for this virtual machine.
- **Provisioned** is the used memory in MB for this virtual machine.

Click the **Chart Options** bar to select which of these metrics you want to display in the chart. Click the **Select time range** button to choose real-time or a historic time period to plot in the chart.

**Volumes**

The Volumes portlet shows a table of NetApp physical storage (volumes) associated with the selected cluster or server data stores.

For each volume, the following values are displayed:

- **Volume Type** is the volume classification, such as NAS.
- **Name** is the name given to the volume.
- **Size (GB)** is the volume capacity in GB.
- **Status** is the health status of the volume.
- **Used Space (%)** is the percentage used of the total amount of space on the volume.
- **Used (GB)** is the amount of space in gigabytes used on the volume.
- **Read Latency** is the average time, in milliseconds, it takes to process a read command from the physical device.
**Write Latency** is the average time, in milliseconds, it takes to process a write command to the volume.

**Volume Size** is the size of the volume in gigabytes.

**Total Ops** is the average time in milliseconds for other operations on the volume.

The Volumes table gets its data from the NetApp and Storage Productivity Center agents. If these agents are not available, data does not appear for the Volumes table.

You can launch reports or the Tivoli Enterprise Portal console from the Volumes table: Right-click inside a row and click **TEP and Reports** to display the available choices.

**Volume Metrics**

The Volume Metrics portlet shows a graph of chosen metrics for selected volumes.

Select the volumes to graph in the Volumes portlet. In the Volume Metrics portlet, click the Chart Options bar to see and select the metrics to plot:

**Percent of Space Used**

The percentage of space used on the volume.

**Read Latency**

The average time, in milliseconds, it takes to process a read command from the physical device.

**Write Latency**

The average time, in milliseconds, it takes to process a write command to the virtual machine.

**Volume Size**

The size of the volume in gigabytes.

**Total Ops**

The total I/O operations per second for the volume.

Click the **Chart Options** bar to select which of these metrics you want to display in the chart. Click the **Select time range** button to choose real-time or a historic time period to plot in the chart.

**Situation Event List**

The Situation Event List portlet shows a table of situation events for the selected data store.

Events that caused a critical problem status are sorted first. The table contains the following columns:

- **Severity** column shows the severity of the situation event: Unknown, Informational, Harmless, Warning, Minor, Critical, or Fatal.
- **Situation Name** column shows the short name given to the situation.
- **Display Item** column shows the attribute name.
- **Timestamp** column shows in MM/DD/YY HH:MM:SS format when the event occurred or the condition was observed by the originating managed system.
**Virtualization Change History**

The Virtualization Change History portlet shows in table form the list of changes associated with the data store as provided by the Tivoli Application Dependency Discovery Manager.


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**Network Details**

The Network Details page allows you to identify and isolate network problems affecting the VMs running in the environment.

**Note:** A □ for a chart legend symbol instead of a color (such as □) means that either there is no data to plot or the values are 0. For example, if the selected virtual machine is powered off (Power Status column of the scorecard in the Server Details dashboard shows □), the utilization metric values are 0.

**Related tasks:**
- "Isolating problems for a cluster" on page 54
- Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected cluster.

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**Virtual Machines**

The Virtual Machines portlet shows a table of virtual machines that are members of the context cluster or server.

The name of the context object is shown just above the Virtual Machines table.

The Virtual Machines table has columns for VM Name, Server, Hostname, Overall Status, Power Status (whether the VM is powered on or off), CPU Utilization (percentage of allocated CPU utilized), CPU Used (number of physical CPUs utilized), Memory Utilization (percentage of allocated memory utilized), Memory Used (amount of memory used in MB), VM Percent Ready for the selected ESX server.

---

**VM Utilization**

The VM Utilization portlet shows a graph of selected metrics for the selected virtual machine.

The following metrics are available:
- **CPU Utilization** is the percentage of the allocated CPU that has been consumed.
- **CPU Used** is the number of physical CPUs that have been used.
- **VM Percent Ready** is the percentage of time that the virtual machine was ready before it could be scheduled on a CPU.

Click the Chart Options bar to select which of these metrics you want to display in the chart. Select the virtual machines to graph in the Virtual Machines scorecard. Click Select time range to choose real-time or a historic time period for the data to plot in the chart.
Physical Network Interfaces

The Physical Network Interfaces portlet shows in table form metrics for the selected virtual machine.

The table has columns for Server Host Name, Virtual Switch, NIC Name, Status, Link Utilization, Link Speed, Transmission + Receive (KBps), Transmission Rate (KBps), Receive Rate (KBps), and Packets Sent.

Physical Network Interface Metrics

The Physical Network Interface Metrics chart shows metrics for the selected virtual machine.

Use the Chart Options to select the metrics to plot. Use the Select time range button to specify a time period to plot.

The following metrics are available for selection from the Chart Options bar:

- Link Utilization
- Link Speed (MBps)
- Transmission + Receive (KBps) (Transmission Rate plus the Receive Rate in kilobytes per second)
- Transmission Rate (KBps)
- Receive Rate (KBps)
- Packets Sent
- Packets Received

Click the Select time range button to choose real-time or a historic time period to plot in the chart.

Situation Event List

The Situation Event List portlet shows a table of network situation events for the selected virtual machine.

Events that caused a critical problem status are sorted first. The table contains the following columns:

- **Severity** column shows the severity of the situation event: Unknown, Informational, Harmless, Warning, Minor, Critical, or Fatal.
- **Situation Name** column shows the short name given to the situation.
- If the situation is for a multiple-row attribute group and a display item was chosen, the **Display Item** column shows the attribute name.
- **Timestamp** column shows in MM/DD/YY HH:MM:SS format when the event occurred or the condition was observed by the originating managed system.

Virtualization Change History

The Virtualization Change History table shows metrics for the selected virtual machine.

The table contains the following columns:

- Type
- Component
- Change
- Date
- Attribute
- Old
- New
Chapter 4. Using the VMware Stand-alone Server Dashboard

Use the VMware Stand-alone Server Dashboard to determine the health of individual servers that do not belong to a cluster. You can investigate any storage, server, or network issues that the server might have.

Logging on to the Server Dashboard

Log on to the Tivoli Common Reporting or Tivoli Integrated Portal console in your web browser to use the Server Dashboard.

Procedure
2. In the navigation tree, select System Status and Health > VMware Stand-alone Server Dashboard to open the Server Dashboard page.

Isolating problems for a stand-alone server

Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected stand-alone server.

Procedure
1. In the navigation tree of the Tivoli Integrated Portal console, click System Status and Health > VMware Stand-alone Server Dashboard to open the Stand-alone Server Dashboard page.
2. In the Server Scorecard, click a status icon in the Server, Storage, or Network column to open a page of details for the selected host server. The Situations Events List portlet shows the situation events related to the server, storage, or network that have opened for the server, with highest priority first.
3. In the table portlet, click a row to see the details in the surrounding charts:
   • Server Details page: The Virtual Machines portlet shows a list of server situations for the cluster, with highest priority server problems first. Select a server or servers to refresh the other portlets in the Server Details page with data in the context of the selected server or servers.
   • Storage Details page: In the Data Stores portlet, select a data store with a critical status problem. Use the launch-in-context operation to open the Tivoli Monitoring VMware VI agent data store workspaces for more information about the data store problem.
   • Network Details page: The Virtual Machines portlet shows each virtual machine in the network and the host server name and vital statistics. Select a row to refresh the other portlets in the Network Details page with data in the context of the selected virtual machine.
**Related concepts:**

**Server Details**

The Storage Details page shows views containing information about storage components associated with a cluster or server. Views of storage components (data stores, physical volumes) for the cluster or server are displayed with key performance indicators. The views in the page are displayed in the context of the data store or data stores selected in the Data Stores portlet.

**Storage Details**

**Network Details**

The Network Details page allows you to identify and isolate network problems affecting the VMs running in the environment.

---

**Server Dashboard**

The Server Dashboard has portlets that show information about the defined servers in the VMware environment that do not belong to a cluster.

Each defined server is displayed in the Server Scorecard.

You control the context of the charts and views on this page by selecting a row in the Server Scorecard table. After you select a new row in the scorecard, the other charts update with information about the selected server.

**Tip:** Use the Select time range button to set the time range displayed in the portlet charts in the Server Dashboard. This setting does not affect the Server Scorecard.

**Note:** A ❌ for a chart legend symbol instead of a color (such as 🔴) means that either no data is available to plot or the values are 0. For example, if the selected virtual machine is powered off (Power Status column of the scorecard in the Server Details dashboard shows ☂), the utilization metric values are 0.

---

**Server Scorecard**

The Server Scorecard contains an entry for each VMware defined server in the environment that does not belong to a cluster.

When you select a server in the scorecard, all other views in the Server Dashboard are displayed in the context of the server selected.

**Note:** For rows to appear in the Server Scorecard table, the VMware VI agent must be configured to monitor a VMware Virtual Center.

By default the servers are sorted by severity of health status. Those with the most severe health status are at the top. To view more details for a server, click in the server to open the Server details page. The Server Scorecard has Server, Storage, and Network status columns. For each column, the three statuses available are normal, warning, and critical problem. Each status is a composite of availability and performance metrics that provide indications of the health for that server. If you hover over a warning or critical problem status, the tooltip text displays information about the IBM Tivoli Monitoring situations that are causing the warning or critical problem status.
You can sort all the columns in the scorecard. You can launch reports or the Tivoli Enterprise Portal console from the Cluster Scorecard by right-clicking inside a row and selecting TEP and Reports to display the available choices.

**Server**
To view details related to servers in a cluster, click the Server status icon for the server. The Server Details page is displayed. See “Server Details” on page 55 for information on what you can do with this page.

**Storage**
To view details of situations related to physical and virtual storage in a server, click in the Storage status icon for the server. The Storage Details page for the server is displayed. See “Storage Details” on page 58 for information about this page.

**Network**
To view details of situations related to a network in a server, click in the Network status for the server. The Network Details page is displayed for the server. See “Network Details” on page 61 for information about this page.

**Related tasks:**
:Isolating problems for a stand-alone server” on page 65

Use the Virtual Environments Dashboard to isolate and investigate storage, server, and network issues in a selected stand-alone server.

**Server CPU**
The Server CPU (central processing unit) portlet shows a bar chart of the total and used CPU for the selected server. The CPU is displayed in GHz (gigahertz).

The Server CPU bar chart has the following bars:

**Total CPU**
The Total CPU bar shows the total CPU resources that are defined to the server.

**Used CPU**
The Used CPU bar shows the amount of the effective CPU that is being used.

Move the mouse over a bar to view an exact value in GHz. If you selected a historical time period with the Select time range button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

**Server Memory (MB)**
The Server Memory portlet shows a bar chart of total memory and used memory for the selected server. Memory is displayed in MB.

The Memory bar chart has the following bars:

**Total Memory**
The Total Memory bar shows the total memory resources that are defined to the server.

**Used Memory**
The Used Memory bar shows the amount of memory that is being used by the server.
Move the mouse over a bar to view an exact total or used memory value in MB. When you have selected a historical time period with the Select time range button, the chart is reconfigured as a line chart and the metrics plotted for the selected time frame. The plot includes only the time period for which data is available.

Server Storage
The Server Storage portlet shows a graph of used and free storage across all the defined data stores for the selected server.

The Storage bar chart has the following bars:

- **Used** The Used bar shows the used storage across the defined data stores for the server.
- **Free** The Free bar shows the amount of free storage across the defined data stores for the server.

Move the mouse pointer over a bar to view an exact used or free storage value. If you selected a historical time period with the Select time range button, the chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

VM CPU Percent Ready
The VM CPU Percent Ready portlet displays the average of the CPU percent ready values for all the virtual machines on this server.

If you selected a historical time period with the Select time range button, this chart shows the metrics plotted in a line chart for the selected time frame. The plot includes only the time period for which data is available.

Virtualization Server Configuration Details
The Virtualization Server Configuration Details portlet displays the configuration details for the server that are provided by the Tivoli Application Dependency Discovery Manager.


Server, Storage, and Network Details
The Server Details, Storage Details, and Network Details pages are the same whether accessed from the Cluster Dashboard or the Server Dashboard. The difference is the context: When accessed from the Server Dashboard, the details are for the stand-alone server rather than for the cluster.
Related concepts:

**Server Details**

The Storage Details page shows views containing information about storage components associated with a cluster or server. Views of storage components (data stores, physical volumes) for the cluster or server are displayed with key performance indicators. The views in the page are displayed in the context of the data store or data stores selected in the Data Stores portlet.

**Network Details**

The Network Details page allows you to identify and isolate network problems affecting the VMs running in the environment.
Chapter 5. IBM Tivoli Monitoring for Virtual Environments
Performance and Capacity Management Reports

The Performance and Capacity Management Reports component includes reports for the following agents:

- IBM Tivoli Monitoring for Virtual Environments Agent for VMware VI
- IBM Tivoli Monitoring for Virtual Environments Agent for NetApp Storage

Other IBM Tivoli Monitoring for Virtual Environments agents include Cognos-based reports designed for use with Tivoli Common Reporting. See the Tivoli Common Reporting chapter in the following agent user's guides for these reports:

- IBM Tivoli Monitoring for Virtual Environments Agent for Cisco UCS
- IBM Tivoli Monitoring for Virtual Environments Agent for Citrix XenServer

Complete documentation for the Tivoli Common Reporting tool is located at the [Tivoli Common Reporting Information Center](http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_211/ic-home.html).

Report packages

The Tivoli Monitoring for Virtual Environments V7.1 reports are historical reports, reporting against summarized data collected in Tivoli Data Warehouse V6.2.2 or later.

The following databases for Tivoli Data Warehouse are supported: DB2, Oracle, and SQL Server for all reports.

The reports can be administered, run, and edited by Tivoli Common Reporting for Asset and Performance Management Version 2.1.1 software included with Tivoli Monitoring 6.2.2 Fix Pack 2 or later.

Tivoli Common Reporting v2.1 is included with Tivoli Monitoring for Virtual Environments V7.1. This version of Tivoli Common Reporting includes Cognos Business Intelligence and Reporting V8.4.1.

The predefined reports run against VMware VI agent V7.1 only. The package contains 36 predefined reports and Cognos data models for the VMware VI agent and the NetApp Storage agent. Custom reports can be built for both agents.

Prerequisites for running the Performance and Capacity Management reports

This topic outlines prerequisites for the Performance and Capacity Management reports.

The reports are developed on a data model that is based on IBM Tivoli Monitoring for Virtual Environments V7.1 and later only. The reports do not run with earlier versions of IBM Tivoli Monitoring for Virtual Servers.
Historical Data collection and aggregation

Historical data collection and aggregation is a key component of the infrastructure of IBM Tivoli Monitoring.

See the information center for managing historical data (http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.2fp2/history_manage_intro.htm) for more information about how history can be collected and summarized over time.

The data collected by the VMware agent can be aggregated at the following levels of hierarchy:

- Data center
- Cluster
- Host server
- Virtual machine
- Data store
- Network information center

A huge amount of performance metrics is collected. These metrics are pulled into a data model to make it more usable. Most of the preconfigured capacity reports are focused on the following key metrics:

- CPU usage
- Percent ready time
- Memory consumption
- Data store space usage
- Disk I/O
- Network I/O
- Number of virtual machines on the host

For the preconfigured reports to work, you must enable historical collection on the following attribute groups.

<table>
<thead>
<tr>
<th>Attribute groups</th>
<th>Summarization type</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVM CLUSTERED RESOURCE POOLS</td>
<td>DAILY</td>
</tr>
<tr>
<td>KVM CLUSTERS</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM DATASTORES</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM SERVER</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM SERVER DATASTORE</td>
<td>DAILY</td>
</tr>
<tr>
<td>KVM SERVER DISK</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM SERVER NETWORK</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM VIRTUAL MACHINES</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM SERVER VIRTUAL SWITCHES</td>
<td>DAILY</td>
</tr>
<tr>
<td>KVM VM DATASSTORE UTILIZATION</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM VM MEMORY</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
<tr>
<td>KVM VM NETWORK</td>
<td>DAILY, HOURLY, WEEKLY, MONTHLY</td>
</tr>
</tbody>
</table>
**Note:** Hourly and daily summarization intervals must be enabled. Although reports can be run against weekly and monthly historical data, you are not required to enable those summarization intervals unless you plan to run reports using those intervals.

To use the data model for custom reporting, you must enable historical collection on the following attribute groups for the daily, hourly, weekly, and monthly summarization types.

*Table 3. Attribute groups where historical collection must be enabled for custom reporting*

<table>
<thead>
<tr>
<th>Attribute groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVM SERVER</td>
</tr>
<tr>
<td>KVM SERVER DATASTORE</td>
</tr>
<tr>
<td>KVM SERVER DISK</td>
</tr>
<tr>
<td>KVM SERVER NETWORK</td>
</tr>
<tr>
<td>KVM VM MEMORY</td>
</tr>
<tr>
<td>KVM VM NETWORK</td>
</tr>
<tr>
<td>KVM VIRTUAL MACHINES</td>
</tr>
<tr>
<td>KVM CLUSTERS</td>
</tr>
<tr>
<td>KVM VM DATASTORE UTILIZATION</td>
</tr>
<tr>
<td>KVM CLUSTERED RESOURCE POOLS</td>
</tr>
<tr>
<td>KVM DATASTORES</td>
</tr>
<tr>
<td>KVM CLUSTERED VIRTUAL MACHINES</td>
</tr>
<tr>
<td>KVM DISTRIBUTED VIRTUAL PORTGROUPS</td>
</tr>
<tr>
<td>KVM DISTRIBUTED VIRTUAL SWITCH</td>
</tr>
<tr>
<td>KVM NETWORKED VIRTUAL MACHINES</td>
</tr>
<tr>
<td>KVM CLUSTERED DATASTORES</td>
</tr>
<tr>
<td>KVM CLUSTERED SERVERS</td>
</tr>
<tr>
<td>KVM NETWORKED SERVERS</td>
</tr>
<tr>
<td>KVM NETWORKS</td>
</tr>
<tr>
<td>KVM RESOURCE POOL CPU</td>
</tr>
<tr>
<td>KVM RESOURCE POOL GENERAL</td>
</tr>
<tr>
<td>KVM RESOURCE POOL MEMORY</td>
</tr>
<tr>
<td>KVM SERVER CPU</td>
</tr>
<tr>
<td>KVM SERVER SAN</td>
</tr>
<tr>
<td>KVM SERVER VIRTUAL SWITCHES</td>
</tr>
<tr>
<td>KVM VIRTUAL MACHINES</td>
</tr>
<tr>
<td>KVM VM CPU</td>
</tr>
<tr>
<td>KVM VM DISK</td>
</tr>
<tr>
<td>KVM VM PARTITION</td>
</tr>
<tr>
<td>KVM SERVER MEMORY</td>
</tr>
</tbody>
</table>

Historical data is collected and aggregated at various levels. The reports make use of hourly and daily data. Some reports include the option of using weekly and monthly data if required. For best practices on how to set up the warehouse, see Historical Collections Best Practices in Tivoli Monitoring 6.2.2 (https://www.ibm.com/developerworks/wikis/display/tivolimonitoring/Historical+Collections+Best+Practices+in+Tivoli+Monitoring+6.2.2).

The following table contains some examples of the types of attributes that can be collected and the intervals that can be used for collection.

<table>
<thead>
<tr>
<th>Attribute group type</th>
<th>Collection and warehouse interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor and memory utilization</td>
<td>• 5- or 15-minute interval; retain for 2 weeks</td>
</tr>
<tr>
<td></td>
<td>• Hourly summarization; retain for 3 months</td>
</tr>
<tr>
<td></td>
<td>• Daily summarization; retain for 1 year</td>
</tr>
<tr>
<td>Disk I/O</td>
<td>• 5-minute interval; retain for 2 weeks</td>
</tr>
<tr>
<td></td>
<td>• Hourly summarization; retain for 3 months</td>
</tr>
<tr>
<td>Volume usage</td>
<td>• Daily summarization; retain for 1 year</td>
</tr>
<tr>
<td>Network adapter rates</td>
<td>• 5-minute interval; retain for 2 weeks</td>
</tr>
<tr>
<td></td>
<td>• Daily summarization; retain for 3 months</td>
</tr>
<tr>
<td>Process data</td>
<td>• 15-minute interval; retain for 1 to 2 weeks</td>
</tr>
</tbody>
</table>

**Prerequisites checking**

These reports provide a prerequisite scanner that checks whether the Tivoli Data Warehouse contains the list of all tables and views needed to run the predefined reports, and those needed to support custom reporting.

The reports also direct you to appropriate documentation that can be helpful in the following ways:

- Enabling historical collection and summarization and pruning
- Creating IBM_TRAM schema, the Time Dimension, and other shared dimensions, such as WEEKDAY_LOOKUP, MONTH_LOOKUP, and ComputerSystem
- Populating the Time dimension

The reports also provide a list of attribute groups for the agent to guide you while enabling historical collection.

**Note:** Despite having all the prerequisite tables and views in the Tivoli Data Warehouse, you might not be able to run the reports due to insufficient data in the warehouse. For example, this can happen if adequate time stamps are not generated for the Time Dimension.

The documentation provided will help you to run the appropriate database scripts to populate the tables. However, before you run the prerequisite scanner reports, ensure that you have defined and tested the appropriate database connection (DB2, Oracle, or MS SQL Server) to the Tivoli Data Warehouse.
Use case:

- (a) While I am running a predefined report, an error message similar to the following is displayed: RQP-DEF-0177 An error occurred while performing operation 'sqlPrepareWithOptions' status='201'. UDA-SQL-0196 The table or view "ITMUSER.KVM_SERVER_NETWORK_DV" was not found in the dictionary.

- (b) While I am creating an ad hoc query (custom report) in Query Studio, I see a blank screen while trying to drag a column from a table.

How do I find out whether my warehouse has all the tables and views needed to run a report or create a custom report?

Review the following reports to help answer the questions in the use case:

Table 5. VMware VI Report Prerequisite Scanner DB2

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Report Prerequisite Scanner DB2</td>
</tr>
<tr>
<td>Description</td>
<td>This report runs against the DB2 database to check whether all prerequisite tables and views are available in the Tivoli Data Warehouse. The report also runs an agent version check.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Check whether all prerequisite tables and views needed to run a predefined report or create a custom report are available in the Tivoli Data Warehouse.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Ensure that you have defined and tested a DB2 database connection to the Tivoli Data Warehouse before you run the report. Choose this connection while running the report.</td>
</tr>
<tr>
<td>Output</td>
<td>The report lists all the prerequisite tables and views and shows a status against each of them. A red x indicates that the table or view is required to run some of our predefined reports and is missing in the Tivoli Data Warehouse. A yellow exclamation point (!) indicates that the table or view is missing in Tivoli Data Warehouse. The missing view does not affect the running of the predefined reports. However, ad hoc reporting on this attribute group is not possible. You are directed to the documentation to enable historical collection and summarization and pruning in either case. The output is presented as a table with three columns:</td>
</tr>
<tr>
<td></td>
<td>• The first column lists the prerequisite tables and views from ITM for VMware VI Agent in Tivoli Data Warehouse</td>
</tr>
<tr>
<td></td>
<td>• The second column lists the prerequisite tables for Tivoli Common Reporting Shared Dimensions</td>
</tr>
<tr>
<td></td>
<td>• The third column shows the result of IBM Tivoli Monitoring for Virtual Environments Agent Version Check</td>
</tr>
</tbody>
</table>

Table 6. VMware VI Report Prerequisite Scanner Oracle

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Report Prerequisite Scanner Oracle</td>
</tr>
<tr>
<td>Description</td>
<td>This report runs against the Oracle database to check whether all prerequisite tables and views are available in the Tivoli Data Warehouse. The report also runs an agent version check.</td>
</tr>
</tbody>
</table>
Table 6. VMware VI Report Prerequisite Scanner Oracle (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Check whether all prerequisite tables and views needed to run a predefined report or create a custom report are available in the Tivoli Data Warehouse.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Ensure that you have defined and tested an Oracle database connection to the Tivoli Data Warehouse before you run the report. Choose this connection while running the report.</td>
</tr>
<tr>
<td>Output</td>
<td>The report lists all the prerequisite tables and views and shows a status against each of them. A red x indicates that the table or view is required to run some of our predefined reports and is missing in the Tivoli Data Warehouse. A yellow exclamation point (!) indicates that the table or view is missing in Tivoli Data Warehouse. The missing view does not affect the running of the predefined reports. However, ad hoc reporting on this attribute group is not possible. You are directed to the documentation to enable historical collection and summarization and pruning in either case. The output is presented as a table with three columns: • The first column lists the prerequisite tables and views from ITM for VMware VI Agent in Tivoli Data Warehouse • The second column lists the prerequisite tables for Tivoli Common Reporting Shared Dimensions • The third column shows the result of IBM Tivoli Monitoring for Virtual Environments Agent Version Check</td>
</tr>
</tbody>
</table>

Table 7. VMware VI Report Prerequisite Scanner MS SQL Server

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Report Prerequisite Scanner MS SQL Server</td>
</tr>
<tr>
<td>Description</td>
<td>This report runs against the MS SQL Server database to check whether all prerequisite tables and views are available in the Tivoli Data Warehouse. The report also runs an agent version check.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Check whether all prerequisite tables and views needed to run a predefined report or create a custom report are available in the Tivoli Data Warehouse.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Ensure that you have defined and tested an MS SQL Server database connection to the Tivoli Data Warehouse before you run the report. Choose this connection while running the report.</td>
</tr>
</tbody>
</table>
Table 7. VMware VI Report Prerequisite Scanner MS SQL Server (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Output           | The report lists all the prerequisite tables and views and shows a status against each of them. A red x indicates that the table or view is required to run some of our predefined reports and is missing in the Tivoli Data Warehouse. A yellow exclamation point (!) indicates that the table or view is missing in Tivoli Data Warehouse. The missing view does not affect the running of the predefined reports. However, ad hoc reporting on this attribute group is not possible. You are directed to the documentation to enable historical collection and summarization and pruning in either case. The output is presented as a table with three columns:  
• The first column lists the prerequisite tables and views from ITM for VMWare VI Agent in Tivoli Data Warehouse  
• The second column lists the prerequisite tables for Tivoli Common Reporting Shared Dimensions  
• The third column shows the result of IBM Tivoli Monitoring for Virtual Environments Agent Version Check |

Detailed information about the Performance and Capacity Management reports

This section describes the reports in greater detail.

Report descriptions

Three groups of reports are included:

- Performance trends and resource forecasts
  This set of reports shows resource usage over time for various levels of the virtualized environment. The reports show trends at the cluster, host server, and virtual machine levels. Some reports show linear forecasts in addition to historical trends. The reports can be run with different date ranges, different summarization types (daily or hourly) and with varied thresholds. These reports are particularly useful in determining trends, patterns, and forecasts, and in doing comparisons across the environment. Some of the reports are interactive and allow drill-through to other reports for more problem determination.
  - Cluster Forecast Alerts
    Calculates the forecast for resources used by all the clusters and alerts you if any of the clusters reach the specified thresholds in the next 30 days
  - Cluster Performance Trends
    Shows a historical trend of all the key performance metrics in percentages for one or more clusters
  - Cluster Weekly Comparison
    Compares the key attributes for clusters between two weeks and shows if any significant changes in the values occurred between the week
  - Cluster Workload Trend and Forecast
    Displays trend charts with historical and forecasted values of the key metrics for one or more clusters
- Data Store Capacity and Performance Trend
  Shows the capacity, performance trends, and forecasting for one or more data stores in the environment
- Host Server CPU Ready and Utilization
  Displays two line charts, which show CPU utilization of the host server, the number of virtual machines on the host and the percentage of this number that are ready to be allocated CPU
- Host Server Forecast Alerts
  Calculates the forecast for resources used by all the host servers in one or more clusters and alerts you if any of the servers reach the specified thresholds in the next 30 days
- Host Server Heat Chart
  Shows patterns of CPU, memory utilization, or both CPU and memory utilization over a period of time for the selected servers
- Host Server Performance Trends
  Shows a historical trend of all the key performance metrics in percentages for one or more host servers
- Host Server Weekly Comparison
  Compares the key attributes for host servers between two weeks and shows if any significant changes in the values occurred between the weeks
- Host Server Workload Trend and Forecast
  Displays trend charts with historical and forecasted values of the key resources for one or more host servers
- Network Usage by VMs
  Shows which virtual machines have physical network interface cards that consume the most, or least, network I/O, as well as the amount they consume
- Top or Bottom Physical NICs
  Shows the top or bottom N physical network interface cards for selected virtual machines
- Top or Bottom Virtual Switches by Network I/O
  Shows the switches that consume the most, or least, network I/O, as well as the amount they consume
- VM CPU Ready and Utilization
  Shows the CPU performance for one virtual machine
- VM Utilization Details
  Shows a historical trend of the average (or maximum or minimum) daily (or hourly or weekly or monthly) CPU utilization in percentages for one or more virtual machines
- VM Heat Chart
  Shows patterns of CPU, memory utilization, or both CPU and memory utilization over a period of time for the selected virtual machines

- What-if analysis for workload placement
  This set of reports provides you with a simple what-if analysis tool to determine an approximate figure of how many more workloads your environment can accommodate and what additional resources you would need. You can modify several parameters to obtain the desired output. The workload placement reports take into consideration purely historical usage data collected by the VMware VI
agent and user inputs. The calculations are not based on forecasted data or other physical characteristics of the virtual machine, such as physical configuration.

- **Number of Workloads for Clusters**
  Performs an analysis to determine the number of additional virtual machines that can be placed on a cluster, based on the historical usage or user inputs

- **Number of Workloads for Clusters or Host Servers**
  Performs an analysis to determine the number of additional virtual machines that can be placed on a cluster or a group of host servers, based on the historical usage or user inputs

- **Resources Needed for Additional Workloads on Clusters**
  Performs an analysis to determine the resources (CPU, memory, storage, and so on) that you need, to add virtual machines to a cluster

- **Resources Needed for Additional Workloads on Host Servers**
  Performs an analysis to determine the resources (CPU, memory, storage, and so on) that you need, to add virtual machines to a server or a group of servers

- **Workload right sizing and balancing**
  This set of reports is useful for determining the overall performance of the environment.

  - **Balanced and Unbalanced Clusters**
    Shows the balanced and unbalanced clusters in the environment

  - **Balanced and Unbalanced Host Servers**
    Shows the balanced and unbalanced host servers in one or more clusters

  - **Bottom N VMs by Host Server**
    Shows the bottom N virtual machines by CPU or memory utilization on one or more selected host servers on a cluster

  - **Bottom N VMs by Resource Pool**
    Shows the bottom N virtual machines by CPU and memory utilization on one or more resource pools

  - **Host Server Memory Allocation**
    Shows the average memory allocated to virtual machines on the host servers in comparison with the actual physical memory on the host

  - **Host Server Memory Allocation Details**
    Shows the clusters, host servers, and virtual machines that consume the most or least resources (CPU, memory, storage)

  - **Top N VMs by Host Server**
    Shows the top N virtual machines by CPU or memory utilization on one or more selected host servers on a cluster

  - **Top N VMs by Resource Pool**
    Shows the top N virtual machines by CPU and memory utilization on one or more resource pools on a cluster

  - **Top or Bottom Workload Consumers Clusters**
    Shows the top or bottom clusters in the environment by CPU, memory, or storage utilization

  - **Top or Bottom Workload Consumers Host Servers**
    Shows the top or bottom host servers in the environment by CPU, memory, or storage utilization
The reports use the following attribute groups:

- **KVM_SERVER** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_SERVER_DATASTORE_DV**
- **KVM_SERVER_DISK** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_SERVER_NETWORK** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_VM_MEMORY** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_VM_NETWORK** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_VIRTUAL_MACHINES** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_CLUSTERS** (Daily, Hourly, Weekly and Monthly Views)
- **KVMVMDSUTL** (Daily, Hourly, Weekly and Monthly Views)
- **KVMCLTRRPS_DV**
- **KVM_DATASTORES** (Daily, Hourly, Weekly and Monthly Views)
- **KVM_SERVER_VIRTUAL_SWITCHES_DV**
- **KVM_CLUSTERS_DV**
- **KVMVMDSUTL_DV** (virtual machine data store utilization)
- **KVM_VIRTUAL_MACHINES** (Daily and Hourly View)
- **KVM_VM_MEMORY** (Daily and Hourly View)
- **KVM_SERVER_DV**
- **KVM_SERVER_MEMORY_DV**
- **KVM_SERVER_DATASTORE_DV**
- **KVM_VM_NETWORK_DV**

**Performance trends and resource forecasts**

These reports show resource usage over time for various levels of the virtualized environment. The reports show trends at the cluster, host server and virtual machine level. Some reports show linear forecasts in addition to historical trends. You can run the reports with different date ranges, with different summarization types (daily or hourly), and with varied thresholds. You can use these reports to determine trends, patterns, and forecasts, and to make comparisons across the environment. Some of the reports are interactive and allow drill-through to other reports for more problem determination.

**Use case: When will my clusters or host servers reach specified thresholds?**

**Table 8. VMware VI Cluster Forecast Alerts report**

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Cluster Forecast Alerts</td>
</tr>
<tr>
<td>Description</td>
<td>This report calculates the forecast for resources used by all the clusters and alerts you if any of the clusters reach the specified thresholds in the next 30 days. This report can be run on a schedule regularly with user-defined thresholds. If the thresholds are exceeded, the corresponding cluster row is highlighted. You can click on a cluster to see more details about the trend. The values are given in percentages.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Determine whether any of the clusters reach the specified thresholds in the next 30 days.</td>
</tr>
<tr>
<td>Report structure</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
</tbody>
</table>
| **Date Range for computing forecast** | You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows:  
  • Last 7 Days  
  • Last 30 Days  
  • Last 90 Days  
  and so on. |
| **Forecast Period (Days)** | This period is the number of days in the future that the forecast will be calculated for. The default is 30 days. |
| **Metric**       | You can select one of the key metrics, or all, to forecast for. The key metrics are CPU, Memory, Storage, or Number of VMs per Host |
| **Tables or views used** |
| KVM_CLUSTERS_DV |
| KVM_SERVER_DV |
| **Output**       | The report displays Average CPU, Data Store, and Memory Utilization for each of the selected clusters.  
  **Note:** The rows marked in red show the clusters that are estimated to exceed the user-defined threshold. |

Table 9. VMware VI Cluster Workload Trend and Forecast report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Cluster Workload Trend and Forecast</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report displays trend charts with historical and forecasted values of the key metrics for one or more clusters. You can specify thresholds to see the trends in reference. The values are given in percentages. The forecasting is purely linear and based on least square regression.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Determine historical and forecasted values of key metrics.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
</tbody>
</table>
| **Date Range for computing forecast** | You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows:  
  • Last 7 Days  
  • Last 30 Days  
  • Last 90 Days  
  and so on. |
| **Forecast Period (Days)** | This period is the number of days in the future that the forecast will be calculated for. The default is 30 days. |
| **Metric**       | You can select one of the key metrics, or all, to forecast for. The key metrics are CPU, Memory, Storage, or Number of VMs per Host |
Table 9. VMware VI Cluster Workload Trend and Forecast report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables or views used</td>
<td>KVM_CLUSTERS_DV</td>
</tr>
<tr>
<td>Output</td>
<td>The report displays a daily historical trend and forecast for resource (CPU, Memory, Storage, and Number of VMs per Host) utilization for a cluster or a group of clusters.</td>
</tr>
</tbody>
</table>

Table 10. VMware VI Host Server Forecast Alerts report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Forecast Alerts</td>
</tr>
<tr>
<td>Description</td>
<td>This report calculates the forecast for resources used for all host servers in one or more clusters and alerts you if any of the servers reach the specified thresholds in the next 30 days. This report can be run on a schedule regularly with user defined thresholds. You can click on a host server to see more details about the trend. The values are given in percentages.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Determine if any of the servers reach the specified thresholds in the next 30 days.</td>
</tr>
<tr>
<td>Parameters</td>
<td><strong>Data Center</strong> You can choose one data center from a list of data centers. <strong>Cluster</strong> You can choose one cluster from a list of clusters that belong to the selected data center. <strong>Host Servers</strong> You can choose one or more host servers from a list of host servers that belong to the selected cluster and data center. <strong>Date Range for computing forecast</strong> You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows: • Last 7 Days • Last 30 Days • Last 90 Days and so on. <strong>Forecast Period (Days)</strong> This period is the number of days in the future that the forecast will be calculated for. The default is 30 days. <strong>Metric</strong> You can select one of the key metrics, or all, to forecast for. The key metrics are CPU, Memory, Storage, or Number of VMs per Host</td>
</tr>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER_DV</td>
</tr>
<tr>
<td>Output</td>
<td>This report alerts you on when a server or group of selected servers are expected to reach capacity limitations. The report calculates a linear trend and determines if any of the servers are expected to exceed the user-defined threshold for the CPU, Memory, and Storage of the server.</td>
</tr>
</tbody>
</table>

Table 11. VMware VI Host Server Workload Trend and Forecast report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Workload Trend and Forecast</td>
</tr>
</tbody>
</table>
Table 11. VMware VI Host Server Workload Trend and Forecast report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>This report displays trend charts with historical and forecasted values of the key resources for one or more host servers. You can specify thresholds to see the trends in reference. The values are in percentages. The forecasting is purely linear and is based on least square regression.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Determine if any of the servers reach the specified thresholds in the next 30 days.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td><strong>Data Center</strong> You can choose one data center from a list of data centers. <strong>Cluster</strong> You can choose one cluster from a list of clusters that belong to the selected data center. <strong>Host Servers</strong> You can choose one or more host servers from a list of host servers that belong to the selected Cluster and data center. <strong>Date Range for computing forecast</strong> You can choose a date range for computing the virtual machine profile. The options for date range selection are as follows: • Last 7 Days • Last 30 Days • Last 90 Days and so on. <strong>Forecast Period (Days)</strong> This period is the number of days in the future that the forecast will be calculated for. The default is 30 days. <strong>Metric</strong> You can select one of the key metrics, or all, to forecast for. The key metrics are CPU, Memory, Storage, or Number of VMs per Host</td>
</tr>
</tbody>
</table>
| Tables or views used | KVM_SERVER_DV  
KVM_SERVER_NETWORK_DV |
| **Output** | This report shows a daily historical trend and forecast for resources (CPU, Memory, Storage, and Network) utilization for a host server or a group of servers. |

Use case: Which host servers are overloaded by processor? That is, the virtual machines are either utilizing more processor capacity or are waiting for a long time to get processor capacity from the host server.

Table 12. VMware VI Host Server CPU Ready and Utilization report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Host Server CPU Ready and Utilization</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows two line charts. One chart shows the processor utilization of the host server, overall virtual machine percent ready for all the virtual machines on the host and the number of virtual machines on that host. The second chart shows the overlaid line chart for virtual machine percent ready of all the virtual machines on the host.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Display the host servers that are overloaded by processor, that is, where the virtual machines are either utilizing more processor capacity or are waiting for a long time to get processor capacity from the host server.</td>
</tr>
</tbody>
</table>
Table 12. VMware VI Host Server CPU Ready and Utilization report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>Host Servers</td>
<td>You can choose one or more host servers from a list of host servers that belong to the selected cluster and data center.</td>
</tr>
<tr>
<td>Date Range</td>
<td>You can choose a date range to display data for.</td>
</tr>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER (Daily, Hourly, Weekly, and Monthly views)</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES (Daily, Hourly, Weekly, and Monthly views)</td>
</tr>
<tr>
<td>Output</td>
<td>This report shows two line charts.</td>
</tr>
<tr>
<td></td>
<td>• The first chart shows the processor utilization of the host server, overall virtual machine percent ready for all the virtual machines on the host, and the number of virtual machines on that host. All lines are overlaid on a single chart with multiple y-axes. Percent ready indicates how long the virtual machines must wait to be allocated processor capacity. Acceptable percent ready range is 0-5%. High virtual machine percent ready and high overall processor utilization on the host server indicates that there is not enough processor capacity. If the percent ready is high and the number of virtual machines is high, then too many virtual machines are competing for processor capacity on that host.</td>
</tr>
<tr>
<td></td>
<td>• The second chart shows the overlaid line chart for virtual machine percent ready of all the virtual machines on the host. From this chart it is easy to identify which virtual machines have to wait longest to obtain processor capacity from the host.</td>
</tr>
<tr>
<td></td>
<td>Where spikes occur on the graphs, you can click on the line to see a weekly comparison report of the server. This shows whether any significant changes in the environment might have caused the spike.</td>
</tr>
</tbody>
</table>

Table 13. VMware VI VM CPU Ready and Utilization report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI VM CPU Ready and Utilization</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the processor performance for one virtual machine. The report compares the virtual machine percent ready, processor utilization of the virtual machine, overall processor utilization on the host and number of virtual machines on the host.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Display the processor performance for one virtual machine.</td>
</tr>
<tr>
<td>Parameters</td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>Host Servers</td>
<td>You can choose one or more host servers from a list of host servers that belong to the selected cluster and data center.</td>
</tr>
<tr>
<td>Date Range</td>
<td>You can choose a date range for which to display data.</td>
</tr>
</tbody>
</table>
Table 13. VMware VI VM CPU Ready and Utilization report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER (Daily, Hourly, Weekly, and Monthly views)</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES (Daily, Hourly, Weekly, and Monthly views)</td>
</tr>
</tbody>
</table>

Output

This report shows a line chart. The chart compares the VM percent ready, CPU utilization of the VM, overall CPU utilization on the host and number of VMs on the host. Acceptable percent ready range is 0-5%. High VM percent ready, low host CPU utilization and high number of VMs on the host indicate that too many virtual machines are competing for CPU on that host. Where spikes occur on the graph, you can click on the line to see a weekly comparison report of the server to observe any significant changes in the environment might have caused the spike.

Use case: What are the historical performance trends for processor, memory, storage and network utilization for one or more clusters or servers? Help me to compare the trends.

Table 14. VMware VI Cluster Performance Trends report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Cluster Performance Trends</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows a dashboard view of historical trends of all the key performance metrics for one or more clusters. The values displayed are average and maximum processor utilization in percent, average and maximum memory utilization in percent, average data store space usage against capacity in GB, average number of virtual machines per host, average number of effective host servers against number of hosts, and average number of virtual machines on against total number of virtual machines. The trends can be seen in an hourly or a daily format.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show historical trends of all key performance metrics for clusters.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center  
|                   | You can choose one data center from a list of data centers.  
|                   | Cluster  
|                   | You can choose one cluster from a list of clusters that belong to the selected data center.  
|                   | Summarization Type  
|                   | You can choose daily or hourly granularity of the trend.  
|                   | Date Range  
|                   | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
|                   | • Last 7 Days  
|                   | • Last 30 Days  
|                   | • Last 90 Days  
|                   | and so on. |
| Tables or views used | KVM_CLUSTERS (Daily, Hourly, Weekly, and Monthly views) |
|                   | KVM_SERVER_DV |
### Table 14. VMware VI Cluster Performance Trends report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output</strong></td>
<td>The report shows trends for multiple performance metrics of multiple clusters in a matrix. For percentages (CPU, Memory), the scales are 0-100. The yellow line indicates the maximum utilization and the blue line indicates the average utilization. Data store usage (shown as a solid line) is plotted against the total capacity (shown as a dashed line). The number of virtual machines that are in the ON state (shown as a solid line) is plotted against the total number of virtual machines on the cluster (shown as a dashed line). The other metrics shown are the number of virtual machines per host, and the number of effective host servers (shown as a solid line), which is plotted against the number of host servers (shown as a dashed line). The red dots show the peaks and the green dots show the minimum values.</td>
</tr>
</tbody>
</table>

### Table 15. VMware VI Host Server Performance Trends report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Host Server Performance Trends</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows a dashboard view of historical trends of all the key performance metrics for one or more host servers. The values displayed are average and maximum processor utilization in percent, average and maximum overall virtual machine percent ready, average and maximum memory utilization in percent, data store space usage against capacity in GB, network I/O in mbps, disk I/O in kbps, and number of virtual machines on against total number of virtual machines. The trends can be seen in an hourly or a daily format.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Show historical trends of all key performance metrics for host servers.</td>
</tr>
</tbody>
</table>
| **Parameters**   | **Data Center**<br>You can choose one data center from a list of data centers.  
**Cluster**<br>You can choose one cluster from a list of clusters that belong to the selected data center.  
**Host Server**<br>You can choose one or more host servers belonging to the selected cluster.  
**Summarization Type**<br>You can choose daily or hourly granularity of the trend.  
**Date Range**<br>You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
  - Last 7 Days  
  - Last 30 Days  
  - Last 90 Days  
  and so on. |
| **Tables or views used** | KVM_SERVER (Daily, Hourly, Weekly, and Monthly views)  
KVM_SERVER_DISK (Daily, Hourly, Weekly, and Monthly views)  
KVM_SERVER_NETWORK (Daily, Hourly, Weekly, and Monthly views) |
Table 15. VMware VI Host Server Performance Trends report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>The report shows trends for multiple performance metrics of multiple host servers in a matrix. For percentages (CPU, Memory, VM Percent Ready), the scales are 0-100. The yellow line indicates the maximum utilization and the blue line indicates the average utilization. Data store usage (shown as a solid line) is plotted against the total capacity (shown as a dashed line). The number of virtual machines that are in the ON state (shown as a solid line) is plotted against the total number of virtual machines on the cluster (shown as a dashed line). Network I/O is plotted in mbps and its scale is relative to the maximum value for all the servers. The red dots show the peaks and the green dots show the minimum values.</td>
</tr>
</tbody>
</table>

Table 16. VMware VI VM Performance Trends report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI VM Performance Trends</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows a dashboard view of historical trends of all the key performance metrics for one or more virtual machines on one or more hosts. The values displayed are average and maximum processor utilization in percent, average and maximum virtual machine percent ready, average and maximum memory utilization in percent, data store space usage against capacity in GB, network I/O in mbps, and disk I/O in kbps. The trends can be seen in an hourly or a daily format.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show historical trends of all key performance metrics for virtual machines.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Data Center You can choose one data center from a list of data centers. Cluster You can choose one cluster from a list of clusters that belong to the selected data center. Host Server You can choose one or more host servers belonging to the selected cluster. Summarization Type You can choose daily or hourly granularity of the trend. Date Range You can choose a date range for which the trend is to be generated. The options for date range selection are as follows: • Last 7 Days • Last 30 Days • Last 90 Days and so on.</td>
</tr>
</tbody>
</table>
Table 16. VMware VI VM Performance Trends report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>The report shows trends for multiple performance metrics of multiple host servers in a matrix. For percentages (CPU, Memory, VM Percent Ready), the scales are 0-100. The yellow line indicates the maximum utilization and the blue line indicates the average utilization. Data store usage (shown as a solid line) is plotted against the total capacity (shown as a dashed line). The number of virtual machines that are in the ON state (shown as a solid line) is plotted against the total number of virtual machines on the cluster (shown as a dashed line). Network I/O is plotted in mbps and its scale is relative to the maximum value for all the servers. The red dots show the peaks and the green dots show the minimum values.</td>
</tr>
</tbody>
</table>

Use case: What are the historical performance trends for processor, memory, storage and network utilization for one or more clusters, host servers, or virtual machines? Help me to compare the trends and identify patterns in utilization and performance.

VMware VI Cluster Performance Trends report
See Table 7.

VMware VI Host Server Performance Trends report
See Table 8.

Table 17. VMware VI Host Server Heat Chart report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Heat Chart</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows a historical trend of the average hourly processor utilization and memory utilization in percentage for one or more host servers.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show historical trend of average hourly processor and memory utilization for one or more host servers.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center You can choose one data center from a list of data centers.  
|                  | Cluster You can choose one cluster from a list of clusters that belong to the selected data center.  
|                  | Host Server You can choose one or more host servers belonging to the selected cluster.  
|                  | Date Range You can choose a date range for which the trend is to be generated. The options for Date Range selection are as follows:  
|                  | • Last 7 Days  
|                  | • Last 30 Days  
|                  | • Last 90 Days  
|                  | and so on. |
| Tables or views used | KVM_SERVER (Daily and Hourly views) |
Table 17. VMware VI Host Server Heat Chart report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>This report presents a different kind of visualization for observing patterns in hourly processor or memory utilization. This chart is called a heat chart. In a heat chart, the X-axis shows the hours during the day and the Y-axis shows the dates. For each host server, hourly averages for the metric are shown. This chart helps in identifying patterns, such as during which times of day the server gets busy. The chart is useful for determining maintenance schedules or observing whether the pattern of the virtual machine matches the pattern of its target host during virtual machine placement exercises. Different colors on the heat chart represent different percentage bands. You can modify the threshold values for these bands. You can click on a specific date to see a detailed report.</td>
</tr>
</tbody>
</table>

Table 18. VMware VI VM Heat Chart report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI VM Heat Chart</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows a historical trend of the average hourly processor utilization and memory utilization in percentage for one or more virtual machines.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show historical trend of average hourly processor and memory utilization for one or more virtual machines.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Data Center: You can choose one data center from a list of data centers. Cluster: You can choose one cluster from a list of clusters that belong to the selected data center. Host Server: You can choose one or more host servers belonging to the selected cluster. VM: You can choose one or more virtual machines belonging to the selected host servers. Date Range: You can choose a date range for which the trend is to be generated. The options for date range selection are as follows: • Last 7 Days • Last 30 Days • Last 90 Days and so on.</td>
</tr>
<tr>
<td>Tables or views used</td>
<td>KVM_VIRTUAL_MACHINES (Daily and Hourly views) KVM_VM_MEMORY_HV</td>
</tr>
</tbody>
</table>
Table 18. VMware VI VM Heat Chart report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>This report presents a different kind of visualization for observing patterns in hourly processor or memory utilization. This chart is called a heat chart. In a heat chart, the X-axis shows the hours during the day and the Y-axis shows the dates. For each host server, hourly averages for the metric are shown. This chart helps in identifying patterns, such as during which times of day the server gets busy. The chart is useful for determining maintenance schedules or observing whether the pattern of the virtual machine matches the pattern of its target host during virtual machine placement exercises. Different colors on the heat chart represent different percentage bands. You can modify the threshold values for these bands. You can click on a specific date to see a detailed report.</td>
</tr>
</tbody>
</table>

Use case: What are the average, maximum, or minimum processor utilization, memory utilization, data store space usage, network I/O, and disk I/O, for a list of host servers over a period of time?

Table 19. VMware VI Host Server Utilization Details report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Utilization Details</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the average, maximum, or minimum processor utilization, memory utilization, data store space usage, network I/O, and disk I/O over a period of time for one or more host servers across a cluster in a data center. You can view the data in hourly, daily, weekly, or monthly format. You can drill down by clicking a data point on the chart to see more granular data. You can scroll to the next page of the report to see tabular data.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show average, maximum, or minimum, values for a range of metrics for one or more host servers over time.</td>
</tr>
</tbody>
</table>
Table 19. VMware VI Host Server Utilization Details report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one or more data centers from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data centers.</td>
</tr>
<tr>
<td>Host Server</td>
<td>You can choose one or more host servers belonging to the selected clusters.</td>
</tr>
<tr>
<td>Aggregation</td>
<td>You can choose average, maximum, or minimum, to aggregate the resources over a period of time.</td>
</tr>
<tr>
<td>Metric</td>
<td>You can choose the metric or resource to run the report on.</td>
</tr>
<tr>
<td>Summarization</td>
<td>You can choose how the data is summarized for the resources. Data can be summarized on an hourly, or daily, or weekly, or monthly basis.</td>
</tr>
</tbody>
</table>
| Date Range       | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
|                  | • Last 7 Days  
|                  | • Last 30 Days  
|                  | • Last 90 Days  
|                  | and so on. |

| Tables or views used | KVM_SERVER (Daily, Hourly, Monthly, and Weekly views) |
|                     | KVM_SERVER_DISK (Daily, Hourly, Monthly, and Weekly views) |
|                     | KVM_SERVER_NETWORK (Daily, Hourly, Weekly, and Monthly views) |

| Output | The report shows a line chart, plotting the average percentage CPU or host memory utilization for the selected host servers, on all the servers on which they are located, over the selected date range. The report also shows the results in table form. |

Table 20. VMware VI Host Server Memory Allocation Details report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Memory Allocation Details</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the average, maximum, or minimum memory utilization over a period of time for one or more host servers across a cluster in a data center. You can view the data in hourly format. You can scroll to the next page of the report to see tabular data.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show average, maximum, or minimum, values for memory utilization for one or more host servers over time.</td>
</tr>
</tbody>
</table>
### Table 20. VMware VI Host Server Memory Allocation Details report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td>Data Center</td>
</tr>
<tr>
<td></td>
<td>You can choose one or more data centers from a list of data centers.</td>
</tr>
<tr>
<td></td>
<td>Cluster</td>
</tr>
<tr>
<td></td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data centers.</td>
</tr>
<tr>
<td></td>
<td>Host Server</td>
</tr>
<tr>
<td></td>
<td>You can choose one or more host servers belonging to the selected clusters.</td>
</tr>
<tr>
<td></td>
<td>Aggregation</td>
</tr>
<tr>
<td></td>
<td>You can choose average, maximum, or minimum, to aggregate the resources over a period of time.</td>
</tr>
<tr>
<td></td>
<td>Date Range</td>
</tr>
<tr>
<td></td>
<td>You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Last 7 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 30 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 90 Days</td>
</tr>
<tr>
<td></td>
<td>and so on.</td>
</tr>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER_MEMORY_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES_DV</td>
</tr>
<tr>
<td>Output</td>
<td>The report shows a line chart, plotting the average percentage host memory utilization for the selected host servers, on all the servers on which they are located, over the selected date range. The report also shows the results in table form.</td>
</tr>
</tbody>
</table>

### Table 21. VMware VI VM Utilization Details report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI VM Utilization Details</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the average, maximum, or minimum processor utilization, memory utilization, data store space usage, network I/O, and disk I/O over a period of time for one or more virtual machines on host servers across a cluster in a data center. You can view the data in hourly, daily, weekly, or monthly format. You can drill down by clicking a data point on the chart to see more granular data. You can scroll to the next page of the report to see tabular data.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show average, maximum, or minimum, values for a range of metrics for one or more host servers over time.</td>
</tr>
</tbody>
</table>
### Table 21. VMware VI VM Utilization Details report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one or more data centers from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data centers.</td>
</tr>
<tr>
<td>Host Server</td>
<td>You can choose one or more host servers belonging to the selected clusters.</td>
</tr>
<tr>
<td>VM</td>
<td>You can choose one or more virtual machines from a list of virtual machines belonging to the selected data centers, clusters, and host servers.</td>
</tr>
<tr>
<td>Aggregation</td>
<td>You can choose average, maximum, or minimum, to aggregate the resources over a period of time.</td>
</tr>
<tr>
<td>Metric</td>
<td>You can choose the metric or resource to run the report on.</td>
</tr>
<tr>
<td>Summarization</td>
<td>You can choose how the data is summarized for the resources. Data can be summarized on an hourly, or daily, or weekly, or monthly basis.</td>
</tr>
</tbody>
</table>
| Date Range       | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
                    • Last 7 Days  
                    • Last 30 Days  
                    • Last 90 Days  
                    and so on. |
| **Tables or views used** | KVMVMDSUTL (Daily, Hourly, Weekly, and Monthly views)  
                               KVM_VIRTUAL_MACHINES (Daily, Hourly, Weekly, and Monthly views)  
                               KVM_VM_MEMORY (Daily, Hourly, Weekly, and Monthly views)  
                               KVM_VM_NETWORK (Daily, Hourly, Weekly, and Monthly views) |
| **Output**       | The report shows a line chart, plotting the average percentage CPU or host memory utilization for the selected virtual machines, on all the servers on which they are located, over the selected date range. The report also shows the results in table form. |

**Use Case:** What are the historical performance trends and capacity for all data stores in the environment?

### Table 22. VMware VI Data Store Capacity and Performance Trend report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Data Store Capacity and Performance Trend</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the capacity and performance trends for one or more data stores in the environment.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Show historical trends of all key performance metrics for data stores.</td>
</tr>
</tbody>
</table>
Table 22. VMware VI Data Store Capacity and Performance Trend report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td><strong>Data Store</strong></td>
<td>You can choose one or more data stores.</td>
</tr>
</tbody>
</table>
| **Date Range**   | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
  - Last 7 Days  
  - Last 30 Days  
  - Last 90 Days  
  and so on.  
| For display options, you can choose Trend Charts or Forecast Charts to see either trending or trending with forecasting. Forecasting has been added only for Total I/O and % Used. |
| **Tables or views used** | KVM_DATASTORES (Daily, Hourly, Weekly, and Monthly views) |
| **Output**       | The report displays the following charts:  
  - The first chart is a stacked bar chart. When the display option is Trend Charts, used space and free space are combined to show the total space in GB.  
  - The second chart shows the space used in percent trend lines over time.  
  - The third chart shows the total I/O in kbps trend over time.  
  - The fourth chart shows the number of virtual machines over time.  
  - The fifth chart shows the number of connected clusters over time.  
  - The sixth chart shows the number of connected host servers over time.  
  - The seventh chart shows the space provisioned for virtual machines over time in GB.  
| When the display option is Forecast Charts, the first chart shows the total I/O in KB per second trending and forecasting over time. The second chart shows the space used in percent trending and forecasting over time. |

Use case: Were there any significant changes in my environment between two weeks?

Table 23. VMware VI Cluster Weekly Comparison report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Cluster Weekly Comparison</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report compares the key attributes for clusters between two weeks and shows whether significant changes occurred in the values between the weeks. You can choose the percent change in values. The default value is 20, which indicates that if a change occurred of more than 20% in the value of any attribute between the weeks, then that field is highlighted.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Compare key attributes for clusters between weeks.</td>
</tr>
</tbody>
</table>
Table 23. VMware VI Cluster Weekly Comparison report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data center.</td>
</tr>
</tbody>
</table>
| Date Range       | You can choose a date range for which the trend is to be generated. You can either choose a historical period for which the trend is to be generated, for example:  
  - Last 7 Days  
  - Last 30 Days  
  - Last 90 Days  
  or you can enter the start week and end week for which you want to compare attributes.  
  **Known issue:** You might need to enter the default value of start week or end week, even if you choose a predefined date range such as **Last 30 days**. If you use the date range, then choose 1 for the start week and 52 for the end week. If you want to choose specific weeks, select the desired start and end week and year. |
| Tables or views used | KVM_CLUSTERS_DV  
  KVM_SERVER_DV |
| Output           | The report displays a table, with comparisons between weeks for each selected cluster. A percent change in values is highlighted if it is higher than the value specified. For configuration changes such as a change in the number of servers or vMotions, any change in value is highlighted. |

Table 24. VMware VI Host Servers Weekly Comparison report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Servers Weekly Comparison</td>
</tr>
<tr>
<td>Description</td>
<td>This report compares the key attributes for host servers between two weeks and shows whether significant changes occurred in the values between the weeks. You can choose the percent change in values. The default value is 20, which indicates that if a change occurred of more than 20% in the value of any attribute between the weeks, then that field is highlighted.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Compare key attributes for host servers between weeks.</td>
</tr>
</tbody>
</table>
Table 24. VMware VI Host Servers Weekly Comparison report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td><strong>Host Server</strong></td>
<td>You can choose one or more host servers belonging to the selected clusters.</td>
</tr>
</tbody>
</table>
| **Date Range**   | You can choose a date range for which the trend is to be generated. You can either choose a historical period for which the trend is to be generated, for example:  
|                  | • Last 7 Days  
|                  | • Last 30 Days  
|                  | • Last 90 Days  
|                  | or you can enter the start week and end week for which you want to compare attributes. |
|                  | **Known issue:** You might need to enter the default value of start week or end week, even if you choose a predefined date range such as Last 30 days. If you use the date range, then choose 1 for the start week and 52 for the end week. If you want to choose specific weeks, select the desired start and end week and year. |

| Tables or views used | KVM_SERVER_DV  
|                     | KVM_SERVER_DATASTORE_DV  
|                     | KVM_SERVER_DISK_DV  
|                     | KVM_SERVER_NETWORK_DV  

| Output | The report displays a table, with comparisons between weeks for each selected host server. A percent change in values is highlighted if it is higher than the value specified. For configuration changes such as a change in the number of virtual machines, any change in value is highlighted. |

**What-if analysis for workload placement: estimate the capacity of your environment**

This set of reports provides you with a simple what-if analysis tool. You can determine approximately how many more workloads your environment can accommodate and what additional resources you might need based on demand. You can modify several parameters to obtain the output you want. The workload placement reports take into consideration purely historical usage data collected by the IBM Tivoli Monitoring for Virtual Environments agent for VMware VI and user inputs. The calculations are not based on forecasted data or other physical characteristics of the virtual machine, such as physical configuration. Calculations are based on current environment characteristics only, and do not account for long-term capacity planning.
Use case: how many more virtual machines can I place on a cluster, a host server, or a group of servers?

One of the most important questions that VMware VI administrators or capacity planners ask is how many more virtual machines they can place, based on the demand created by the virtual machines in their environment. This analysis can be done by using the following reports:

Table 25. VMware VI Number of Workloads for Clusters report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Number of Workloads for Clusters</td>
</tr>
<tr>
<td>Description</td>
<td>Use this report to determine the number of additional virtual machines that can be placed on a cluster, based on the historical usage or user inputs.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Determine the number of additional virtual machines that can be placed on a cluster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Clusters</td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>VM Profile</td>
<td>A profile for virtual machines is computed, which is the amount of resources (CPU in GHz, memory in MB, and storage space in GB) that the virtual machines in the cluster consume. You can choose from the following three VM Profiles:</td>
</tr>
<tr>
<td>Average</td>
<td>In this profile, you use the average amount of resources that the virtual machines in the cluster consume, averaged for the selected cluster over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td>Peak</td>
<td>In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td>User-defined</td>
<td>In this profile, you use resource characteristics of the virtual machine that you enter.</td>
</tr>
<tr>
<td>Buffer</td>
<td>The buffer is the amount of resources that are not allocated based on user preferences. For example, if you do not want to allocate all your storage, you can specify how much space you want to leave unallocated. The analysis takes that figure into account. The default buffer values are:</td>
</tr>
<tr>
<td>• CPU: 2 GHz</td>
<td></td>
</tr>
<tr>
<td>• Data store Space: 30 GB</td>
<td></td>
</tr>
<tr>
<td>• Memory: 256 MB</td>
<td></td>
</tr>
<tr>
<td>Date Range for computing VM Profile</td>
<td>You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows:</td>
</tr>
<tr>
<td>• Last 7 Days</td>
<td></td>
</tr>
<tr>
<td>• Last 30 Days</td>
<td></td>
</tr>
<tr>
<td>• Last 90 Days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The default value is Last 7 Days.</td>
</tr>
</tbody>
</table>
Table 25. VMware VI Number of Workloads for Clusters report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables or views used</td>
<td>KVM_CLUSTERS_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VM_MEMORY_DV</td>
</tr>
<tr>
<td></td>
<td>KVMVMDSUTL_DV (virtual machine Data Store utilization)</td>
</tr>
</tbody>
</table>

Output

The report is in table form.

- The first column shows the type of resource: namely CPU in GHz, Data Store Space in GB, Memory in MB.
- The second column shows the **VM profile** based on average resource used by all virtual machines on this cluster. This column displays the resources consumed by all the deployed virtual machines on that cluster over the selected date range. The default date range is the last 7 days.
- The third column shows the **Available Cluster Capacity (before applying Buffer)**. The Available Cluster Capacity is the amount of resources available as a whole for the cluster (the cumulative sum of the available capacities on all servers in the cluster) before applying the user-defined buffer. The available capacity is recorded for the last 24 hours.
- The fourth column shows the **Buffer** that you enter. The buffer is to indicate the resources that you do not want to allocate.
- The fifth column shows the **Available Cluster Capacity after applying Buffer**.
  This figure is calculated using the formula Available Cluster Capacity (before applying Buffer) – Buffer.
- The sixth column shows the **Number of VMs** that can be placed on the cluster for each resource.
  This figure is calculated using the formula Available Cluster Capacity (after applying Buffer) / VM Profile.

The constrained resources are highlighted in red.

**VMware VI Number of Workloads for Clusters or Host Servers report**

The key difference between this report and the VMware VI Number of Workloads for Clusters report is that in this report the calculations are done at a finer level of granularity, that is, at the host server level instead of looking at the aggregated values at the cluster level.

For example, the cluster might have 10 servers, each server having 5 MB of memory. Cumulatively the cluster has 50 MB of memory. Assume that a typical virtual machine consumes 6 MB of memory. Using the VMware VI Number of Workloads for Clusters report, the calculation yields 50 / 6 = 8 more virtual machines can be added to the cluster. However, if you look at each server individually, no more virtual machines can be added, because each server has only 5 MB of memory remaining.

From this report, you can see how many virtual machines can be accommodated by each host server individually in a cluster. Use the VMware VI Number of Workloads for Clusters report to assess how many virtual machines can be placed on the cluster if resources are moved and reallocated, using all available capacity. This report, in contrast, assesses how many virtual machines can fit on a cluster without changing the
clusters. A combination of these two reports shows whether, by moving virtual machines, you can fit more virtual machines on the same cluster.

Table 26. VMware VI Number of Workloads for Clusters or Host Servers report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Number of Workloads for Clusters or Host Servers</td>
</tr>
<tr>
<td>Description</td>
<td>You can use this report to determine the number of additional virtual machines that can be placed on a cluster or a group of host servers, based on the historical usage or user inputs. You can run this report for all the servers in a cluster, for selected host servers in the cluster, or for stand-alone servers.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Determine the number of additional virtual machines that can be placed on a cluster or a group of host servers, based on the historical usage or user inputs.</td>
</tr>
</tbody>
</table>
### Table 26. VMware VI Number of Workloads for Clusters or Host Servers report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td><strong>Host Servers</strong></td>
<td>You can choose one or more host servers from a list of host servers that belong to the selected Cluster and Data Center.</td>
</tr>
<tr>
<td><strong>VM Profile</strong></td>
<td>A profile for virtual machines is computed, which is the amount of resources (CPU in GHz, memory in MB, and storage space in GB) that the virtual machines in the cluster consume. You can choose from the following three VM Profiles:</td>
</tr>
<tr>
<td>Average</td>
<td>In this profile, you use the average amount of resources that the virtual machines in the cluster consume, averaged for the selected cluster over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td>Peak (average)</td>
<td>In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume averaged over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td>Peak (maximum)</td>
<td>In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume maximized over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td>User-defined</td>
<td>In this profile, you use resource characteristics of the virtual machine that you enter.</td>
</tr>
<tr>
<td><strong>Buffer</strong></td>
<td>The buffer is the amount of resources that are not allocated based on user preferences. For example, if you do not want to allocate all your storage, you can specify how much space you want to leave unallocated. The analysis takes that figure into account. The default buffer values are:</td>
</tr>
<tr>
<td></td>
<td>• CPU: 2 GHz</td>
</tr>
<tr>
<td></td>
<td>• Data Store Space: 30 GB</td>
</tr>
<tr>
<td></td>
<td>• Memory: 256 MB</td>
</tr>
<tr>
<td></td>
<td>• Disk I/O: 50%</td>
</tr>
<tr>
<td></td>
<td>• Network I/O: 50%</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>This buffer is applied to each individual server, so to calculate the buffer, divide the total resources you do not want to allocate by the number of servers in the cluster.</td>
</tr>
<tr>
<td><strong>Date Range for computing VM Profile</strong></td>
<td>You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Last 7 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 30 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 90 Days</td>
</tr>
<tr>
<td></td>
<td>The default value is Last 7 Days.</td>
</tr>
</tbody>
</table>
### Table 26. VMware VI Number of Workloads for Clusters or Host Servers report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Tables or views used** | KVM_SERVER_DV  
KVM_SERVER_DISK_DV  
KVM_SERVER_MEMORY_DV  
KVM_SERVER_NETWORK_DV  
KVM_VIRTUAL_MACHINES (Daily or Hourly View)  
KVM_VM_MEMORY (Daily or Hourly View)  
KVM_VM_NETWORK (Daily or Hourly View)  
KVMVMDSUTL (virtual machine data store utilization) (Daily or Hourly View) |

### Output

Although the layout and functionality of this report are similar to the VMware VI Number of Workloads for Clusters report, this report provides a more granular capacity calculation at the host server level instead of the high-level cluster view.

Each row in the table shows a host server. The servers are grouped by cluster.

- The first column shows the type of resource: namely CPU in GHz, Data Store Space in GB, Memory in MB.
- The second column lists the cluster name.
- The third column lists the host server name.
- The fourth column shows the virtual machine profile, that is, the resources consumed by all the deployed virtual machines on the selected host server over the selected date range.
- The fifth column shows the Available Capacity of the host server (before applying buffer). The Available Capacity is the amount of resources available on the single host server before applying the user-defined buffer. The available capacity is recorded for the last 24 hours.
- The sixth column shows the Buffer that you enter. The buffer is to indicate the resources that you do not want to allocate on a host server.
- The seventh column shows the Available Cluster Capacity after applying Buffer. This figure is calculated using the formula Available Cluster Capacity (before applying Buffer) – Buffer.
- The eighth column shows the Number of VMs that can be placed on the cluster for each resource. This figure is calculated using the formula Available Cluster Capacity (after applying Buffer) / VM Profile.

The constrained resource is highlighted in red.

**Note:** A value of 999,999,999 for Number of VMs indicates that no limit exists on the number of virtual machines that can be added to the cluster. This value appears if the VM profile is 0.
Use case: I want to place a number of workloads or virtual machines to a cluster or group of servers. How much additional resource, such as processor, memory, and storage, do I need?

This analysis is derived from the use case about the number of virtual machines needed. In this case, you know how many more virtual machines you want to add to the cluster or host server, but are not sure whether the available capacity is sufficient, or whether you will need additional resources. This analysis can be done by using the following reports:

Table 27. VMware VI Resources Needed for Additional Workloads on Clusters report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Resources Needed for Additional Workloads on Clusters</td>
</tr>
<tr>
<td>Description</td>
<td>You can use this report to determine the resources (CPU, memory, storage, and so on) that you need in order to add virtual machines to a cluster.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Determine the amount of resources that you need in order to add virtual machines to a cluster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one cluster from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>VM Profile</td>
<td>A profile for virtual machines is computed, which is the amount of resources (CPU in GHz, memory in MB, and storage space in GB) that the virtual machines in the cluster consume. You can choose from the following three VM Profiles:</td>
</tr>
<tr>
<td></td>
<td>Average: In this profile, you use the average amount of resources that the virtual machines in the cluster consume, averaged for the selected cluster over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td></td>
<td>Peak: In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume over the range of time specified by the Date Range parameter.</td>
</tr>
<tr>
<td></td>
<td>User-defined: In this profile, you use resource characteristics of the virtual machine that you enter. The default values are:</td>
</tr>
<tr>
<td></td>
<td>• CPU: 2 GHz</td>
</tr>
<tr>
<td></td>
<td>• Data store space: 30 GB</td>
</tr>
<tr>
<td></td>
<td>• Memory: 256 MB</td>
</tr>
<tr>
<td>Date Range for computing VM Profile</td>
<td>You can choose a date range for computing the virtual machine profile. The options for date range selection are as follows:</td>
</tr>
<tr>
<td></td>
<td>• Last 7 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 30 Days</td>
</tr>
<tr>
<td></td>
<td>• Last 90 Days</td>
</tr>
<tr>
<td></td>
<td>The default value is Last 7 Days.</td>
</tr>
<tr>
<td>Number of VMs to add to the cluster</td>
<td>This parameter is the number of virtual machines that you add to the cluster to see how much additional resources you need to accommodate those virtual machines.</td>
</tr>
<tr>
<td>Buffer</td>
<td>The buffer is the amount of resources that are not allocated based on user preferences. For example, if you do not want to allocate all your storage, you can specify how much space you want to leave unallocated. The analysis takes that figure into account.</td>
</tr>
</tbody>
</table>
### Table 27. VMware VI Resources Needed for Additional Workloads on Clusters report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tables or views used</strong></td>
<td>KVM_CLUSTERS_DV</td>
</tr>
<tr>
<td></td>
<td>KVMVMDSUTIL_DV (virtual machine data store utilization)</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VM_MEMORY</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>The report is in table form.</td>
</tr>
<tr>
<td></td>
<td>• The first column shows the type of resource: namely CPU in GHz, Data Store Space in GB, Memory in MB.</td>
</tr>
<tr>
<td></td>
<td>• The second column shows the <strong>VM profile</strong> based on average resource used by all VMs on this cluster. This column displays the resources consumed by all the deployed virtual machines on that cluster over the selected date range. The default date range is the last 7 days.</td>
</tr>
<tr>
<td></td>
<td>• The third column shows the <strong>Resources Needed by Additional VMs</strong>, that is, the amount of resources that are needed to accommodate the virtual machines you want to add. This figure is calculated using the formula Number of VMs to add to the cluster * VM Profile.</td>
</tr>
<tr>
<td></td>
<td>• The fourth column shows the <strong>Available Cluster Capacity (before applying Buffer)</strong>. The Available Cluster Capacity is the amount of resources available as a whole for the cluster before applying the user-defined buffer. The available capacity is recorded for the last 48 hours.</td>
</tr>
<tr>
<td></td>
<td>• The fifth column shows the <strong>Buffer</strong> that you enter.</td>
</tr>
<tr>
<td></td>
<td>• The sixth column shows the <strong>Available Cluster Capacity after applying Buffer</strong>. This figure is calculated using the formula Available Cluster Capacity (before applying Buffer) – Buffer.</td>
</tr>
<tr>
<td></td>
<td>• The seventh column shows the <strong>Capacity Needed</strong>. This figure is calculated using the formula Resources Needed by Additional VMs - Available Cluster Capacity (after applying Buffer). This column shows a value of 0 if the value for Available Cluster Capacity (after applying Buffer) is greater than the value for Resources Needed by Additional VMs.</td>
</tr>
</tbody>
</table>

**Note:** The rows marked in red show the clusters that need additional capacity in order to accommodate additional virtual machines.

---

### Table 28. VMware VI Resources Needed for Additional Workloads on Host Servers report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Resources Needed for Additional Workloads on Clusters</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>You can use this report to determine the resources (CPU, memory, storage, and so on) that you need in order to add virtual machines to a server, or group of servers. This report is similar to the VMware VI Resources Needed for Additional Workloads on Clusters report except the calculation is done at a more granular level, that is, by looking at individual host servers instead of clusters.</td>
</tr>
</tbody>
</table>
Table 28. VMware VI Resources Needed for Additional Workloads on Host Servers report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Determine the amount of resources that you need in order to add virtual machines to a server, or group of servers.</td>
</tr>
</tbody>
</table>
| **Parameters**   | **Data Center**<br>You can choose one data center from a list of data centers. **Cluster**<br>You can choose one cluster from a list of clusters that belong to the selected data center. **Host Servers**<br>You can choose one or more host servers from a list of host servers that belong to the selected Cluster and Data Center. **VM Profile**<br>A profile for virtual machines is computed, which is the amount of resources (CPU in GHz, memory in MB, and storage space in GB) that the virtual machines in the cluster consume. You can choose from the following three VM Profiles:<br>**Average**<br>In this profile, you use the average amount of resources that the virtual machines in the cluster consume, averaged for the selected cluster over the range of time specified by the Date Range parameter.<br>**Peak (average)**<br>In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume, averaged over the range of time specified by the Date Range parameter.<br>**Peak (maximum)**<br>In this profile, you use the maximum amount of resources that the virtual machines in the selected cluster consume maximized over the range of time specified by the Date Range parameter.<br>**User-defined**<br>In this profile, you use resource characteristics of the virtual machine that you enter. **Date Range for computing VM Profile**<br>You can choose a date range for computing the virtual machine profile. The options for Date Range selection are as follows:<br>• Last 7 Days<br>• Last 30 Days<br>• Last 90 Days **Number of VMs to add to each host server**<br>This parameter is the number of virtual machines that you add to the cluster to see how much additional resources are needed to accommodate those virtual machines. **Buffer**<br>The buffer is the amount of resources that are not allocated based on user preferences. For example, if you do not want to allocate all your storage, you can specify how much space you want to leave unallocated and the analysis takes that into account. The default buffer values are:<br>• CPU: 2GHz<br>• Data Store Space: 30GB<br>• Memory: 256 MB<br>• Disk I/O: 50%
• Network I/O: 50% |
### Table 28. VMware VI Resources Needed for Additional Workloads on Host Servers report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_SERVER_MEMORY_DV</td>
</tr>
<tr>
<td></td>
<td>KVMVMDSUTIL (virtual machine data store utilization) (Daily and Hourly View)</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES (Daily and Hourly View)</td>
</tr>
<tr>
<td></td>
<td>KVM_VM_MEMORY (Daily and Hourly View)</td>
</tr>
<tr>
<td></td>
<td>KVM_SERVER_DISK_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_SERVER_NETWORK_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VM_NETWORK (Daily and Hourly View)</td>
</tr>
<tr>
<td>Output</td>
<td>The report is given in table form.</td>
</tr>
<tr>
<td></td>
<td>• The first column shows the type of resource: namely CPU in GHz, Data Store Space in GB, Memory in MB.</td>
</tr>
<tr>
<td></td>
<td>• The second column lists the cluster name.</td>
</tr>
<tr>
<td></td>
<td>• The third column lists the server host name.</td>
</tr>
<tr>
<td></td>
<td>• The fourth column shows the <strong>VM profile</strong>, that is, the resources consumed by the virtual machines on that host server over the selected date range. The default date range is the last 7 days.</td>
</tr>
<tr>
<td></td>
<td>• The fifth column shows the <strong>Resources Needed by Additional VMs</strong>, that is, the amount of resources that are needed to accommodate the virtual machines you want to add.</td>
</tr>
<tr>
<td></td>
<td>This figure is calculated using the formula Number of VMs to add to the host server*VM Profile.</td>
</tr>
<tr>
<td></td>
<td>• The sixth column shows the <strong>Available Capacity (before applying Buffer)</strong>. The Available Capacity is the amount of resources available as a whole for the cluster before applying the user-defined buffer. The available capacity is recorded for the last 48 hours.</td>
</tr>
<tr>
<td></td>
<td>• The seventh column shows the <strong>Buffer</strong> that you enter.</td>
</tr>
<tr>
<td></td>
<td>• The eighth column shows the <strong>Available Capacity after applying Buffer</strong>. This figure is calculated using the formula Available Capacity (before applying Buffer) – Buffer.</td>
</tr>
<tr>
<td></td>
<td>• The ninth column shows the <strong>Capacity Needed</strong>. This figure is calculated using the formula Resources Needed by Additional VMs - Available Capacity (after applying Buffer). This column shows a value of 0 if the value for Available Capacity (after applying Buffer) is greater than the value for Resources Needed by Additional VMs.</td>
</tr>
</tbody>
</table>

**Note:** The rows marked in red show the clusters that need additional capacity in order to accommodate additional virtual machines.

---

**Workload right sizing and balancing: determining the performance of your environment**

You can use these reports to determine the overall performance of the environment.
Use case: Which clusters, host servers, or virtual machines consume the most or least resources (processor, memory, storage, network I/O, or disk I/O)? For example, what are the top 10 servers by processor utilization, or bottom 10 virtual machines by memory utilization using less than 10% memory, or the top 10 clusters by processor usage in GHz?

Table 29. VMware VI Top or Bottom Workload Consumers Clusters report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Top or Bottom Workload Consumers Clusters</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the clusters that consume the most, or least, resources in the environment by processor, memory, and storage utilization. The values can be seen in units such as processor capacity in GHz, memory in MB, and data store space in GB or in percentages.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Show the clusters that consume the most, or least, resources (processor, memory, storage).</td>
</tr>
</tbody>
</table>

**Parameters**

- **Data Center**
  - You can choose one data center from a list of data centers.
- **Top or Bottom**
  - You can choose whether you want to see most utilized or least utilized resources.
- **Display**
  - You can choose whether the charts display real values (CPU in GHz, memory in MB or data store space in GB) or percentages.
- **Number of Resources**
  - You can choose the number of clusters to be displayed, for example the top 10 or bottom 5.
- **Date Range**
  - You can choose a date range for which the trend is to be generated. The options for Date Range selection are as follows:
    - Last 7 Days
    - Last 30 Days
    - Last 90 Days
- **Threshold**
  - You can choose the upper and lower thresholds used to filter the percentage values. For example, you can see the top 10 clusters using more than 80% CPU or the bottom 5 clusters using less than 10% memory.

**Tables or views used**

- KVM_SERVER_DV
- KVM_CLUSTERS_DV
### Table 29. VMware VI Top or Bottom Workload Consumers Clusters report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Output           | The report shows bar charts that display the clusters that consume the most, or least, resources, as well as the amount they consume. One bar chart is shown for each of CPU, memory, and data store space utilization.  
If you specify that the charts display real values, you can see the total processor capacity or memory consumed, the effective processor capacity or memory available, which is the processor capacity or memory available for allocation, and total memory available, which includes the processor capacity and memory unavailable for allocation. If you specify that the charts display percentages, only the used and free processor capacity, memory and data store space are shown.  
You can click on a cluster and see the top or bottom host servers on that cluster. You can then click on a host server to see the top or bottom virtual machines on the host. Alternatively you can click the cluster to see the historical trend of that attribute of the selected cluster over time. |

### Table 30. VMware VI Top or Bottom Workload Consumers Host Servers report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Top or Bottom Workload Consumers Host Servers</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the host servers that consume the most, or least, resources in the environment by processor, memory, and storage utilization.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the host servers that consume the most, or least, resources (processor, memory, storage).</td>
</tr>
<tr>
<td>Parameters</td>
<td></td>
</tr>
</tbody>
</table>
  - **Data Center**  
    You can choose one data center from a list of data centers.  
  - **Cluster**  
    You can choose one cluster or All from a list of clusters that belong to the selected data center.  
  - **Top or Bottom**  
    You can choose whether you want to see most utilized or least utilized resources.  
  - **Display**  
    You can choose whether the charts display real values (processor capacity in GHz, memory in MB, or data store space in GB) or percentages.  
  - **Number of Resources**  
    You can choose the number of host servers to be displayed, for example the top 10 or bottom 5.  
  - **Date Range**  
    You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
    - Last 7 Days  
    - Last 30 Days  
    - Last 90 Days  
  - **Threshold**  
    You can choose the upper and lower thresholds used to filter the percentage values. For example, you can see the top 10 host servers using more than 80% CPU or the bottom 5 host servers using less than 10% memory. |
Table 30. VMware VI Top or Bottom Workload Consumers Host Servers report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables or views used</td>
<td>KVM_SERVER_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_SERVER_DISK_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_SERVER_NETWORK_DV</td>
</tr>
<tr>
<td>Output</td>
<td>The report shows bar charts that display the host servers that consume the most, or least, resources, as well as the amount they consume. One bar chart is shown for each of CPU, memory, and data store space utilization. If you specify that the charts display real values, you can see used and free processor capacity in GHz, memory in MB, data store space in GB, and network I/O in mbps. If you specify that the charts display percentages, only the used and free processor capacity, memory, and data store space are shown. You can click on a host server and see the top or bottom virtual machines on the host. Alternatively you can also click to see the historical trend of that attribute of the selected host server over time.</td>
</tr>
</tbody>
</table>

Table 31. VMware VI Top N VMs by Host Server report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Top N VMs by Host Server</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the top N virtual machines on one or more selected host servers by processor or memory utilization.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the virtual machines that consume the most processor capacity or memory.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Data Center You can choose one data center from a list of data centers. Cluster You can choose one cluster or All from a list of clusters that belong to the selected data center. Host Server You can choose one or more host servers from the selected cluster. Display You can choose whether the charts display real values (processor capacity in GHz) or percentages. Number of Resources You can choose the number of virtual machines to be displayed, for example the top 10. Date Range You can choose a date range for which the trend is to be generated. The options for date range selection are as follows: • Last 7 Days • Last 30 Days • Last 90 Days Threshold You can choose the upper threshold used to filter the percentage values. For example, you can see the top 10 virtual machines using more than 80% processor capacity.</td>
</tr>
</tbody>
</table>
### Table 31. VMware VI Top N VMs by Host Server report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Tables or views used | KVM_VIRTUAL_MACHINES_DV  
                       | KVMVMDSUTIL_DV  
                       | KVM_VM_MEMORY_DV  
                       | KVM_VM_NETWORK_DV |
| Output | The report shows a bar chart that displays the virtual machines that consume the most resources, as well as the amount they consume. By clicking a virtual machine, you can see a historical trend of the virtual machine over time. |

### Table 32. VMware VI Bottom N VMs by Host Server report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Bottom N VMs by Host Server</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the bottom N virtual machines on one or more selected host servers by processor or memory utilization.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the virtual machines that consume the least processor capacity or memory.</td>
</tr>
</tbody>
</table>
| Parameters | Data Center  
                        You can choose one data center from a list of data centers.  
Cluster | You can choose one cluster or All from a list of clusters that belong to the selected data center.  
Host Server | You can choose one or more host servers from the selected cluster.  
Display | You can choose whether the charts display real values (processor in GHz) or percentages.  
Number of Resources | You can choose the number of virtual machines to be displayed, for example the bottom 5.  
Date Range | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
                            • Last 7 Days  
                            • Last 30 Days  
                            • Last 90 Days  
Threshold | You can choose the lower thresholds used to filter the percentage values. For example, you can see the bottom 5 virtual machines using less than 20% processor capacity. |
| Tables or views used | KVM_VIRTUAL_MACHINES_DV  
                       | KVMVMDSUTIL_DV  
                       | KVM_VM_MEMORY_DV  
                       | KVM_VM_NETWORK_DV |
### Table 32. VMware VI Bottom N VMs by Host Server report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>The report shows a bar chart that displays the virtual machines that consume the least resources, as well as the amount they consume. By clicking a virtual machine, you can see a historical trend of the virtual machine over time.</td>
</tr>
</tbody>
</table>

### Table 33. VMware VI Top N VMs by Resource Pool report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Top N VMs by Resource Pool</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the top N virtual machines by processor or memory utilization on one or more resource pools on a cluster.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the virtual machines that consume the most processor capacity or memory.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center
  - You can choose one data center from a list of data centers.

  Cluster
  - You can choose one cluster or All from a list of clusters that belong to the selected data center.

  Host Server
  - You can choose one host server from the selected cluster.

  Display
  - You can choose whether the charts display real values (processor in GHz) or percentages.

  Number of Resources
  - You can choose the number of virtual machines to be displayed, for example the top 10.

  Date Range
  - You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:
    - Last 7 Days
    - Last 30 Days
    - Last 90 Days

  Threshold
  - You can choose the upper threshold used to filter the percentage values. For example, you can see the top 10 virtual machines using more than 80% processor capacity. |
| Tables or views used | KVMCLTRRPS_DV
KVM_VIRTUAL_MACHINES_DV
KVM_VM_MEMORY_DV |
| Output           | The report shows a bar chart that displays the virtual machines that consume the most resources, as well as the amount they consume. By clicking a virtual machine, you can see a historical trend of the virtual machine over time. |

### Table 34. VMware VI Bottom N VMs by Resource Pool report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Bottom N VMs by Resource Pool</td>
</tr>
</tbody>
</table>
### Table 34. VMware VI Bottom N VMs by Resource Pool report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the bottom N virtual machines by processor capacity or memory utilization on one or more resource pools on a cluster.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Show the virtual machines that consume the least processor capacity or memory.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td><strong>Data Center</strong>&lt;br&gt;You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td></td>
<td><strong>Cluster</strong>&lt;br&gt;You can choose one cluster or All from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td></td>
<td><strong>Host Server</strong>&lt;br&gt;You can choose one host server from the selected cluster.</td>
</tr>
<tr>
<td></td>
<td><strong>Display</strong>&lt;br&gt;You can choose whether the charts display real values (processor in GHz) or percentages.</td>
</tr>
<tr>
<td></td>
<td><strong>Number of Resources</strong>&lt;br&gt;You can choose the number of virtual machines to be displayed, for example the bottom 5.</td>
</tr>
<tr>
<td></td>
<td><strong>Date Range</strong>&lt;br&gt;You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:&lt;br&gt;• Last 7 Days&lt;br&gt;• Last 30 Days&lt;br&gt;• Last 90 Days</td>
</tr>
<tr>
<td></td>
<td><strong>Threshold</strong>&lt;br&gt;You can choose the lower thresholds used to filter the percentage values. For example, you can see the bottom 5 virtual machines using less than 20% processor capacity.</td>
</tr>
<tr>
<td><strong>Tables or views used</strong></td>
<td>KVMCLTRRPS_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VIRTUAL_MACHINES_DV</td>
</tr>
<tr>
<td></td>
<td>KVM_VM_MEMORY_DV</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>The report shows a bar chart that displays the virtual machines that consume the least resources, as well as the amount they consume. By clicking a virtual machine, you can see a historical trend of the virtual machine over time.</td>
</tr>
</tbody>
</table>

**Use case:** What clusters or host servers in the environment are balanced or unbalanced compared with the rest of the clusters or host servers in the environment?

### Table 35. VMware VI Balanced and Unbalanced Clusters report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Balanced and Unbalanced Clusters</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the balanced and unbalanced clusters in the environment.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Identify the balanced and unbalanced clusters in the environment.</td>
</tr>
</tbody>
</table>
### Table 35. VMware VI Balanced and Unbalanced Clusters report (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>Date Range</td>
<td>You can choose a date range for which the report is to be generated.</td>
</tr>
<tr>
<td><strong>Tables or views used</strong></td>
<td></td>
</tr>
<tr>
<td>KVM_CLUSTERS_DV</td>
<td></td>
</tr>
<tr>
<td>KVM_SERVER_DV</td>
<td></td>
</tr>
</tbody>
</table>

**Output**
The report shows three bar charts that display usage of processor capacity, memory, and data store for the specified clusters in the specified time period. The clusters that are close to the average and are far from the average (either below or above the average) are shown.

Three reference lines show how balanced the cluster is:
- The first reference line is the mean, which is the average of all the clusters in the environment.
- The second reference line is the statistical maximum, which is determined by the following expression: `75th percentile value + 1.5 * (75th percentile value - 25th percentile value)`. The statistical maximum uses percentiles to determine values and does not appear in the chart if the values are off the axis.
- The third reference line is the statistical minimum, which is determined by the following expression: `25th percentile value - 1.5 * (75th percentile value - 25th percentile value)`. The statistical minimum uses percentiles to determine values and does not appear in the chart if the values are off the axis.

### Table 36. VMware VI Balanced and Unbalanced Host Servers report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>VMware VI Balanced and Unbalanced Host Servers</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the balanced and unbalanced host servers in the environment.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Identify the balanced and unbalanced host servers in the environment.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Data Center</td>
<td>You can choose one data center from a list of data centers.</td>
</tr>
<tr>
<td>Cluster</td>
<td>You can choose one or more clusters from a list of clusters that belong to the selected data center.</td>
</tr>
<tr>
<td>Host Server</td>
<td>You can choose one or more host servers from the selected cluster.</td>
</tr>
<tr>
<td>Date Range</td>
<td>You can choose a date range for which the report is to be generated.</td>
</tr>
<tr>
<td><strong>Tables or views used</strong></td>
<td></td>
</tr>
<tr>
<td>KVM_SERVER_DV</td>
<td></td>
</tr>
<tr>
<td>KVM_SERVER_DISK_DV</td>
<td></td>
</tr>
<tr>
<td>KVM_SERVER_NETWORK_DV</td>
<td></td>
</tr>
</tbody>
</table>
Table 36. VMware VI Balanced and Unbalanced Host Servers report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Output           | The report shows three bar charts that display usage of processor capacity, memory, and data store for the specified host servers in the specified time period. The host servers that are close to the average and are far from the average (either below or above the average) are shown. The following three reference lines show how balanced the cluster is:  
  • The first reference line is the mean, which is the average of all the clusters in the environment.  
  • The second reference line is the statistical maximum, which is determined by the following expression: 75th \text{percentile value} + 1.5 \times (75th \text{percentile value} - 25th \text{percentile value}). The statistical maximum uses percentiles to determine values and does not appear in the chart if the values are off the axis.  
  • The third reference line is the statistical minimum, which is determined by the following expression: 25th \text{percentile value} - 1.5 \times (75th \text{percentile value} - 25th \text{percentile value}). The statistical minimum uses percentiles to determine values and does not appear in the chart if the values are off the axis. |

Use case: Which are the top or bottom N virtual switches used by a list of host servers, based on network I/O?

Table 37. VMware VI Top or Bottom Virtual Switches by Network I/O

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Top or Bottom Virtual Switches by Network I/O</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the top or bottom N virtual switches by network I/O. The report can be used to drill down to see the top or bottom physical network interface cards connected to a virtual switch.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the top or bottom N virtual switches by network I/O.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center: You can choose one data center from a list of data centers.  
  Top or Bottom: You can choose whether you want to see the most utilized or least utilized virtual switches.  
  Display: You can choose whether the charts display real values (network I/O in Mbps) or percentages.  
  Number of Resources: You can choose the number of switches to be displayed, for example the top 10.  
  Date Range: You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
  • Last 7 Days  
  • Last 30 Days  
  • Last 90 Days |
### Table 37. VMware VI Top or Bottom Virtual Switches by Network I/O (continued)

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Tables or views used | KVM_SERVER_DV  
  KVM_SERVER_NETWORK_DV  
  KVM_SERVER_VIRTUAL_SWITCHES_DV |
| Output | The report shows a bar chart that displays the switches that consume the most, or least, network I/O, as well as the amount they consume. The results are also shown in table form. |

### Use case: Which are the top or bottom N physical network interface cards used by a list of host servers, based on network I/O?

**Table 38. VMware VI Top or Bottom Physical NICs**

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Top or Bottom Physical NICs</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the top or bottom physical network interface cards in one or more host servers. The output of this report provides a view into the network I/O. The report can be used to drill down to see the network usage by virtual machines hosted on a server.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the top or bottom N physical network interface cards.</td>
</tr>
</tbody>
</table>
| Parameters | **Data Center**  
  You can choose one data center from a list of data centers.  
**Top or Bottom**  
You can choose whether you want to see the most utilized or least utilized network interface cards.  
**Display**  
You can choose whether the charts display real values (network I/O in Mbps) or percentages.  
**Number of Resources**  
You can choose the number of physical network interface cards to be displayed, for example the top 10.  
**Date Range**  
You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:  
  - Last 7 Days  
  - Last 30 Days  
  - Last 90 Days |
| Tables or views used | KVM_SERVER_DV  
  KVM_SERVER_NETWORK_DV |
| Output | The report shows a bar chart that displays the switches that consume the most, or least, network I/O, as well as the amount they consume. The results are also shown in table form. |
Use case: Which are the top or bottom N physical network interface cards used by a list of virtual machines, based on network I/O?

Table 39. VMware VI Network Usage by VMs

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Network Usage by VMs</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the top or bottom N physical network interface cards for selected virtual machines. The output of this report provides a view into the network I/O.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show which virtual machines have physical network interface cards that consume the most, or least, network I/O.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center
|                  | You can choose one data center from a list of data centers. |
|                  | Top or Bottom
|                  | You can choose whether you want to see the most utilized or least utilized virtual machines. |
|                  | Display
|                  | You can choose whether the charts display real values (network I/O in Mbps) or percentages. |
|                  | Number of Resources
|                  | You can choose the number of physical network interface cards to be displayed, for example the top 10. |
|                  | Date Range
|                  | You can choose a date range for which the trend is to be generated. The options for date range selection are as follows:
|                  | • Last 7 Days
|                  | • Last 30 Days
|                  | • Last 90 Days |
| Tables or views used | KVM_VIRTUAL_MACHINES_DV |
|                    | KVM_VM_NETWORK_DV |
| Output            | The report shows a bar chart that displays the virtual machines corresponding to the physical network interface cards that consume the most, or least, network I/O, as well as the amount they consume. The results are also shown in table form. |

Use case: What is the memory allocation on all the host servers? On which servers does the allocation exceed the physical memory present?

Table 40. VMware VI Host Server Memory Allocation report

<table>
<thead>
<tr>
<th>Report Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>VMware VI Host Server Memory Allocation</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows the average memory allocated to virtual machines on the host servers in comparison with the actual physical memory on the host.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show the memory allocation on all the host servers and highlight the servers where the allocation exceeds the physical memory present.</td>
</tr>
</tbody>
</table>
### Using the Cognos data model

The historical data collected by the VMware VI agent and the NetApp Storage agent can be used in Tivoli Common Reporting for building ad hoc reports and queries. A Cognos data model that is ready to use is provided to enable this function.

The VMware VI agent data model is part of the IBM Tivoli Monitoring for Virtual Environments Reports V7.1 package. The data model is located under IBM Tivoli Monitoring for Virtual Environments V7.1 in the Data Navigation tree of the Query and Report Studio. The data model is a layer built on top of the Tivoli Data Warehouse to make the data more usable. The data model contains predefined relationships so that when you drag elements across different tables and views, they are joined so you do not have to manually write SQL code.

After importing the package in Tivoli Common Reporting, click Launch > Query Studio from the TCR menu and select IBM Tivoli Monitoring for Virtual Environments Reports v7.1.0. The Query Studio is a web-based ad hoc query tool that you can use to build quick tables and charts by dragging.

The structure of the VMware VI and NetApp Storage agent data models is shown in [Figure 15 on page 117](#).
Cognos data models are virtual star schema models separated into facts and dimensions. Facts are measurable quantities that can be aggregated, such as CPU utilization and number of processors. Dimensions are the main identifiers by which facts can be grouped, aggregated, and organized. For example, time and server are dimensions by which the fact CPU utilization can be grouped.

The data model contains two types of dimensions:
- **TRAM Shared Dimensions** (TRAM stands for Tivoli Reporting and Analytics Model), which are shared across Tivoli by products such as Time
- **ITM for Virtual Environments Shared Dimensions**, which are dimensions shared across the IBM Tivoli Monitoring for Virtual Environments agents such as Datacenter, Clusters, Environments, VMs, Data Stores, and so on

The facts in the data model are organized under folders by their summarization type, such as **Daily** and **Hourly**.

When you expand Daily and Hourly, you can see the attribute groups (see Figure 16 on page 118).
Each attribute group corresponds to a table or view in the data warehouse. Each attribute group contains a group of facts or measures, such as MIN_CPU_Utilization and AVG_CPU_Utilization, and some identifiers, such as CPU_Number, and shift and vacation periods.

The data model has relationships defined between the different tables and with the NetApp Storage agent data model, so that you can correlate VMware data stores to NetApp volumes.

By using the various controls in Query Studio, you can build a report in minutes.

The following procedure shows an example for building a report:

1. Drag one of the IBM Tivoli Monitoring for Virtual Environments Shared Dimensions, such as the Datacenter/Clusters/Environments/VMs.VM_Name dimension. When looking at data at the cluster and server level, drag the dimension from the Datacenter/Clusters/Environments dimension. When looking at the virtual machine level, use the Datacenter/Clusters/Environments/VMs dimension. Followed by the VM_Name dimension, drag the Datacenter/Clusters/Environments/VMs.Server_Hostname dimension. An example is shown in Figure 17 on page 119.
2. Filter the data by server in order to narrow down your results. Click the **Server_Hostname** column and click the **Filter** icon in the toolbar at the top of the screen. This action displays a list of host servers. Select the server you want to view and click **OK**. Alternatively, you can search for servers by clicking **Search for values**. Select the **Prompt every time the report runs** check box to make this a report parameter. This specification reduces the number of entries automatically included on the report.

These actions are illustrated in [Figure 18 on page 120](#).
3. Drag any metric from a related attribute group, for example, if you want to look at server-related metrics, drag any metric in the attribute groups with names that start with Server. For virtual machine-related metrics, drag data from the attribute groups with names that start with VM. For this example, drag the Virtual Machines Daily.AVG_Used_CPU_MHz metric.

4. Filter the metric to eliminate values of -1, which indicate that no data was collected. Click on the AVG_Used_CPU_MHz column, click the Filter icon and enter the values as shown in Figure 19 on page 121.
5. Drag a time element from the TRAM Shared Dimensions.Time Dimension. For daily data you can use Date, and for hourly you can use Standard Timestamp. You can use any of the other time metrics to organize the data. The data now appear as in Figure 20 on page 122.
6. Create a cross tab by pivoting on the date. Click the Date column and select Pivot (Create a Cross tab) from the menu. This action creates a cross tab as shown in Figure 21 on page 123 with dates along the x-axis and the virtual machine names along the y-axis.
7. Create a chart. Click the chart icon and select Area and the Stacked option from the Chart wizard, as in Figure 22. Click OK.

Figure 21. Cross tab

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>vwds1</td>
<td>162.73</td>
<td>169.17</td>
<td>166.52</td>
<td>161.02</td>
<td>161.35</td>
<td>154.7</td>
<td>150.34</td>
<td></td>
</tr>
<tr>
<td>vwds1</td>
<td>162.73</td>
<td>169.17</td>
<td>166.52</td>
<td>161.02</td>
<td>161.35</td>
<td>154.7</td>
<td>150.34</td>
<td></td>
</tr>
<tr>
<td>vwds2</td>
<td>124.48</td>
<td>109.84</td>
<td>158.74</td>
<td>117.35</td>
<td>114.70</td>
<td>110.03</td>
<td>109.87</td>
<td>110.03</td>
</tr>
<tr>
<td>vwds2</td>
<td>124.48</td>
<td>109.84</td>
<td>158.74</td>
<td>117.35</td>
<td>114.70</td>
<td>110.03</td>
<td>109.87</td>
<td>110.03</td>
</tr>
<tr>
<td>vwds3</td>
<td>122.98</td>
<td>111.82</td>
<td>226.14</td>
<td>120.42</td>
<td>112.77</td>
<td>107.22</td>
<td>110.56</td>
<td>110.56</td>
</tr>
<tr>
<td>vwds3</td>
<td>122.98</td>
<td>111.82</td>
<td>226.14</td>
<td>120.42</td>
<td>112.77</td>
<td>107.22</td>
<td>110.56</td>
<td>110.56</td>
</tr>
<tr>
<td>vwdatdm</td>
<td>123.69</td>
<td>123.19</td>
<td>122.2</td>
<td>121.25</td>
<td>121.06</td>
<td>121.40</td>
<td>123.85</td>
<td></td>
</tr>
<tr>
<td>vwdatdm</td>
<td>123.69</td>
<td>123.19</td>
<td>122.2</td>
<td>121.25</td>
<td>121.06</td>
<td>121.40</td>
<td>123.85</td>
<td></td>
</tr>
<tr>
<td>win2000vm1</td>
<td>2,654.67</td>
<td>2,653.92</td>
<td>2,653.35</td>
<td>2,654.66</td>
<td>2,654.66</td>
<td>2,654.66</td>
<td>2,655.00</td>
<td></td>
</tr>
<tr>
<td>win2000vm1</td>
<td>2,654.67</td>
<td>2,653.92</td>
<td>2,653.35</td>
<td>2,654.66</td>
<td>2,654.66</td>
<td>2,654.66</td>
<td>2,655.00</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td>641.70</td>
<td>669.87</td>
<td>703.90</td>
<td>635.08</td>
<td>635.07</td>
<td>630.37</td>
<td>666.49</td>
<td>671.56</td>
</tr>
</tbody>
</table>

Figure 22. Chart wizard
This selection produces a stacked area chart for all the virtual machines on the filtered host server. As shown in Figure 23, five virtual machines exist on this host and their average processor capacity used in MHz is stacked and plotted against time.

8. Save the report. Click the Save icon on the toolbar at the top of the screen. Enter a name for this report, such as “VM CPU Stacked Area Chart” and click OK. When you go back by clicking the Back button at the top of the screen, you see that the report has been saved under the main ITM for Virtual Environments Reports v6.2.3 folder.

9. You can further enhance this report. In order to filter by date and time, use the Report Studio. In the TCR navigation, click More, next to the report actions, as in Figure 24.

10. From the next screen, select Open with Report Studio. The Report Studio is a more advanced report editing tool where you can manipulate various parts of the reports. When the Report Studio opens, click the title in the report header to edit the report.

11. Add the time range filtering. Hover over Page Explorer in the center of the page to browse to the prompt page, as in Figure 25 on page 125. Parameters
that filter the report are called **Prompts** in Cognos. The prompt page is visible every time you run the report.

12. When the prompt page is open, notice that the **Server Hostname** prompt already exists because you filtered the data by the server host name.

13. Click the **Toolbox** tab in the navigation. Drag **TCR Date Range prompt** from the toolbox onto the prompt page, as in **Figure 26**.

14. A hint appears. Copy the text `#prompt('TCRDateFilter','token','1=1', '[YOUR-COLUMN-NAME]')#`.

14. Browse to the query to add this filter. Hover over the center of the page and select **Query** under Query Explorer, as in **Figure 27 on page 126**.
You see next the query that was created when you dragged data from the data model into the report. As you can see on the right of the screen, a filter on the Server_Hostname already exists.

15. Filter by time. Browse to the Toolbox tab and drag Filter onto the Detail Filters section. This action opens an Expression editor. In this box, paste the value you copied from the prompt page, that is, 
#prompt('TCRDateFilter','token','1=1', '[YOUR-COLUMN-NAME]')#, and replace YOUR-COLUMN-NAME with [TRAM Shared Dimensions (Query)].[Time].[Standard Timestamp] dragged from the Time dimension under Available Components, as shown in Figure 28 on page 127. Click OK to save.
16. Save the report and run it by clicking Play on the toolbar at the top of the page, as shown in Figure 29.

17. When you run the report, you see two prompts, one for host server name and the other for time range. Select a host, select Last 7 Days from the date filter, as in Figure 30 on page 128 and click Finish.
The report runs and displays values only for the last seven days and the server selected, as in Figure 31 on page 129.
After you have the desired output, you can save the report and use it like any other report. You can run the report later and view it in different formats such as PDF and Excel, schedule it, email it, and so on.
Chapter 6. Capacity Planner

Capacity Planner works on the configuration and historical usage data collected by IBM Tivoli Monitoring to provide recommendations for optimizing the virtual environment.

Introduction: PlanningCenter wizard

The PlanningCenter provides a simple five-step wizard to generate an optimized plan for the Virtual Environment.

Important: Capacity Planner does not support multiple concurrent users.
1. **In Step 1: Snapshot config data**, click **Load Config** to load the latest configuration data.

2. **In Step 2: Set analysis time period**, click **Set Time** to set the time period for which the historical data in the warehouse can be analyzed.

3. **In Step 3: Scope the infrastructure for analysis**, click **Define Scope** to open a window where you can choose physical servers to analyze. The default scope includes all physical servers loaded in **Step 1: Snapshot config data**. You can edit the current configuration in the Edit Current Environment window, which is shown in [Figure 33 on page 134](#).
4. In Step 4: Analyze virtual machine characteristics, click Size VMs to calculate the virtual machine sizing estimates based on defaults. You can customize and edit the sizing estimates in the Edit Current Environment window, which is shown in Figure 33 on page 134. The Current Environment report opens a new window that displays bar charts showing Capacity, Resource Usage, and Spare.

5. In Step 5: Generate optimization plan, click Generate Plan to generate a recommended environment. You should view this report after you complete the sizing step, to see the computed usage and estimated spare. You can edit optimization strategies in the Edit Recommended Environment Settings window.

Scenario: Consolidate and plan for growth

A capacity planner performs “what-if” planning to accommodate capacity growth while optimizing the environment. Consider a cloud environment that has multiple customer virtual machines distributed on two clusters: Production and Development. The capacity analyst can periodically analyze the cloud usage data to do capacity planning regularly. The two clusters currently have three hosts and 37 virtual machines.

About this task

An administrator or an analyst can use this scenario:

- An IT administrator wants to balance workloads to avoid a capacity bottleneck.
- A capacity analyst wants to plan for an IT infrastructure that anticipates business growth.

Procedure

1. Launch the PlanningCenter, which is shown in Figure 32 on page 132.
2. Select the overall data set you want to analyze:
   a. Click Load Config to load the latest configuration data for the what-if analysis.
   b. Click Set Time to set the time period to analyze measurement data in Tivoli Data Warehouse.
3. Click Define Scope to open the Edit Current Environment window, as shown in Figure 33 on page 134.
4. Select the check boxes for the servers you want to analyze. The default scope includes all physical servers loaded when you clicked Load Config.
   - You can add servers; see “Scenario: Adding more servers” on page 139 for more details.
   - You can add attribute columns by clicking Actions > Add Custom Tag. Enter a name for the new column in the Column Header field, which is shown in Figure 34. Attribute columns are added in order to augment the discovered data with additional attributes. You can leverage these attributes for writing policies as discussed in “Detailed reference: Edit Recommended Environment settings” on page 154.

   ![Figure 33. Current Environment Physical Servers view](image)

   ![Figure 34. Add Custom Tag window](image)

   - You can double-click any cell in the table to edit configuration data. However, for bulk editing or global search and replace, use the Export Data and Import Data options on the Actions menu. These options can be used to complete the following functions:
     - Export or import configuration data for bulk editing
     - Global search and replace or add new attributes
Click Actions > Export Data to export data in csv format. After you edit the data, click Actions > Import Data to import the csv file.

The required format for csv files is given in Appendix A, “CSV format for data import and export,” on page 193.

- You can generate context-sensitive reports from the Reports menu, as shown in Figure 35.

**Important:** In Capacity Planner, reports are in the context of the current view and might not give the correct result if run separately.

Each report opens in a new window.

See Physical Server Inventory view reports for more details about the Capacity Planner Physical Server Inventory report.

5. Click **Size VMs** to compute the default sizes of the virtual machines, based on historical usage. The sizes can be viewed in the view shown in Figure 36 on page 136. A custom sizing profile can be applied in the same view, as shown in the next step. Other detailed sizing options are discussed in Compute Usage.
You can apply a growth profile by using the Actions menu, as shown in Figure 37.

Click Edit Usage on this menu to apply a growth profile, as shown in Figure 38 on page 137.
You can generate context-sensitive reports from the **Reports** menu. An example is shown in Figure 39.

**Important:** In Capacity Planner, reports are in the context of the current view and might not give the correct result if run separately.

Each report opens in a new window.

For details of these reports, see the Virtual Machine Utilization reports.


7. Click **Generate Plan** to generate a recommended environment, as shown in Figure 40 on page 138.
Results

The optimization plan opens in a new window. For this example, the optimization plan shows that, based on historical usage data and rules, virtual machines can be consolidated on two physical servers instead of three physical servers in the current environment. The optimization plan contains different types of output:

- A table that compares overall current resources with recommended resources, as shown in Figure 41.

<table>
<thead>
<tr>
<th>Physical Servers Virtual Machines</th>
<th>Current</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capacity</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total Reservation</td>
<td>2.38</td>
<td>3.33</td>
</tr>
<tr>
<td>Total Unused Capacity (excluding headroom)</td>
<td>49.83</td>
<td>7.01</td>
</tr>
<tr>
<td>Capacity Efficiency Index</td>
<td>87.75</td>
<td>68.54</td>
</tr>
</tbody>
</table>

Note: See “Detailed reference: Capacity efficiency and performance risk indices” on page 166 for an explanation of capacity efficiency index and performance risk index. By consolidating the number of servers, we can improve the capacity efficiency index.

- Detailed output for individual data centers, clusters, physical servers, and virtual machines, displayed in bar charts, as shown in Figure 42 on page 139.
Individual results in table form. Figure 43 shows the placement recommendation, that is, physical server to virtual machine mapping, along with the recommended reservation for CPU and memory. The reservation recommended can be implemented by the administrator in the case of virtual machines where no risk of performance degradation should be taken. The placement recommendation can be implemented independently of the reservation recommendation.

Any virtual machines that cannot be placed are listed at the end of the report. This situation usually occurs either when there is no CPU or memory usage data for those virtual machines, or there is no capacity left on the target servers.

**Scenario: Adding more servers**

A capacity planner adds more servers in what-if analysis to remove a capacity shortfall with existing servers.
**Procedure**

1. On the PlanningCenter page, which is shown in Figure 32 on page 132, click **Define Scope**, which opens the Edit Current Environment page, which is shown in Figure 33 on page 134.
2. Click **Actions > Add Server**, as shown in Figure 44, which opens the Create Server Instances window, as shown in Figure 45.

   ![Edit Current Environment](image)

   **Figure 44. Physical Servers Actions menu**

   which opens the Create Server Instances window, as shown in Figure 45.

![Create Server Instances](image)

   **Figure 45. Create Server Instances window**

   In this window, you can select a model from the list and enter the number of servers that you want to add.

   The new servers are displayed at the bottom of the list of servers on the Edit Current Environment page. Ensure that the checkboxes are selected that correspond to the new servers to be added in scope.

3. On the PlanningCenter page, which is shown in Figure 32 on page 132, click **Generate Plan** to regenerate the optimization plan with the increased scope.

**Results**

An example optimization plan is shown in Figure 46 on page 141.
Note that this optimization plan shows four servers in the recommended environment, which implies that an additional server is required to address a shortfall in capacity.

**Scenario: Adding new virtual machines**

A capacity planner wants to allocate new virtual machines in a cloud.

**About this task**

Consider a cloud environment that has multiple customer virtual machines distributed on two clusters: Production and Development. The capacity analyst can periodically analyze the cloud usage data to do capacity planning regularly. The two clusters currently have three hosts and 37 virtual machines.

Consider a scenario where three new virtual machines must be added to the cloud for a specific customer. The planner can assess where to allocate the resources: at a cluster level or optionally at a host level. The request can be actual or a predicted future request for what-if analysis.

**Procedure**

1. On the PlanningCenter page, which is shown in Figure 32 on page 132, click **Define Scope** to open the Edit Current Environment page, which is shown in Figure 33 on page 134.
2. Select the checkboxes corresponding to the Production and Development servers.
3. Click **Views > Virtual Machines** to open the virtual machines view. This view shows the virtual machines from the selected servers. A column specifying the customers that the virtual machines belong to can be added as described in adding a custom tag.
4. Click **Actions > Add Virtual Machine** to add a virtual machine for the customer. The new virtual machine appears in the scope.
5. On the PlanningCenter page, click **Edit Recommended Environment Settings**, which is shown in Figure 40 on page 138 to open a new window, which is shown in Figure 62 on page 155. In this window, you can detail customer-specific rules. For more information about rules, see “Detailed reference: Edit Recommended Environment settings” on page 154.
6. On the PlanningCenter page, click **Generate Plan**.
Results

A new optimization plan is generated, including the virtual machine that you added to the cloud. An example of the output is shown in Figure 47.

<table>
<thead>
<tr>
<th>Physical Servers</th>
<th>Current</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Machines</td>
<td>CPU (GHz)</td>
<td>Memory (GB)</td>
</tr>
<tr>
<td>Total Capacity</td>
<td>70.30</td>
<td>60.98</td>
</tr>
<tr>
<td>Total Reservation</td>
<td>4.25</td>
<td>26.02</td>
</tr>
<tr>
<td>Total Unused Capacity (excluding headroom)</td>
<td>59.04</td>
<td>37.09</td>
</tr>
<tr>
<td>Capacity Efficiency Index</td>
<td>63.73</td>
<td>35.73</td>
</tr>
</tbody>
</table>

Figure 47. Optimization plan including new virtual machine

Note: Information about the mapping of the added virtual machines to the recommended physical server is contained in the detailed section of the optimization plan.

Detailed reference: Edit Current Environment

The Edit Current Environment window presents a spreadsheet-like view within a browser window. In this view, you can view and edit the configuration and utilization profile, as well as define scope.

Data loaded in this view is a snapshot of the current environment loaded by using Load config, or by adding servers, as described in “Scenario: Adding more servers” on page 139. You can subsequently add to the data.

Physical server inventory view

The Physical Servers view presents the physical server configuration data in the current environment. To define the scope, you can select a subset of physical
servers to include in the analysis session. The candidate column in the view has Source and Target tags. These tags determine how the server is used in optimization generation.

- The Source tag ensures that during optimization, virtual machines from this physical server can only be moved to another physical server.
- The Target tag ensures that during optimization, this physical server can only receive virtual machines from another physical server.
- Source and Target tags together ensure that during optimization, virtual machines from the server can be moved for optimization and the server can also be used to place virtual machines.

The Status column indicates if any problems exist with matching performance benchmark data for the particular server. Additionally, you can click the Status column to see benchmark search results. A green check mark icon indicates that a single matching benchmark entry exists. A yellow triangle icon indicates that multiple benchmark matches to the server architecture exist, but an approximate benchmark value has been assigned to the server. An X in a red circle icon indicates that no benchmark match exists.

You can verify the search result by clicking the Status column. In the case of multiple matches or no match, you can use the information from the search results to modify the architecture column to narrow down the match to the correct benchmark.

For example, for a server with architecture Intel(R) Xeon(R) CPU X5460@3.16GHz, the default result is a multiple match:

![Benchmark Search Results window](image)

You can enter the correct string from the Benchmark Search Results window to the Architecture field in the physical server inventory view to narrow the match. In this example, if the architecture is updated to IBM BladeCenter HS21 (Intel Xeon X5460 3.15 GHz 3.16 GHz) from the search results, a single match is displayed:
If no match is found because no benchmark value exists for the corresponding architecture or model, you can update the knowledge base to include an appropriate benchmark value for the architecture. To update the knowledge base, see Appendix B, “Editing knowledge base,” on page 195.

If the environment is homogeneous, use the raw CPU capacity option for analysis. Enable this option by updating the normalization benchmark setting as described in “Normalization benchmark setting” on page 165.

The following actions are available on the Actions menu:

**Add Server**
You can add additional physical servers to this view. These servers can be used to provide for additional hardware, or to try what-if scenarios. When you choose this action, a window opens with a list of available models, as shown in Figure 45 on page 140. You can select the appropriate model and create multiple instances as needed.

When you click Create, a new row is added to the inventory grid with architecture details populated from the knowledge base data.

**Add Custom Tag**
You can extend and augment the discovered data with user-defined attributes (tags). When you select this action, you are prompted to provide the tag name and a new column is added to the inventory grid. You can then add values for this column.

These tags can be used to formulate and apply rules during optimization. See “Detailed reference: Edit Recommended Environment settings” on page 154 for more information.

**Export Data**
You can download the data in the Physical Servers inventory view to a CSV file, which can be edited offline to add missing information.

**Import Data**
You can import a CSV file that was downloaded using Export Data.

**Important:** Note the following while editing this file:

- The first column, Physical_Server_PK, should NOT be edited.
- Only previously NULL or blank data is updated. If data already exists in a specified column, it will not be updated if edited.

See Appendix A, “CSV format for data import and export,” on page 193 for more information about editing CSV files.
Reports

Capacity Planner Physical Server Inventory
The Capacity Planner Physical Server Inventory report presents an overall view of the physical environment in the current Capacity Planner session. The report contains a summary table of the inventory, and bar charts organized by hypervisor name and version, or data center and cluster, as shown in Figure 51.

**Physical Server Summary**

<table>
<thead>
<tr>
<th>Number of Physical servers</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Physical CPUs</td>
<td>60</td>
</tr>
<tr>
<td>CPU Speed (GHz)</td>
<td>165.45</td>
</tr>
<tr>
<td>Memory Installed (GB)</td>
<td>256.93</td>
</tr>
</tbody>
</table>

**Server Distribution: by Hypervisor type and version**

![Bar chart showing server distribution by hypervisor type and version](image)

*Figure 51. Capacity Planner Physical Server Inventory report*
Virtual machine inventory view

The Virtual Machines view presents the virtual machine configuration data from the selected set of physical servers. You can make corrections, add missing data or add new attributes (tags) that cannot be discovered in the current environment (such as middleware details, or tags such as criticality, SLA factors, and so on).

The following actions are available on the Actions menu:

Add Virtual Machine
You can add a virtual machine to provide for future workloads. A new row is added to the inventory grid where you can populate details of the new virtual machine. Virtual Machines can be added to any server in the working set, provided that spare capacity exists for CPU and memory reservations.

Add Custom Tag
You can extend and augment the discovered data with user-defined attributes (tags). When you select this action, you are prompted to provide the tag name and a new column is added to the inventory grid. You can then add values for this column.

These tags can be used to formulate and apply rules during optimization. See "Detailed reference: Edit Recommended Environment settings" on page 154 for more information.

Export Data
You can download the data in the Virtual Machines inventory view to a CSV file, which can be edited offline to add missing information.

Import Data
You can import a CSV file that was downloaded using Export Data.
Important: Note the following while editing this file:

- The first column, Physical_Server_PK, should NOT be edited.
- Only previously NULL or blank data is updated. If data already exists in a specified column, it will not be updated if edited.

Reports

Virtual Machine Inventory

The Virtual Machine Inventory report presents an overall view of the virtual environment in the current capacity planning session. The report contains a summary table of the inventory and overall organizational graphical representations organized by datacenter and cluster, operating system name and version, and middleware name and version. The report also contains bar charts organized by hypervisor name and version, or data center and cluster, as shown in Figure 53.

Virtual Machine Summary

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Virtual Machines</td>
<td>74</td>
</tr>
<tr>
<td>Number of Virtual CPUs</td>
<td>208</td>
</tr>
<tr>
<td>Current CPU Reservation (GHz)</td>
<td>11.85</td>
</tr>
<tr>
<td>Current Memory Reservation (GB)</td>
<td>15.00</td>
</tr>
</tbody>
</table>

VM Distribution: By Data Center And Cluster

![Bar chart showing VM distribution by data center and cluster]

Figure 53. Virtual Machine Inventory report
A capacity analyst can use this view to view and analyze the utilization profiles of the virtual machines on the servers currently in the working set. The virtual machine utilization data is federated from the Tivoli Data Warehouse tables. The capacity analyst can define the time interval for analysis of data on the PlanningCenter (Step 2: Set analysis time period).

The following actions are available on the Actions menu:

**Compute Usage**

You can compute the usage requirement of virtual machines by using different parameters, as shown in Figure 55 on page 149.
Compute Usage calculates the sizing of the virtual machine for the parameters: CPU, memory, network bandwidth and disk I/O usage. This sizing is done by analyzing the utilization data available in Tivoli Data Warehouse based on the summarization and aggregation levels specified. Aggregation levels available are Average, Minimum, Maximum, and 90th Percentile. Summarization levels available are Hourly, Daily, Weekly, and Monthly. The available values in the Selected Summarization field depend on which value was selected in the Summarization field.

Important: Usage numbers are generated only for virtual machines that have utilization data collected in the Tivoli Data Warehouse.

Generate Workload Stability Type
The Generate Stability Characteristic Parameters window is shown in
Generate Workload Stability Type analyzes the hourly utilization data for a virtual machine and determines whether the resource utilization is stable or unstable, depending on the variation in usage.

**Edit Usage**

The Edit Usage window is shown in Figure 57.

You can manually edit or Adjust-for-growth the resource usage. You can apply different growth profiles to adjust as needed. The usage parameters can be specified in absolute units, for example, 1024 MHz CPU, or a growth percentage can be applied, for example, add 10% growth to memory.

**Reports**
The following reports are available:

**Utilization Aggregated Timeseries report**

This report can be used to identify utilization patterns of virtual machines. Because you can view aggregations of multiple virtual machines at a time, you can also identify correlations in the resource utilizations. You can use these observations to determine the usage sizing summarization level. An example graph is shown in Figure 58.

![CPU Utilization graph](image)

**Utilization Detailed Timeseries report**

This report helps you identify any data gaps in the utilization data collected for the virtual machines. Data points come directly from aggregated measurement tables in utilization schema. An example graph is shown in Figure 59 on page 152.
The Capacity Planner Current Environment report shows the recommended usage and sizing for each virtual machine based on time series utilization data and sizing methodology: summarization, granularity type, and selections. The report shows the capacity gaps, if any, in the current environment before any optimization. Example output is shown in Figure 60 on page 153 and Figure 61 on page 154.
Figure 60. Current Environment report
Capacity Planner provides a framework to capture various business and technical rules and apply them during optimization. The policies ensure that when an optimization is done for an environment, the generated recommendation complies with the stated business requirements and follows technical best practices.

**Rule framework overview**

A window where you can edit rules is shown in Figure 62 on page 155.
This window displays all rule instances from the database. Select the checkbox beside a rule instance to enable that rule. Clear the checkbox beside a rule instance to disable that rule.

Capacity Planner provides the following rule templates that can be used to encode rule instances catering to business as well as technical requirements:

**Colocation and anti-colocation**

This rule template is the most commonly used. You choose two sets of virtual machines and specify whether these two sets should share the same host or should never share the same host. In the anti-colocation case, no two virtual machines from different sets share the same host. In the colocation case, you want to put all of the set on the same host. If the virtual machines do not all fit on the same host, place the excess virtual machines on the next available host.

A variant of the colocation template specifies a set of virtual machines to be pinned to a set of hosts. In this case, instead of both sets being virtual machines, a set of virtual machines is placed on a specific set of container hosts.

The following examples of colocation and anti-colocation rule instances illustrate the nature of the templates:

**Colocate Windows 2003 VMs**

This rule consolidates Windows virtual machines on a group of hosts and reduces the number of physical processors that the Windows system is deployed on, thus reducing the license cost.
Anti-colocate customer 1 and customer 2 VMs
This rule imposes a business rule restriction to share hosts among competitor virtual machines in a shared cloud.

Use x3950 high memory configuration hosts in Net1 network for all VMs running databases
This rule ensures a technical best practice for database consolidation.

In all these examples, it is assumed that the configuration or usage attributes that are used to create these sets of virtual machines and hosts are known. You discover or create these attributes in the Edit Current Environment page.

Boundary
In this template, you can pick a set of virtual machines and specify them to be placed on an isolated set of containers, which is not shared by any other virtual machine that does not belong to that set. The container is a host or set of hosts. This rule creates an isolation zone for the specified set of virtual machines. A boundary rule can also be created by several anti-colocation policies.

The following example shows a boundary rule:

Create a boundary for all WebSphere TEST VMs
This rule prevents these virtual machines from sharing a host with any other type of virtual machine.

Utilization
This template specifies a growth factor for the processor resource demand of the virtual machines in excess of the current values of processor use that are displayed in the Virtual Machine Utilization view of the Edit Current Environment page.

The following example shows a utilization rule:

Use 20% CPU growth for all Critical VMs
This rule specifies a 20% increase in processor demand for all virtual machines that have a Critical tag. This rule ensures that enough safety margin is kept to maintain the performance of the applications running in these virtual machines.

Rule syntax
Colocation and anti-colocation
```xml
<?xml version="1.0" encoding="UTF-8"?>
<rule>
  <group1 operator="GROUPING_OPERATOR">
    <literal>
      <path>DATABASE_PATH</path>
      <operator>"PATH_OPERATOR"</operator>
      <term>PATH_VALUE</term>
    </literal>
    .
    .
  </group1>
  <constraint>CONSTRAINT_TYPE</constraint>
</rule>
```
where

GROUPING_OPERATOR
  AND or OR

PATH_OPERATOR
  EQ or NEQ

DATABASE_PATH
  See "Supported database paths for writing rules" on page 160

PATH_VALUE
  All possible values defined for DATABASE_PATH

CONSTRAINT_TYPE
  Inclusion or Exclusion

COLOCATION_TYPE
  S2S specifies a constraint for two groups of virtual machines
  S2T specifies a constraint for a group of virtual machines and a
group of physical servers

Example colocation rule: Colocate all Windows 2003 workloads

```xml
<?xml version="1.0" encoding="UTF-8"?>
<rule>
<group1 operator="AND">
  <literal>
    <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*
      CFg_VIRTUAL_MACHINE.OPERATING_SYSTEM_NAME</path>
    <operator>EQ</operator>
    <term>Windows 2003</term>
  </literal>
</group1>
<constraint>Inclusion</constraint>
<group2 operator="AND">
  <literal>
    <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*
      CFg_VIRTUAL_MACHINE.OPERATING_SYSTEM_NAME</path>
    <operator>EQ</operator>
    <term>Windows 2003</term>
  </literal>
</group2>
<type>S2S</type>
</rule>
```
Boundary

where

GROUPING_OPERATOR
  AND or OR

PATH_OPERATOR
  EQ or NEQ

DATABASE_PATH
  See "Supported database paths for writing rules" on page 160

PATH_VALUE
  All possible values defined for DATABASE_PATH

BOUNDARY_NAME
  Unique name for boundary

  Note: If multiple boundary rules are specified with same name
  then they are all treated as one boundary.

Example boundary rule: Do not mix workloads that include a production environment with other workloads

<?xml version="1.0" encoding="UTF-8"?>
<rule>
  <if>
    <antecedent operator="AND">
      <literal>
        <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*</path>
        <operator>EQ</operator>
        <term>ENVIRONMENT</term>
      </literal>
    </antecedent>
    <then>
      <dependent>
        <literal>
          <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*</path>
          <operator>EQ</operator>
          <term>ENVIRONMENT</term>
        </literal>
      </dependent>
    </then>
  </if>
</rule>
where

GROUPING_OPERATOR
  AND or OR

PATH_OPERATOR
  EQ or NEQ

DATABASE_PATH
  See [Supported database paths for writing rules](#) on page 160

PATH_VALUE
  All possible values defined for DATABASE_PATH

NUMBER
  Valid number in percentages (positive or negative)

Example utilization rule: apply 20% buffer on DB2 workloads
Supported database paths for writing rules

Commonly used discovered attributes and their corresponding database paths:

Table 41. Physical servers attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Database path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host name</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.HOST_NAME</td>
</tr>
<tr>
<td>Cluster name</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.SERVER_POOL_NAME</td>
</tr>
<tr>
<td>Data center name</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.DATA_CENTER_NAME</td>
</tr>
<tr>
<td>Model</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.MODEL</td>
</tr>
<tr>
<td>Architecture</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.Architecture</td>
</tr>
<tr>
<td>Hypervisor type</td>
<td>Physical_Server.ANL_WORKING_SET_V*CFG_PHYSICAL_SERVER.HYPERVISOR_TYPE</td>
</tr>
</tbody>
</table>

Table 42. Virtual machine attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Database path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual machine ID</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.VMID</td>
</tr>
<tr>
<td>Virtual machine name</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.VM_NAME</td>
</tr>
<tr>
<td>Operating system name</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.OPERATING_SYSTEM_NAME</td>
</tr>
<tr>
<td>Operating system version</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.OPERATING_SYSTEM_VERSION</td>
</tr>
<tr>
<td>Application name</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.MIDDLEWARE_NAME</td>
</tr>
<tr>
<td>Application version</td>
<td>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*CFG_VIRTUAL_MACHINE.MIDDLEWARE_VERSION</td>
</tr>
</tbody>
</table>
Table 42. Virtual machine attributes (continued)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Database path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical server host name</td>
<td><code>Virtual_Machine.ANL_VM_PLACEMENT_SET_V* CFG_VIRTUAL_MACHINE.PHYSICAL_SERVER_PK.HOST_NAME</code></td>
</tr>
<tr>
<td>Cluster name</td>
<td><code>Virtual_Machine.ANL_VM_PLACEMENT_SET_V* CFG_VIRTUAL_MACHINE.PHYSICAL_SERVER_PK.SERVER_POOL_NAME</code></td>
</tr>
<tr>
<td>Data center name</td>
<td><code>Virtual_Machine.ANL_VM_PLACEMENT_SET_V* CFG_VIRTUAL_MACHINE.PHYSICAL_SERVER_PK.DATA_CENTER_NAME</code></td>
</tr>
<tr>
<td>Physical servers model</td>
<td><code>Virtual_Machine.ANL_VM_PLACEMENT_SET_V* CFG_VIRTUAL_MACHINE.PHYSICAL_SERVER_PK.MODEL</code></td>
</tr>
<tr>
<td>Physical servers architecture</td>
<td><code>Virtual_Machine.ANL_VM_PLACEMENT_SET_V* CFG_VIRTUAL_MACHINE.PHYSICAL_SERVER_PK.HYPERVISOR_TYPE</code></td>
</tr>
<tr>
<td>CPU variance</td>
<td><code>Virtual_Machine.ANL_PLACEMENT_SET_V* ANL_RESOURCE_DEMAND.CPU_VAR</code></td>
</tr>
<tr>
<td>Memory variance</td>
<td><code>Virtual_Machine.ANL_PLACEMENT_SET_V* ANL_RESOURCE_DEMAND.MEM_VAR</code></td>
</tr>
<tr>
<td>Network variance</td>
<td><code>Virtual_Machine.ANL_PLACEMENT_SET_V* ANL_RESOURCE_DEMAND.NETWORK_VAR</code></td>
</tr>
<tr>
<td>Disk variance</td>
<td><code>Virtual_Machine.ANL_PLACEMENT_SET_V* ANL_RESOURCE_DEMAND.DISK_VAR</code></td>
</tr>
</tbody>
</table>

Note:
- Database paths are used to specify specific attributes from the database. A database path consists of table and view names, column names, and operators such as asterisks (*) and dots (.). An asterisk is used where tables and views have a one-to-many relationship. A dot is used where tables and views have a one-to-one relationship.
- Ensure that database paths do not include spaces or new line characters.

Writing rules for custom attributes

Use the following code in rules for custom attributes for virtual machines:

```xml
<literal>
  <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*
    ANL_VIRTUAL_MACHINE_TAG_MAP.SERVER_TAGS_PK.TAG_TYPE</path>
  <operator>EQ</operator>
  <term>TAG_TYPE</term>
</literal>

<literal>
  <path>Virtual_Machine.ANL_VM_PLACEMENT_SET_V*
    ANL_VIRTUAL_MACHINE_TAG_MAP.SERVER_TAGS_PK.TAG_NAME</path>
  <operator>EQ</operator>
  <term>TAG_VALUE</term>
</literal>
```

Use the following code in rules for custom attributes for physical servers:

```xml
<literal>
  <path>Physical_Server.ANL_WORKING_SET_V*ANL_SERVER_TAG_MAP.SERVER_TAGS_PK.TAG_TYPE
    ANL_SERVER_TAG_MAP.SERVER_TAGS_PK.TAG_TYPE</path>
  <operator>EQ</operator>
  <term>TAG_TYPE</term>
</literal>

<literal>
  <path>Physical_Server.ANL_WORKING_SET_V*ANL_SERVER_TAG_MAP.SERVER_TAGS_PK.TAG_NAME
    ANL_SERVER_TAG_MAP.SERVER_TAGS_PK.TAG_NAME</path>
  <operator>EQ</operator>
  <term>TAG_VALUE</term>
</literal>
```
In each case, replace **TAG_TYPE** and **TAG_VALUE** with appropriate values, for example, to write a rule for virtual machines with production environment, then set **TAG_TYPE** to Environment and **TAG_VALUE** to Production. These values should exactly match the database values. Use **AND** as the grouping operator.

**Importing rules in Capacity Planner**

The XML snippets used to author policies must be kept in a single file in CSV format and loaded into the Planner Knowledge Base by clicking **Load Knowledge Base**. Any existing policies in the Knowledge Base are deleted when a new set is loaded.

**Table 43. CSV format details**

<table>
<thead>
<tr>
<th>Column name</th>
<th>Maximum column length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>RuleDimKey</td>
<td>8</td>
<td>Primary key of this rule</td>
</tr>
<tr>
<td>RuleName</td>
<td>50</td>
<td>Readable identifier of this rule</td>
</tr>
<tr>
<td>Priority</td>
<td>4</td>
<td>Rule Priority. 1 is the highest priority. All rules that cannot be broken should have priority 1.</td>
</tr>
<tr>
<td>Source</td>
<td>50</td>
<td>Metadata, for example, General, Customer, and BestPractice</td>
</tr>
<tr>
<td>IsActive</td>
<td>1</td>
<td>1 for yes, 0 for no</td>
</tr>
<tr>
<td>RuleType</td>
<td>50</td>
<td>Type of rule, such as App Selection, OS selection, and so on</td>
</tr>
<tr>
<td>Notes</td>
<td>255</td>
<td>Additional information</td>
</tr>
<tr>
<td>RuleXML</td>
<td>Binary large object</td>
<td>XML format of rule</td>
</tr>
</tbody>
</table>

A sample CSV file can be found in the installer, in the `installer_zip_file_path/ITMFVSDash\COI\PackageSteps\AnalyticsDatabaseInstaller\FILES\AnalyticsDatabaseInstaller-noarch-7.1.0.0.zip/samples` directory.

Complete the following steps in order to import rules in Capacity Planner:

1. **Open the Edit Current Environment window**, as shown in Figure 33 on page 134.
2. **Click the Load Knowledge Data** icon, which is in the upper-right corner of the window. The Refresh Knowledge Base Content window opens, as shown in Figure 63 on page 163.
3. Select the Rules checkbox. In the corresponding field, enter the path of the CSV file that contains the rules.
4. Click Upload.

**Optimization goal**

Currently, Capacity Planner supports Minimize Systems as an optimization goal. This goal consists of packing virtual machines together to minimize the number of physical servers used in the recommended environment.

**Example: Optimization without rules**

P1, P2, P3, and P4 are physical servers. V1 to V9 are virtual machines. Each physical server is marked as source, target, or both.

**Source and Target**

During optimization, virtual machines from this physical server can be moved to another physical server. This physical server can also receive virtual machines from another physical server.

**Source**

During optimization, virtual machines from this physical server can only be moved to another physical server.

**Target**

During optimization, this physical server can only receive virtual machines from another physical server.

In this example, assume that the size of the physical server indicates the total CPU capacity, and for virtual machines CPU requirement is in descending order for V1 through V9. Place virtual machines from physical servers marked as target on their corresponding physical servers, that is, V3 and V4 are placed on P2. During minimize systems optimization, we start by placing the virtual machine with the highest CPU requirement on the physical server with the highest CPU capacity and continue until the physical server does not have enough capacity. We then move to the next highest physical server.

In this example, four physical servers were consolidated to two physical servers, as shown in Figure 64 on page 164.
Example: Optimization with rules

Rules for optimization for Minimize Systems with rules:
- Run the optimization for each boundary rule
- Apply growth on virtual machine CPU usage based on utilization policies
- Try to pack workloads together that comply with colocation and anti-colocation policies

Example:

P1, P2, P3, and P4 are physical servers. V1 to V9 are virtual machines. Each physical server is marked as source, target, or both.

Source and Target
- During optimization, virtual machines from this physical server can be moved to another physical server. This physical server can also receive virtual machines from another physical server.

Source
- During optimization, virtual machines from this physical server can only be moved to another physical server.

Target
- During optimization, this physical server can only receive virtual machines from another physical server.

Policies applied in this example:
- Colocate virtual machines for Windows systems
- Do not mix production virtual machines with non-production virtual machines
- Do not mix virtual machines for Windows and Linux systems
In this example, all physical servers have the same total CPU capacity. For virtual machines the CPU requirement is in descending order for V1 through V9. Place virtual machines from physical servers marked as target on their corresponding physical servers, that is, V4 is placed on P3.

During Minimize Systems optimization with policies, we start with production virtual machines. To minimize the system, V2 and V6 are placed with V4. From the remaining virtual machines, V5, V7, V9 are placed next on P1 because these virtual machines are from the colocation group. V1 and V3 are placed on same physical server because P1 still has enough capacity. V8 is not placed on P1 or P2 so as not to violate rules. Hence, V8 is placed on P3.

After optimization with rules, four physical servers were consolidated to three physical servers and placement ensures compliance with all policies, as shown in Figure 65.

Figure 65. Minimize systems optimization with rules

**Optimization options**

**Keep existing recommendations**
You can do incremental capacity planning.

**Overwrite existing recommendations**
You can ignore existing recommendations and optimize a selected set of physical servers.

**Normalization benchmark setting**
You can define settings in the analytics.properties file, which is located in the TIP_HOME\tip2\profiles\TIPProfile\installedApps\TIPCell\isc.ear\AnalyticsWebUI.war\WEB-INF\classes directory:

**Capacity normalization setting**
Set BENCHMARK as SPEC or NONE.

**SPEC** Use the Standard Performance Evaluation Corporation (SPEC) benchmark for capacity normalization. Standard Performance

Use the raw capacity for capacity normalization. The raw capacity of the physical server is calculated based on the CPU speed and the number of cores.

**Detailed reference: Capacity efficiency and performance risk indices**

The plan generated contains two indices to explain the quality of the plan.

The capacity efficiency index explains how efficiently we are using resources at the containers, such as hosts, clusters, and data centers, and overall across data centers. The measure is based on spare resources available at these multiple levels and the indices are provided at all levels. The spare is computed from usage analysis, not allocations.

- A virtual environment container level can have a negative spare, hence a negative capacity efficiency index, if resources are overcommitted at that level.
- A low positive capacity efficiency index means that the resources are used efficiently with not much wastage and low risk because no overcommitment occurs, according to observed usage.
- A high positive capacity efficiency index means that wastage occurs in the environment and efficiency is low.

These three states are color-coded as red (negative capacity efficiency index), green (low capacity efficiency index), and yellow (high capacity efficiency index).

The performance risk index is computed for each virtual machine. The index is computed differently for the current and the optimized environments.

In the current environment, the performance risk index of a virtual machine is based on the comparison of usage versus the reservation of the virtual machine. The performance risk index is color-coded as follows:

- Red if the virtual machine uses more than the reservation,
- Green if the virtual machine is using close to the reservation,
- Yellow if the virtual machine is using much less than the reservation

For the recommended environment, the performance risk index for a virtual machine is computed as the likelihood of a virtual machine violating the recommended reservation. The performance risk index is color-coded as follows:

- Red if the likelihood is high
- Green if the likelihood is low
- Yellow if the likelihood is moderate

The capacity efficiency index and performance risk index are computed for CPU and memory. The more conservative estimate determines the capacity efficiency index for the host, cluster or datacenter and the performance risk index for the virtual machine. All values are normalized to the total CPU and memory capacity. Red takes precedence over yellow, which in turn takes precedence over green. For example, if for a host, the capacity efficiency index for CPU is red and for memory is green, then the capacity efficiency index for the host is taken as red.
Some default settings for performance risk index calculation in the recommended environment report can be modified through the analytics.properties file, which is located in the $TIP_HOME/profiles/TIPProfile/installedApps/TIPCell/isc.ear/AnalyticsWebUI.war/WEB-INF/classes directory, according to the following details.

**Important:** The performance risk index of virtual machines is calculated using GHz and GB values. After any change in this file, restart Tivoli Integrated Portal.

---

**#RISK_SCORE_CALCULATION**

This value enables risk scoring for the recommended environment report. Valid values are DEFAULT and UTILIZATION. In DEFAULT mode, the performance risk index is essentially disabled and all virtual machines are shown as green for the recommended environment. UTILIZATION mode enables the calculation to estimate the performance risk index based on historical data.

Syntax: RISK_SCORE_CALCULATION=DEFAULT

---

**#RISK_SCORE_GRANULARITY**

This value gives the time scale granularity, for example, HOURLY, DAILY, or WEEKLY. The risk is calculated based on this value. The default value is HOURLY. This value is only used if RISK_SCORE_CALCULATION=UTILIZATION.

Syntax: RISK_SCORE_GRANULARITY=HOURLY

---

**#RISK_SCORE_PARAMETERS**

This value denotes the resource types. You can choose from CPU, MEM, and ALL. The default value is ALL.

Syntax: RISK_SCORE_PARAMETERS=ALL

---

### Capacity Planner reports

Capacity Planner uses Tivoli Common Reporting.

Complete documentation for the Tivoli Common Reporting tool is located at the [Tivoli Common Reporting Information Center](http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc/tcr_welcome.html).

### Cognos-based report packages

The Cognos-based reports can be administered, run, and edited by Tivoli Common Reporting for Asset and Performance Management Version 1.3 software included with IBM Tivoli Monitoring 6.2.2 Fix Pack 2 or later.

For more information about Tivoli Common Reporting, see the [developerWorks page on Tivoli Common Reporting](http://www.ibm.com/developerworks/spaces/tcr).

### Report descriptions for Capacity Planner

All the Capacity Planner reports work on the data set that is selected in the Capacity Planner Edit Current Environment view. These reports can be launched from the Capacity Planner web pages and are launched in the context of the current data set.

Capacity Planner contains the following predefined Cognos-based reports:

- Physical Server
Shows configuration summary details for physical servers present in the working set.

- Virtual Server
  Shows virtual machine configuration details. The virtual machines shown are hosted on servers in the working set.

- Detailed Utilization
  Shows a detailed, unaggregated plot for various servers in a given time interval. Data points come directly from aggregated measurement tables in utilization schema.

- Aggregated Utilization
  Shows multiple time series plots for servers. The report compares aggregated utilization values on the y axis for various virtual machines selected or hosted on servers present in the working set.

- Current Environment
  Shows the recommended usage and sizing for each virtual machine, based on time series utilization data and sizing methodology: summarization, granularity type, and selections.

- Optimized Environment
  Compares current resources utilized in the environment with optimized resources.

**Table 44. Physical Server report**

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Physical Server</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows configuration summary details for physical servers that are present in the working set. The values displayed are Number of Physical servers, Number of Physical CPUs, CPU Speed (GHz), and Memory Installed (GB). The distribution of servers is displayed for different data centers, clusters, and hypervisors.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show configuration summary details for physical servers in the working set.</td>
</tr>
</tbody>
</table>
| Output           | The report displays bar charts of the distribution of physical servers.  
  - The first chart displays the distribution for different clusters and data centers.  
  - The second chart displays the distribution for different hypervisors. |

**Table 45. Virtual Machine report**

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Virtual Machine</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows virtual machine configuration details. The virtual machines shown are hosted on servers in the working set. The values displayed are Number of Virtual Machines, Number of Virtual CPUs, Current CPU Reservation (GHz), and Current Memory Reservation (GB). The distribution of virtual machines is displayed for different data centers, clusters, operating systems, and applications.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show configuration summary details for virtual machines hosted on servers in the working set.</td>
</tr>
</tbody>
</table>
Table 45. Virtual Machine report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
</table>
| Output           | The report displays bar charts of the distribution of virtual machines.  
                   - The first chart displays the distribution for different clusters and data centers.  
                   - The second chart displays the distribution for different operating systems.  
                   - The third chart displays the distribution for different applications. |

Table 46. Detailed Utilization report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Detailed Utilization</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows a detailed, unaggregated plot for various servers in a given time interval. Data points come directly from aggregated measurement tables in utilization schema. Utilization is displayed for CPU, memory, network, and disk.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show utilization for various servers in a given time interval.</td>
</tr>
</tbody>
</table>
| Parameters       | Data Center  
                   - You can choose one data center, or all.  
                   Cluster - You can choose one cluster, or all, among clusters that belong to the selected data centers.  
                   Server - You can choose one server, or all, among servers that belong to the selected clusters.  
                   Top/Bottom Host Servers  
                   - You can choose whether to view the top utilized, or bottom utilized, servers.  
                   N/N% - You can choose what percentage of servers to view, at either top or bottom.  
                   Aggregation - You can choose minimum, maximum, or average aggregation.  
                   Summarization - You can choose the granularity of how the data are generated.  
                   You can choose Hourly, Daily, Weekly, Monthly, or Yearly. |
| Output           | The report displays separate line graphs for CPU, memory, network, and disk utilization. |

Table 47. Aggregated Utilization report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Aggregated Utilization</td>
</tr>
<tr>
<td>Description</td>
<td>This report shows multiple time series plots for servers. The report compares aggregated utilization values on the y axis for various virtual machines selected or hosted on servers present in the working set. Utilization is displayed for CPU, memory, network, and storage.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Show utilization for various servers in a given time interval.</td>
</tr>
</tbody>
</table>
### Table 47. Aggregated Utilization report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center, or all.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster, or all, among clusters that belong to the selected data centers.</td>
</tr>
<tr>
<td><strong>Server</strong></td>
<td>You can choose one server, or all, among servers that belong to the selected clusters.</td>
</tr>
<tr>
<td><strong>Top/Bottom Host Servers</strong></td>
<td>You can choose whether to view the top utilized, or bottom utilized, servers.</td>
</tr>
<tr>
<td><strong>N/N%</strong></td>
<td>You can choose what percentage of servers to view, at either top or bottom.</td>
</tr>
<tr>
<td><strong>Aggregation</strong></td>
<td>You can choose minimum, maximum, or average aggregation.</td>
</tr>
<tr>
<td><strong>Summarization</strong></td>
<td>You can choose the granularity of how the data are generated.</td>
</tr>
<tr>
<td></td>
<td>You can choose Hourly, Daily, Weekly, Monthly, or Yearly.</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>The report displays separate line graphs for CPU, memory, network, and storage utilization.</td>
</tr>
</tbody>
</table>

### Table 48. Current Environment report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Current Environment</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report shows the resource demand numbers stored for each server present. CPU and memory details are displayed for selected data centers, clusters, and host servers. Recommended reservation is displayed with current reservation of virtual machine CPU and memory details. Expected network usage and storage are displayed. Threshold values of CPU, memory, network, and disk are given.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Show resource demand numbers for each server. Compare recommended reservation with current reservation. Show expected usage and storage, and threshold values.</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Data Center</strong></td>
<td>You can choose one data center, or all.</td>
</tr>
<tr>
<td><strong>Cluster</strong></td>
<td>You can choose one cluster, or all, among clusters that belong to the selected data centers.</td>
</tr>
<tr>
<td><strong>Server</strong></td>
<td>You can choose one server, or all, among servers that belong to the selected clusters.</td>
</tr>
<tr>
<td><strong>Top/Bottom Host Servers</strong></td>
<td>You can choose whether to view the top utilized, or bottom utilized, servers.</td>
</tr>
<tr>
<td><strong>N/N%</strong></td>
<td>You can choose what percentage of servers to view, at either top or bottom.</td>
</tr>
<tr>
<td><strong>Aggregation</strong></td>
<td>You can choose minimum, maximum, or average aggregation.</td>
</tr>
<tr>
<td><strong>Summarization</strong></td>
<td>You can choose the granularity of how the data are generated.</td>
</tr>
<tr>
<td></td>
<td>You can choose Hourly, Daily, Weekly, Monthly, or Yearly.</td>
</tr>
</tbody>
</table>
### Table 48. Current Environment report (continued)

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output</strong></td>
<td>The report displays two bar charts for each selected data center, cluster, and host server. The first bar chart displays CPU details. The second bar chart displays memory details. Both bar charts display capacity, recommended reservation, buffer, and space. These bar charts are followed by two bar charts that compare current reservation with recommended reservation for each individual virtual machine in the selected data center, cluster, and host server. The first of these bar charts displays data for CPU. The second bar chart displays data for memory. The final two bar charts display expected usage for the individual virtual machines. The first bar chart displays expected network usage. The second bar chart displays expected storage usage. At the end of the report, a table displays Thresholds Used for CPU, Memory, Network, and Disk. In each of these four categories, thresholds are displayed for Utilization (High/Medium/Low) and Variance (Stable/Unstable).</td>
</tr>
</tbody>
</table>

### Table 49. Optimized Environment report

<table>
<thead>
<tr>
<th>Report structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Optimized Environment</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>This report compares current resources utilized in the environment with optimized resources. Current, and recommended, values are displayed for total capacity, reservation, and spare CPU (GHz) and memory (GB). Expected utilization is displayed before and after optimization. Compare recommended values with current values for capacity, reservation, and spare CPU and memory. Show expected utilization before and after optimization. The report displays a table with the current, and recommended, number of physical servers and virtual machines. For both CPU and memory, the table also displays the current, and recommended, values of total capacity, reservation, and spare, which is the difference between capacity and reservation. This table is followed by two bar charts - one for CPU and one for memory. Each bar chart displays Expected Utilization before Optimization, Expected Utilization after Optimization, Capacity, Buffer, and Spare. The bar charts are followed by a table containing details of individual virtual machines: Name, Number of vCPUs, Current Reservation CPU, Current Reservation Memory, Recommended Reservation CPU, Recommended Reservation Memory, Operating System, and Application. This sequence of charts and tables is repeated for each physical server specified.</td>
</tr>
</tbody>
</table>
Chapter 7. Troubleshooting

Some problems and solutions for those problems have been identified in the following areas: installation and configuration, timeout and memory, Performance and Capacity Management Reports, Dashboard, and the Capacity Planner.

Installation and configuration problems

Use the installation problems table to troubleshoot errors you might encounter while installing and configuring the Virtual Environments Dashboard, Performance and Capacity Management Reports, and Capacity Planner.

Table 50. Installation and configuration problems.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You cannot find the log files.</td>
<td>The installer generates a primary log file in the user’s home directory named ITMfVSDashboardInstaller-00.log. Similarly, the uninstaller creates a log file called ITMfVSDashboardUnInstaller-00.log. Both phases also typically collect various detailed log files and places them in a .zip file in the ITMFVSDash/logs directory. The .zip file is named logs-yyyyMMddHHmm.zip, where yyyyMMddHHmm is a timestamp corresponding to the creation time of the archive. If you encounter any problems with the install or uninstall operations, have these files available when contacting support.</td>
</tr>
</tbody>
</table>

WebSphere® Application Server SOAP timeout.

The installation or uninstallation is failing, and the ITMfVSDashboardInstaller-00.log file contains lines similar to these:
2010-10-26 04:37:27.998-04:00 : INFO : [exec] com.ibm.websphere.management.exception.ConnectorException (from AntRuntime.execute)
2010-10-26 04:37:27.998-04:00 : INFO : [exec] org.apache.soap.SOAPException: [SOAPException: faultCode=SOAP-ENV:Client; msg=Read timed out; targetException=java.net.SocketTimeoutException: Read timed out] (from AntRuntime.execute)
2010-10-26 04:37:28.013-04:00 : INFO : [exec] (from AntRuntime.execute)
2010-10-26 04:37:28.060-04:00 : INFO : [exec] WASX7309W: No "save" was performed before the script "C:\IBM\tivoli\ITMFVSDash\bin\deployVSDashboardWars.jy" exited; configuration changes will not be saved. (from AntRuntime.execute)

A timeout occurred while the Websphere Application Server was saving the updated configuration. The SOAP interface that the installer uses to configure the Websphere Application Server has a 3 minute (180 second) timeout configured by default. The timeout can be increased (or set to unlimited time) by editing the file:
TIP_dir/profiles/TIPProfile/ \ properties/soap.client.properties

and changing the value of the com.ibm.SOAP.requestTimeout=180 property in the file. If you encounter this problem, set the value to 0 (unlimited) or at least 300 (5 minutes).
### Table 50. Installation and configuration problems. (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| **Response File Install uncertain status.**  
The response file installer ran for a while and then exited. How do I know that it was successful? | The response file installer returns a return code of 0 to the calling shell if the installation was successful. If you ran the installer from the command line, this value might not be displayed. In this case, you can examine the ITMFVSDashboardInstaller-00.log file to determine the status. Near the end of the file, a line similar to the following text appears after a successful installation:  
2010-10-28 10:20:38.104-04:00 :  
FINE : \$IAGLOBAL\_COI\_PLAN\_STATUS\$= SUCCESS (from com.ibm.ac.coi.ext.ia.plugin.COIProcessPlan.install)  
The following entry indicates success:  
IAGLOBAL\_COI\_PLAN\_STATUS=SUCCESS |
| **Response File Uninstall authentication failure.**  
You used the response file method to install the dashboard. You are now trying to uninstall the dashboard and the uninstallation is failing. The ITMFVSDashboardUnInstaller-00.log file contains a message similar to:  
2010-10-28 13:39:35.060-04:00 : SEVERE : TIPIN0024E Invalid User ID or password. Try again. (from com.ibm.tivoli.itmfvs.install.tip.WASCredentialValidationReuseUpgradeAction.uninstall) | This problem can occur if you changed the password for the Tivoli Integrated Portal administrative userid (typically tipadmin) since you installed the Virtual Environments Dashboard. You can complete the uninstallation by forcing the uninstaller to operate in interactive mode. Run the uninstaller from the command line with the following command:  
ITMFVSDash\_uninst\ITMFVSDashboard\uninstall.bat -i swing  
or  
ITMFVSDash\_uninst\ITMFVSDashboard\uninstall.sh -i swing |
### Table 50. Installation and configuration problems. (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Tivoli Integrated Portal fix pack installation fails.</td>
<td>If the Monitoring Agent for Windows OS is installed and running on the same system as the Tivoli Integrated Portal Server that is being updated, the agent might lock certain eWAS .dll files and cause the Tivoli Integrated Portal fix pack installation to fail. To avoid this problem, stop the agent before installing the fix pack. To stop the agent, take one of the following steps. If you have encountered an install failure, restart the computer before performing these steps.</td>
</tr>
<tr>
<td></td>
<td>• In the Manage Tivoli Enterprise Monitoring Services application, select the Monitoring Agent for Windows OS service and select <strong>Actions &gt; Stop</strong>.</td>
</tr>
<tr>
<td></td>
<td>• In the Windows “Services” applet, stop both the “Monitoring Agent for Windows OS - Primary” and “Monitoring Agent for Windows OS - Watchdog” services.</td>
</tr>
<tr>
<td></td>
<td>After the Tivoli Integrated Portal fix pack installation has completed, you can restart the agent.</td>
</tr>
<tr>
<td></td>
<td>If there are any processes other than the Tivoli Integrated Portal and the Tivoli Common Reporting Cognos process using the TIP supplied Java runtime environment, you must stop them before installing the fixpack. Usually such processes are locally developed or customized tools.</td>
</tr>
<tr>
<td>During installation, the VMware VI Agent TCR Reports step fails.</td>
<td>If you are using the DB2 V9.7 or higher, you might encounter this error. Run the following commands on your Tivoli Data Warehouse database, where $dbName$ is the name of the database and $db2admin$ is the database administrator ID:</td>
</tr>
<tr>
<td></td>
<td>db2 connect to $dbName</td>
</tr>
<tr>
<td></td>
<td>db2 grant dbadm on $dbName to $db2admin</td>
</tr>
<tr>
<td></td>
<td>db2 disconnect $dbName</td>
</tr>
<tr>
<td></td>
<td>For details about the DB2 V9.7 requirement, see <a href="http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.admin.dbobj.doc/doc/c0004105.html">Schemas</a>.</td>
</tr>
</tbody>
</table>
### Table 50. Installation and configuration problems. (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You get an error when running the <code>tadfkc_setup_fed.sh</code> script on AIX: <code>./tadfkc_setup_fed.sh -server itmx21a -dm TADFDCDB -dmschema TADFDC -add all</code></td>
<td>The error occurs because you must run the script from a bash shell. Enter <code>/bin/bash</code> to switch to the bash shell. Start the script.</td>
</tr>
<tr>
<td>Connecting to: TADFDCDB... Setting schema to: TADFDC...</td>
<td></td>
</tr>
<tr>
<td><code>./tadfkc_setup_fed.sh[37]: DB2_VERSION=${VERSION:4:4}: 0403-011 The specified substitution is not valid for this command.</code></td>
<td></td>
</tr>
<tr>
<td>You completed installation, and the Capacity Planner web application is visible in the Tivoli Integrated Portal, but the Capacity Planner web application does not work.</td>
<td>During installation, if you select the dashboard component install checkbox, but do not select the Capacity Planner component checkbox, the IBM Tivoli Monitoring for Virtual Environments installer installs the Capacity Planner web application and it is visible in the Tivoli Integrated Portal navigation panel. However, because the Capacity Planner database and reports are not installed, the web application does not work. Install the Capacity Planner database and reports by running the installer again and selecting the <strong>Capacity Planner</strong> option.</td>
</tr>
<tr>
<td>The installation is failing on your Windows system. You have over 2GB of free space but the logs say there is not enough space.</td>
<td>The Tivoli Integrated Portal V2.2 Fix Pack 1 (2.2.0.3) has an error in the way it computes the available free space on Windows. The installer is checking for 2500 MB free temporary space when it should be checking for approximately 250 MB free temporary space. You can bypass this problem by creating at least 2500 MB free space on the drive containing the <code>%TEMP%</code> directory (usually C:) by removing unneeded files or temporarily moving files to another drive or system until the installation is complete.</td>
</tr>
</tbody>
</table>
### Table 50. Installation and configuration problems. (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report installation fails on Linux with the following error found in the logs: The <code>&lt;fileset&gt;</code> type doesn’t support the &quot;erroronmissingdir&quot; attribute.</td>
<td>The Linux environment has another version of ANT lower than 1.8.1 configured as the default. Set the following environment variables and run the installer again: &lt;br&gt;export PATH=Install_dir\reports\lib\apache-ant-1.8.1\bin:$PATH &lt;br&gt;export ANT_HOME=Install_dir\reports\lib\apache-ant-1.8.1 &lt;br&gt;export CLASSPATH=Install_dir\reports\lib\apache-ant-1.8.1\bin:$CLASSPATH &lt;br&gt;TEST: ant -version should return ant 1.8.1 compiled &lt;br&gt;Before starting the installer again, run ant -version to check that the returned results show ant 1.8.1 compiled.</td>
</tr>
<tr>
<td>You get errors while running the reports installer.</td>
<td>The report installer performs three steps: &lt;br&gt;1. Imports reports. &lt;br&gt;2. Defines the Tivoli Data Warehouse data source in Cognos. &lt;br&gt;3. Makes schema updates by running scripts against the Tivoli Data Warehouse (adding and populating Time Dimension tables, creating indexes if history is enabled on the attribute groups). &lt;br&gt;Check the following logs on Windows under C:\Documents and Settings\Administrator or on Linux or UNIX under $HOME: &lt;br&gt;• Report_Installer_InstallLog.log &lt;br&gt;• Report_Installer_For_TCR_Output.txt &lt;br&gt;See &quot;Analyzing the report installer log&quot; for guidance in analyzing the logs.</td>
</tr>
<tr>
<td>When you install reports, the installer fails with error messages similar to the following: JVMDUMP006I Processing dump event &quot;systhrow&quot;, detail &quot;java/lang/OutOfMemoryError&quot; - please wait. ...&lt;br&gt;JVMDUMP013I Processed dump event &quot;systhrow&quot;, detail &quot;java/lang/OutOfMemoryError&quot;. CTGTRQ010E Processing has ended because of an unexpected error.</td>
<td>This is a known problem with Tivoli Common Reporting. See the Tivoli Common Reporting tech note <a href="http://www.ibm.com/support/docview.wss?uid=swg21580122">http://www.ibm.com/support/docview.wss?uid=swg21580122</a> for more information.</td>
</tr>
</tbody>
</table>

### Analyzing the report installer log

Review the Report_Installer_For_TCR_Output.txt file (on Windows under C:\Documents and Settings\Administrator; on Linux and UNIX under $HOME) to learn which step the installer failed on.
Sample log output

========================================
INSTALLATION COMPLETED.
========================================
The status of installation steps:
TCRRunDBScripts(runDbScript): FAILED
INFORMATION: /tmp/450480.tmp/reports/itmfvs/build.xml:31:
The <fileset> type doesn't support the "erroronmissingdir" attribute.
InstallReportsAction(IBM Tivoli Monitoring for
Virtual Environments Reports v7.1): SUCCESS
CognosDataSource(TDW): SUCCESS
========================================

Analysis

Reviewing the sample log, the success or failure of each step is evident:
1. InstallReportsAction (Step 1 - Importing Reports) succeeded.
2. CognosDataSource(TDW) (Step 2 - Defining the Tivoli Data Warehouse
data source in Cognos) succeeded.
3. RunDBScripts (Step 3 - Updating schema by running scripts against the
Tivoli Data Warehouse) failed.

Step 2: Define the Tivoli Data Warehouse data source in Cognos.
Possible causes of the failure:
- The database alias specified during install did not match the cataloged
db2 database alias, the Oracle local TNS service name, or the MS SQL
Server ODBC data source name.
- The credentials are wrong for connecting to the Tivoli Data Warehouse.

Solution:
- Ensure you have installed database client on the same server as Tivoli
Common Reporting and have cataloged the database. If you are using
Oracle, you need to have defined TNS service name in the tnsnames.ora file. If you are using MS SQL server, you need to have a defined ODBC
data source (see "Connecting to the Tivoli Data Warehouse using the
database client over ODBC" in the IBM Tivoli Monitoring Administrator’s
Guide). If you already have a Tivoli Data Warehouse data source defined,
adding another one will overwrite the existing data source.

Step 3: Make schema updates
Possible causes of failure:
- Database administrative privileges (such as db2admin or sys) are required
for this step; if user ITMUSER is specified, the schema cannot be updated.
- Database issues like connectivity problems, full logs, space issues, or any
other performance problems that will prevent writing to the database.
- If scripts are run to create indexes (ITMfVE 7.1 only) and the schema is
different from ITMUSER or the prerequisite tables are not in the Tivoli
Data Warehouse, an error might occur.

Solution:
- An error at Step 3 is accompanied by a informational message that
contains SQL errors with SQL codes. You can search on the SQL code to
determine the problem.
- If Time Dimension tables are present in the database, you can choose to
skip the schema update (JDBC) step while running the dashboard
installer. If you want to create time dimension with a different
granularity, you will need to edit the following sql file:
  1. Go to <reports package>\reports\cognos_reports\itmfvs\db_scripts.
2. Open `call_proc_DB2.sql`, `call_proc_MSSQL.sql`, or `call_proc_ORACLE.sql` depending on the database used.

3. Edit the last parameter in the call to `IBM_TRAM.CREATE_TIME_DIMENSION`.

Notes

- During installation, some indexes are created for enhanced reporting performance in the Tivoli Data Warehouse. If your data warehouse is not prepared with history before installation, this step is skipped by the installer. You can manually run one of the following scripts, depending on your database type:
  - `create_index_DB2.sql`
  - `create_index_MSSQL.sql`
  - `create_index_ORACLE.sql`

For more information, see Creating shared dimensions tables and populating the time dimensions table (http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.3/tcr_reports_dimensionsshared.htm).

- Although indexes help in enhancing report performance, some limitations apply: Indexes are recommended only on large tables with thousands of rows; indexes degrade the performance of insert, update, and delete operations on a table.

You can run a script to drop these indexes if you run into either of these performance issues:
  - `drop_index_DB2.sql`
  - `drop_index_MSSQL.sql`
  - `drop_index_ORACLE.sql`

- Connections under the Tivoli Data Warehouse are overwritten by the report installer. This is a limitation of the current installer.

- The privileges required while running the installer are ITMUSER (database user) for the Tivoli Data Warehouse creation step and ADMIN (database administrator) for the schema update step. The Database Test connection for the schema update panel does not check for privileges of the database user. Installation fails at the schema update step if the database user does not have administrative privileges.

- The Database Test connection for the schema update panel can fail due to reasons such as invalid host name, incorrect database name, incorrect port number for the database, or unable to load driver class. Look in the ITMfVSDashboardInstaller-00.log for the cause of the failure. Sample error messages:

  2011-10-10 10:20:04.343-04:00 : FINER : RETURN Unable to load the driver class! Error:oracle.jdbc.driver.OracleDriver1 (from com.ibm.tivoli.itmfvs.install.actions.ResolveJdbcDriverClasspath.install)

  2011-10-10 08:10:43.703-04:00 : FINER : RETURN DB2 SQL Error: SQLCODE=-1001, SQLSTATE=2E000, SQLERRMC=WAREHOUS1, DRIVER=3.57.82 (from com.ibm.tivoli.itmfvs.install.actions.CapacitySchemaJdbcUrl.install)


  2011-10-10 08:33:04.093-04:00 : FINER : RETURN [jcc][t4][2043][11550]
Timeout and memory problems

If the default timeout values for the Tivoli Common Reporting or Cognos console login are too short, you can change the settings. If your Java Virtual Machine runs out of memory, you can increase the heap size.

Table 51. Timeout and memory problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| You must log in to the Cognos server frequently because of automatic timeout (the default is 60 minutes). | 1. Edit the following file:  
   - Linux or operating systems such as UNIX: /opt/IBM/tivoli/tipv2Components/TCRComponent/cognos/configuration/cogstartup.xml  
   - Windows: C:\IBM\tivoli\tipv2Components\TCRComponent\cognos\configuration\cogstartup.xml  
2. Locate the “mdmSessionTimeout” parameter.  
3. Change the value from 60 minutes to a longer timeout interval. Do not set it to -1, which gives an unlimited timeout period, because connections to the Cognos server might be left open.  
4. Save the file.  
5. Restart the Tivoli Integrated Portal Server and the Cognos Report Server using the `startTCRserver` script (Linux and operating systems such as UNIX, use `startTCRserver.sh`; Windows, use `startTCRserver.bat`). If you are also editing the Tivoli Integrated Portal timeout value, you can restart the server after making the changes described next. |
Table 51. Timeout and memory problems (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| I am being prompted to log in again to the Tivoli Integrated Portal after I have been logged in for a while. How do I increase the session timeout? | Use the WebSphere Administrative Console to set the session timeout and LTPA timeout values to larger values. To open the administrative console from within the Tivoli Integrated Portal, select **Settings > WebSphere Administrative Console** in the navigation tree and click **Launch WebSphere administrative console**.  
1. Set the session timeout for Tivoli Integrated Portal application (ISC):  
   a. In left panel, expand **Applications and Application Types**, click **Websphere Enterprise applications**.  
   b. In the list of Enterprise Applications, select isc.  
   c. In the Configuration tab, click **Session management**.  
   d. For the **Session timeout** setting, either specify the number of minutes you want for the timeout or No timeout.  
   e. Click **OK**; click **Save** to save the changes.  
2. Set the LTPA timeout:  
   a. In the left panel of the WebSphere Administrative Console, expand Security and click on Global security.  
   b. In the Global security panel, click on LTPA in the Authentication section.  
   c. Enter the LTPA timeout value in minutes that you want.  
   d. Click **OK**; click **Save** to save the changes.  

**Important:** Use very high or unlimited values for timeouts with caution, because such values can lead to poor server performance or out of memory conditions. These timeouts are used by the server to release storage associated with sessions that are no longer active. Such sessions can occur when users close their browsers without logging off or are disconnected from the server due to network disruptions.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You get Java core dumps when running out of Java Virtual Machine (JVM) memory.</td>
<td>If your JVM runs out of memory within the Tivoli Integrated Portal, you receive a Java core dump. The Java core files appear in the /opt/IBM/tivoli/tip2/profiles/TIPProfile directory on Linux and operating systems such as UNIX, and in C:\ibm\tivoli\tipv2\profiles\TIPProfile on Windows. This problem is particularly common on AIX because the default maximum heap size for Java 1.6 on AIX is very low. Set the maximum heap size to 512 MB or higher. Take the following steps to update the maximum heap size for the Tivoli Integrated Portal JVM: 1. Edit the server.xml file in the following directory:   - Linux and operating systems such as UNIX: /data/IBM/tivoli/tipv2/profiles/TIPProfile/config/cells/TIPCell/nodes/TIPNode/servers/server1   - Windows: C:\IBM\tivoli\tipv2\profiles\TIPProfile\config\cells\TIPCell\nodes\TIPNode\servers\server1 2. Locate the genericJvmArguments=&quot;&quot; parameter towards the end of the file. Notice that there are no default JVM heap settings. 3. Add –Xmx512m or –Xmx1024m to the genericJvmArguments, depending on how much system memory you have on your server. For example, genericJvmArguments=&quot;-Xmx1024m&quot;&gt; 4. Restart the Tivoli Integrated Portal Server and the Cognos Report Server using the startTCRserver script (Linux and operating systems such as UNIX, use startTCRserver.sh; Windows, use startTCRserver.bat).</td>
</tr>
</tbody>
</table>

**Note:** The values given here are appropriate for typical cases, but be aware that the heap size might have already been set for other applications. The heap size adjustment should be finely tuned. If set too high, the Java process can use too much memory and slow the system. See [IBM developerWorks Roadmap for WebSphere Application Server - Tuning](https://www.ibm.com/developerworks/community/wikis/home#!/wiki/WebSphere_Developer_Area) for more information.
Performance and Capacity Management Reports problems

Use the Performance and Capacity Management Reports table to troubleshoot any errors you encounter while viewing the Cognos reports.

The reports are accessed from the Tivoli Integrated Portal navigation tree:
Reporting > Virtualization.

Table 52. Performance and Capacity Management Reports problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| When you run Tivoli Common Reporting reports or test the database connection in Cognos, you get errors (such as The logon failed) that reference libdb2.a. | Ensure that you have set up the proper library path environment variables. Complete the following steps. The example uses LD_LIBRARY_PATH, which might be LIBPATH on some operating systems.  
1. Stop Tivoli Common Reporting: 
   /opt/IBM/tivoli/tipv2Components/TCRComponent/bin/stopTCRserver.sh tipadmin tippass  
2. Open /opt/IBM/tivoli/tipv2Components/TCRComponent/bin/startTCRserver.sh in a text editor and add the following two lines at line 26 of the script (prior to WebSphere being started): export LD_LIBRARY_PATH=/opt/ibm/db2/V9.7/lib32:$LD_LIBRARY_PATH . /home/db2inst1/sqllib/db2profile  
3. Start Tivoli Common Reporting: 
   /opt/IBM/tivoli/tipv2Components/TCRComponent/bin/startTCRserver.sh tipadmin tippass  
   Another option is to add these environment variables to your .bashrc/.profile so that the variables are set up every time you log into the system. |
| The reports schema update fails. An SQL error message appears in the Report_Installer_For_TCR_Output.txt log file. | The error message indicates that the transaction log file has run out of space. Set the following database parameters in order to increase the size of the transaction log file:  
   • LOGBUFSIZE : 1024  
   • BUFFPAGE : 2000 or 3000  
   • Number of primary log files : 20  
   • Log File size : 8192  
   • Number of secondary log files : 10 |
### Table 52. Performance and Capacity Management Reports problems (continued)

<table>
<thead>
<tr>
<th><strong>Problem</strong></th>
<th><strong>Solution</strong></th>
</tr>
</thead>
</table>
| You have trouble with the database connection. | The Tivoli Monitoring reports must connect to the Tivoli Data Warehouse in order to run. The data source called **TDW** is defined in Cognos.  

Test the Database Connection to the Tivoli Data Warehouse:
1. Depending on the database type, make sure the Tivoli Data Warehouse is cataloged locally in the database client (DB2), the local TNS service name has been defined in `tnsnames.ora` (Oracle), or the ODBC data source has been created (Microsoft SQL Server). The alias/tns service name/odbc data source name is used in the data source connection.
2. Test the connection to the data warehouse:
   a. Select **TCR** > **Launch** > **Administration** > **Configuration** > **Data Sources** > **TDW**.
   b. Click **TDW** to discover the data source connections (also called TDW).
   c. Click the **test** icon next to **TDW** to test the connection.
3. If **TDW** is not defined, manually define the data source in Cognos.
   a. Using the database client, catalog the Tivoli Data Warehouse database.
   b. Log in to the Tivoli Integrated Portal.
   c. In the navigation tree, select **Reporting** > **Common Reporting**.
   d. Follow the instructions under [Configuring database connection](http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_211/ttcr_config_db.html) in the Tivoli Common Reporting information center to create the data source in Cognos. Make sure you call this data source “TDW”. |

| **I don’t see reports listed under Reporting > Virtualization: Workload Performance Trends and Forecasting, What-if Analysis for Capacity Estimation, and Workload Right-sizing and Balancing.** | If you are using the Internet Explorer, it is possible that no child pages appear under **Reporting > Virtualization**. Try opening the page in a new window by right-clicking and selecting **Open in New Window**. If the page opens, check the browser’s security settings and add the Tivoli Integrated Portal URL to the list of trusted sites.  

For example, in Internet Explorer 7, open **Tools** > **Internet Options** > **Security** > **Trusted Sites** > **Sites**. Add the URL to the list and click **Close** and **Ok**. |
### Table 52. Performance and Capacity Management Reports problems (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am able to connect to TDW using the database client but, when I run a report, I’m asked to enter my database credentials again. In the Work with reports page, you are prompted to <strong>Type a user ID and password</strong> and you get the following message: “An attempt to connect to the data source failed.”</td>
<td>If you get this prompt while attempting to run a report, the database connection under TDW is not configured properly. Some common causes might be that the connection is to an invalid DSN, or an incorrect user ID was given, or the database server might be down. Confirm that you have created the correct database connection and configure the Tivoli Data Warehouse correctly before running the report again. See the Configuring database connection (<a href="http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_211/tcr_config_db.html">http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_211/tcr_config_db.html</a>) for details.</td>
</tr>
<tr>
<td>I open a report, but it does not populate with data; it is empty.</td>
<td>Check for one or more of these possible causes:</td>
</tr>
<tr>
<td></td>
<td>• The Tivoli Data Warehouse has required historical tables for attributes but does not have the dimension tables. Follow the instructions in Creating shared dimensions tables and populating the time dimensions table (<a href="http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.3/tcr_reports_dimensionsshared.htm">http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc_6.2.3/tcr_reports_dimensionsshared.htm</a>).</td>
</tr>
<tr>
<td></td>
<td>• The historical data in the warehouse has not been summarized and pruned. If you know summarization and pruning has been configured and enabled, wait until the process has completed at least one time before opening a report. If you are not sure, see Configuring historical data collection for the Performance and Capacity Management Reports on page 42.</td>
</tr>
<tr>
<td></td>
<td>• The Tivoli Data Warehouse does not have data. Set summarization and pruning for at least hourly summarization and daily pruning for the required attribute groups. Check the “Prerequisite” topic in the Tivoli Common Reporting chapter of your agent user’s guide and look for the queries to run to validate the required attribute groups. With Tivoli Monitoring for Virtual Environments V7.1 (and later), Prereq Scanner Reports are provided for these checks. If historical collection has been configured and started, as well as summarization and pruning, and you see seeing missing tables or data for a monitoring agent, please contact customer support.</td>
</tr>
</tbody>
</table>
Table 52. Performance and Capacity Management Reports problems (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
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<tbody>
<tr>
<td>While running a report, you encounter the following error or similar:</td>
<td>This means that some of the tables or views (or both) are missing in the</td>
</tr>
<tr>
<td>RQP-DEF-0177 An error occurred while performing operation 'sqlPrepareWithOptions' status='-201'. UDA-SQL-0196 The table or view &quot;ITMUSER.KVM_SERVER_NETWORK_DV&quot; was not found in the dictionary.</td>
<td>database. Or it could indicate that the shared dimensions have not been created.</td>
</tr>
<tr>
<td><strong>For missing tables or views</strong></td>
<td>Check whether historical collection and summarization and pruning are</td>
</tr>
<tr>
<td></td>
<td>enabled for all the prerequisite attribute groups for the VMware agent.</td>
</tr>
<tr>
<td></td>
<td>If any of them are missing, enable historical collection and</td>
</tr>
<tr>
<td></td>
<td>Summarization and Pruning for that particular attribute group. After</td>
</tr>
<tr>
<td></td>
<td>the historical data collection is configured and historical data has</td>
</tr>
<tr>
<td></td>
<td>been saved, run the report again. Follow the instructions in</td>
</tr>
<tr>
<td></td>
<td>&quot;Configuring historical data collection for the Performance and Capacity Management Reports&quot; on page 42.</td>
</tr>
<tr>
<td><strong>For missing dimensions</strong></td>
<td>The shared dimensions have not been created and the appropriate</td>
</tr>
<tr>
<td></td>
<td>database scripts need to be run to create shared dimensions and</td>
</tr>
<tr>
<td></td>
<td>populate them. For details, see Creating shared dimensions tables and</td>
</tr>
<tr>
<td><strong>ITMUSER</strong></td>
<td>You can also check whether you are using ITMUSER as your schema name</td>
</tr>
<tr>
<td></td>
<td>in the Tivoli Data Warehouse. If you are using any schema other than</td>
</tr>
<tr>
<td></td>
<td>ITMUSER, see the ITMUSER schema entry.</td>
</tr>
<tr>
<td>Problem</td>
<td>Solution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>I am not using the ITMUSER schema for Tivoli Data Warehouse.</td>
<td>If you are using a schema other than ITMUSER, complete the following steps in order for the data model and reports to run. The following instructions are for the Tivoli Monitoring for Virtual Servers Reports, but apply to any other monitoring agent reports.</td>
</tr>
<tr>
<td></td>
<td>1. Install and configure the Cognos Framework Manager, which is the data modeling tool. Follow the procedure in <a href="#">Installing Framework Manager</a>.</td>
</tr>
<tr>
<td></td>
<td>2. Open the Framework Manager and select File &gt; Open.</td>
</tr>
<tr>
<td></td>
<td>3. Browse to the “model” folder in the extracted VMware reports package and select the ITM for Virtual Servers.cpf.</td>
</tr>
<tr>
<td></td>
<td>4. If you are prompted to enter login credentials, enter the tipadmin user ID (or other user ID with the same administrator permissions).</td>
</tr>
<tr>
<td></td>
<td>5. After the IBM Tivoli Monitoring for Virtual Servers data model in the Framework Manager opens, select Project Viewer &gt; IBM Tivoli Monitoring for Virtual Servers &gt; Data Sources &gt; TDW.</td>
</tr>
<tr>
<td></td>
<td>The Properties view is updated with information about the data source (View &gt; Properties).</td>
</tr>
<tr>
<td></td>
<td>6. In the Schema field, change from ITMUSER to your schema name and Save the project.</td>
</tr>
<tr>
<td></td>
<td>7. Select Project Viewer &gt; Packages, right-click IBM Tivoli Monitoring for Virtual Servers Reports, and click Publish Packages.</td>
</tr>
<tr>
<td></td>
<td>8. In the Publish Wizard, keep the default selection and click Next twice.</td>
</tr>
<tr>
<td></td>
<td>9. Clear the Verify the package before publishing check box and click Publish.</td>
</tr>
<tr>
<td></td>
<td>10. At the prompt, “A package with that name already exists. Do you want to publish this package?”, click Yes.</td>
</tr>
<tr>
<td></td>
<td>11. Return to Tivoli Common Reporting and confirm that the publishing time is shown in the Modified field of “IBM Tivoli Monitoring for Virtual Servers Reports” in the Public Folders of IBM Cognos Connection.</td>
</tr>
<tr>
<td></td>
<td>You can run reports from the IBM Tivoli Monitoring for Virtual Servers Reports package.</td>
</tr>
</tbody>
</table>
Virtualization Environments Dashboard problems

Use the Virtual Environments Dashboard problems table to troubleshoot errors you might encounter when you are using the Virtual Environments Dashboard.

Note: The Health Check page provides information on the health of the data connections in your system. To access this page, log on to the Tivoli Integrated Portal console and select System Status and Health > Configuration Health Check from the navigation tree. See "Health Check” on page 190.

Table 53. Virtual Environments Dashboard problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Data does not populate the chart or table, does not refresh, or the chart or table only partially displays. | 1. Log out of the Tivoli Integrated Portal.  
2. Clear the browser cache. (For example, on Firefox you click Tools > Options > Advanced > Network > Clear Now.)  
3. Recycle the browser by exiting and restarting it.  
4. Log back in to the Tivoli Integrated Portal console. |
| The refresh intervals of chart portlets are different from the intervals for table portlets. | By default, table portlets refresh every five minutes and chart portlets more frequently (one minute, however, because the data provider caches data samples for three minutes, the effective interval is three minutes). Follow the instructions given in the Tivoli Integrated Portal information center topic, Modifying chart properties (http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.tip.doc/tip_config_chart_props.html), to edit the UPDATE_MINIMUM_INTERVAL and UPDATE_MAXIMUM_INTERVAL parameters. Change them to the same value (such as 300 seconds for five minutes) if you want the refresh rate to be consistent among the dashboard charts and tables. |
Table 53. Virtual Environments Dashboard problems (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am getting an error message <strong>ATKRST123E Java Message Service initialization error</strong>... What is wrong?</td>
<td>This message indicates that the micro broker service that communicates asynchronous updates from the server to the tables in the browser client is not running or unable to start. A common cause of this is the port it must use is being used by another process. The port number it requires is shown in the URI in the message. In this example, it is the default port 16324. This problem can sometimes be resolved by restarting the TIP server. If that does not solve the problem, investigate what other processes on the host may be using the port. The WebSphere Appliance Management Center product has published another solution to this problem that you can try if the one above does not resolve the issue. The alternate solution is described in the WebSphere Appliance Management Center Information Center topic, Fixing the display problem with the Device window, Firmware window and other windows (<a href="http://publib.boulder.ibm.com/infocenter/wamcinfo/v4r0m0/topic/com.ibm.wamc.doc/tr_widgets_display_issue.html">http://publib.boulder.ibm.com/infocenter/wamcinfo/v4r0m0/topic/com.ibm.wamc.doc/tr_widgets_display_issue.html</a>).</td>
</tr>
<tr>
<td>I see no data in the Guest OS and Guest OS Utilization portlets of the Server Details dashboard. What is wrong?</td>
<td>The information is from the Tivoli Monitoring OS agent that is running on the guest. If the agent is not installed or not running, no guest OS information is available and the table displays no rows. If you know the OS agent is online and reporting data, the problem could be that the OS type cannot be determined for the virtual machine, VMware Tools might not be installed or running. Ensure that VMware Tools is installed on the virtual machine. On Linux, the VMware Tools do not start until at least the first login to the virtual machine, so ensure that you have logged in to the virtual machine.</td>
</tr>
<tr>
<td>Some of the columns in the Virtual Machines portlet of the Storage Details dashboard show a dash (—) instead of data. What does it mean?</td>
<td>Provisioned (MB) and Uncommitted (MB): During Virtual Machine creation, the administrator selected the check box to allow unlimited growth of the Virtual Machine's memory. <strong>Hostname</strong>: The Virtual Machine is in the powered <strong>off</strong> state. For a Virtual Machine to report a host name, it must be in the powered <strong>on</strong> state.</td>
</tr>
</tbody>
</table>
Table 53. Virtual Environments Dashboard problems (continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Why does Internet Explorer display the message "Do you want to view only the web page content that was delivered securely?" on some of the dashboard pages? | The browser displays this message to alert you that some of the content on the page is being delivered by a secure (https) connection and some content is being delivered by a nonsecure (http) connection. In the case of the Virtual Environments Dashboard, this situation occurs because the TADDM server is accessed using the http protocol and the content hosted on the local Tivoli Integrated Portal Server is accessed using https. You can respond to the prompt in several ways:  
  • Respond Yes to the message prompt. This suppresses the nonsecure content from the TADDM server for the remainder of the current browser session.  
  • Respond No to the message prompt. This allows the nonsecure content for the remainder of the current browser session.  
  • Change your settings to suppress the prompt. If you want to suppress this prompt, you can edit the Security Settings for the zone that applies to the Tivoli Integrated Portal and TADDM servers. If you set Enable mixed content to true, it will always allow http and https content to be mixed on a single page without prompting. This setting increases the exposure to certain security issues, so use it with caution in zones that apply to untrusted sites. Conversely, setting Enable mixed content to false always suppresses the http content on a secure page. To change the setting in the Internet Explorer, select Tools > Internet Options > Security and click Custom level. Scroll down to Display mixed content and select the Disable or Enable radio button, depending on your preference. Click OK twice to save your changes. |

Health Check

The Health Check page allows you to determine if any configuration problems exist in the environment by means of a series of tests on configuration settings.

The followings tests are available on the health check page:

**TEPS Hostname**  
Checks if the host name specified for the Tivoli Enterprise Portal Server can be found.

**TEPS Ping**  
Checks if the host specified for the Tivoli Enterprise Portal Server responds to a network ping.
TEPS Login
Checks if the Tivoli Enterprise Portal Server log in was successful.

TEPS Application Support
Checks if all required Tivoli Enterprise Portal Server support is installed.

VMware Agent Version
Checks that at least one VMware managed system in the IBM Tivoli Monitoring environment is at the minimum level of 7.1 and displays a CRITICAL (red) alert if none is found.

VMware Agent Online
Checks that at least one v7.1 VMware managed system is online and displays a CRITICAL (red) alert if not.

EIF Enabled
Checks if event forwarding has been enabled on the monitoring server.

EIF Configured
Checks if an event destination has been created for the Tivoli Integrated Portal server.

TADDM Hostname
Checks if the host name specified for the Tivoli Application Dependency Discovery Manager can be found.

TADDM Ping
Checks if the host specified for the Tivoli Application Dependency Discovery Manager responds to a network ping.

TADDM Login
Checks if the Tivoli Application Dependency Discovery Manager log in was successful.

For each Test Name, the table displays the Component to which the test was applied, the Result status, and a Recommendation for action or, if the test is successful, an explanation of the test results.

Capacity Planner problems
Consult the Capacity Planner problems table to troubleshoot errors you might encounter when using the Capacity Planner.

Enabling debugging information in Capacity Planner logs
- For data loading logs, update the following properties file: TIP_HOME/tipv2/profiles/TIPProfile/installedApps/TIPCell/isc.ear/AnalyticsWebUI.war/WEB-INF/classes/DMLOADER_log4j.properties
  - Update log4j.logger.DMLoader=INFO,DMLoader_FILE,DMLoader_CONSOLE to log4j.logger.DMLoader=DEBUG,DMLoader_FILE,DMLoader_CONSOLE
  - Update log4j.appender.DMLoader_FILE.threshold=INFO to log4j.appender.DMLoader_FILE.threshold=DEBUG
- For server logs, update the following file: TIP_HOME/tipv2/profiles/TIPProfile/installedApps/TIPCell/isc.ear/AnalyticsWebUI.war/WEB-INF/classes/log4j.properties
  - Update log4j.logger.Analytics=INFO, ANALYTICS_FILE to log4j.logger.Analytics=DEBUG, ANALYTICS_FILE
- Restart the Tivoli Integrated Portal or Tivoli Common Reporting server for settings to take effect.
Log files are available in the `TIP_HOME/tipv2/profiles/TIPProfile/logs` directory.

**Table 54. Capacity Planner problems**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| During Capacity Planner workflow, the following error appears in the `Analytics.log` file: For DB2 exception SQLCODE=-805 SQLSTATE=51002. | 1. Login as a DB2 administrator.  
2. Run the following command: `db2inst1@tfam02:/opt/ibm/db2/V9.7/bnd]db2 bind /opt/ibm/db2/V9.7/bnd/ @db2cli.lst CLIPKG 30`  
   **Note:** If DB2 is installed in a different location, change the path accordingly.  
3. A success message similar to the following message is displayed after completion of the command: `LINE MESSAGES FOR db2cli.lst ------ -------------------------------------- SQL0061W The binder is in progress. SQL0091N Binding was ended with "0" errors and "0" warnings. db2inst1@tfam02:/opt/ibm/db2/V9.7/bnd]` |
| The DBinstaller is looking for bash and failing on AIX.                 | Bash is a prerequisite on AIX V6.1, but is not available by default on AIX. You can download it from [IBM AIX Toolbox download](https://www.ibm.com/support/knowledgecenter/SSXW6A_6.1.0/ixrlinux.html).  
[See also IBM developerWorks System Administration Toolkit: Get the most out of bash](https://www.ibm.com/support/knowledgecenter/SSXW6A_6.1.0/ixrlinux.html) |
| On the Edit Recommended Environment Settings page, after I make changes, the Save button is enabled, but the Cancel button remains disabled. I cannot cancel my changes. | To cancel changes on the Edit Recommended Environment Settings page, reload the page by closing and reopening it. |
| The Capacity Planner appears to fail randomly in loading data for the configuration objects (Physical Server, VM, and Datastores) from the Tivoli Enterprise Portal Server. | In rare cases, due to environmental issues, Capacity Planner data loaders might face problems in sourcing data from the Tivoli Enterprise Portal Server. Click **Load Config Data** to rerun the data load. |
| In the Edit Current Environment page, you click the Load knowledge data icon and load the server model catalog. In the Physical Servers view, you then click Actions > Add server. Newly added physical server models are not visible in the list of available models. | Log out of the Capacity Planner user interface and log back in. The newly added physical server models appear in the list of available models. |
Appendix A. CSV format for data import and export

Data to be imported and exported must be kept in CSV format.

The format for CSV files is shown in the following tables:

<table>
<thead>
<tr>
<th>COLUMN NAME</th>
<th>DATA TYPE</th>
<th>COLUMN LENGTH</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL_SERVER_PK</td>
<td>BIGINT</td>
<td></td>
<td>Primary key</td>
</tr>
<tr>
<td>SERVER_POOL_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Name of server pool if a hierarchy exists</td>
</tr>
<tr>
<td>DATA_CENTER_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Data center to which physical server belongs</td>
</tr>
<tr>
<td>FQDN</td>
<td>VARCHAR</td>
<td>256</td>
<td>Fully qualified host name</td>
</tr>
<tr>
<td>HOST_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Host name of physical server</td>
</tr>
<tr>
<td>IP_ADDRESS</td>
<td>VARCHAR</td>
<td>256</td>
<td>IP address of physical server</td>
</tr>
<tr>
<td>MODEL</td>
<td>VARCHAR</td>
<td>256</td>
<td>Model name, for example, SUN-FIRE-V240 or POWER 570</td>
</tr>
<tr>
<td>MANUFACTURER</td>
<td>VARCHAR</td>
<td>256</td>
<td>Name of manufacturing company, for example, IBM, HP, or DELL</td>
</tr>
<tr>
<td>ARCHITECTURE</td>
<td>VARCHAR</td>
<td>256</td>
<td>System Architecture, for example, SUN4 or POWER</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_NAME</td>
<td>VARCHAR</td>
<td>64</td>
<td>Operating system name, for example, Linux or Windows</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_VERSION</td>
<td>VARCHAR</td>
<td>32</td>
<td>Operating system version</td>
</tr>
<tr>
<td>CPU_SPEED</td>
<td>BIGINT</td>
<td></td>
<td>Processor speed in MHZ</td>
</tr>
<tr>
<td>NUM_CPUS</td>
<td>INTEGER</td>
<td></td>
<td>Number of cores</td>
</tr>
<tr>
<td>MEMORY_LIMIT</td>
<td>BIGINT</td>
<td></td>
<td>Physical memory capacity in MB</td>
</tr>
<tr>
<td>MEMORY_INSTALLED</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>STATUS</td>
<td>VARCHAR</td>
<td>256</td>
<td>Do not edit this column</td>
</tr>
<tr>
<td>HYPERVISOR_VERSION</td>
<td>VARCHAR</td>
<td>32</td>
<td>Hypervisor version, for example, 3.5 U3 for VMware</td>
</tr>
<tr>
<td>HYPERVISOR_TYPE</td>
<td>VARCHAR</td>
<td>64</td>
<td>Hypervisor Name, for example, pHyp or VMware ESX</td>
</tr>
<tr>
<td>BIOS_DATE</td>
<td>DATE</td>
<td></td>
<td>BIOS date of server</td>
</tr>
<tr>
<td>DATA_SOURCE</td>
<td>VARCHAR</td>
<td>64</td>
<td>Do not edit this column</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TAG TYPE</th>
<th>DATA TYPE</th>
<th>STRING LENGTH</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUST_PRIMARY_BU</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business unit with most significant dependency on this server</td>
</tr>
<tr>
<td>CUST_PRIMARY_BUSINESS_APP</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business application with most significant dependency on this server</td>
</tr>
<tr>
<td>SERVER_FUNCTION</td>
<td>VARCHAR</td>
<td>50</td>
<td>Application, database, print server, or web server</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>VARCHAR</td>
<td>50</td>
<td>Production, development, test, data management zone, or eminent security zone</td>
</tr>
<tr>
<td>CRITICALITY_SLA</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business criticality or service level agreement info</td>
</tr>
<tr>
<td>CITY_CENTER</td>
<td>VARCHAR</td>
<td>50</td>
<td>If multiple locations, city or data center name location of server or host</td>
</tr>
<tr>
<td>WORKINGSET</td>
<td>VARCHAR</td>
<td>50</td>
<td>Flag indicating physical server is part of working set</td>
</tr>
<tr>
<td>TYPE</td>
<td>VARCHAR</td>
<td>50</td>
<td>Candidate type indicating whether a physical server is Source or Target</td>
</tr>
</tbody>
</table>
### Table 55. CFG_PHYSICAL_SERVER (continued)

<table>
<thead>
<tr>
<th>COLUMN NAME</th>
<th>DATA TYPE</th>
<th>COLUMN LENGTH</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL_SERVER_PK</td>
<td>BIGINT</td>
<td></td>
<td>Primary key</td>
</tr>
<tr>
<td>PS_HOST_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Host name of physical server</td>
</tr>
<tr>
<td>VMID</td>
<td>VARCHAR</td>
<td>256</td>
<td>ID of the virtual machines</td>
</tr>
<tr>
<td>HOST_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Host name of virtual machine</td>
</tr>
<tr>
<td>IP_ADDRESS</td>
<td>VARCHAR</td>
<td>256</td>
<td>IP address of virtual machine</td>
</tr>
<tr>
<td>FQDN</td>
<td>VARCHAR</td>
<td>256</td>
<td>Fully qualified domain name</td>
</tr>
<tr>
<td>CPU_MIN</td>
<td>BIGINT</td>
<td></td>
<td>CPU reservation</td>
</tr>
<tr>
<td>CPU_MAX</td>
<td>BIGINT</td>
<td></td>
<td>CPU limit</td>
</tr>
<tr>
<td>CPU_DESIRED</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>MEMORY_MIN</td>
<td>BIGINT</td>
<td></td>
<td>Memory reservation</td>
</tr>
<tr>
<td>MEMORY_MAX</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>MEMORY_DESIRED</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Name of operating system</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_VERSION</td>
<td>VARCHAR</td>
<td>256</td>
<td>Operating system version</td>
</tr>
<tr>
<td>MIDDLEWARE_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Middleware name</td>
</tr>
<tr>
<td>MIDDLEWARE_VERSION</td>
<td>VARCHAR</td>
<td>256</td>
<td>Middleware version</td>
</tr>
<tr>
<td>DATA_SOURCE</td>
<td>VARCHAR</td>
<td>64</td>
<td>Source of configuration data of virtual machine. Do not edit this information.</td>
</tr>
<tr>
<td>PHYSICAL_SERVER_PK</td>
<td>BIGINT</td>
<td></td>
<td>Physical server primary key</td>
</tr>
<tr>
<td>VM_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Display name of virtual machine</td>
</tr>
<tr>
<td>WORKINGSET</td>
<td>VARCHAR</td>
<td>50</td>
<td>Flag indicating that virtual machine is part of working set</td>
</tr>
<tr>
<td>CITY_CENTER</td>
<td>VARCHAR</td>
<td>50</td>
<td>If multiple locations, city or data center name location of server or host</td>
</tr>
<tr>
<td>CRITICALITY_SLA</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business criticality or service level agreement info</td>
</tr>
<tr>
<td>CUST_PRIMARY_BU</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business unit with most significant dependency on this server</td>
</tr>
<tr>
<td>CUST_PRIMARY_BUSINESS_APP</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business application with most significant dependency on this server</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>VARCHAR</td>
<td>50</td>
<td>Production, development, test, data management zone, or eminent security zone</td>
</tr>
<tr>
<td>SERVER_FUNCTION</td>
<td>VARCHAR</td>
<td>50</td>
<td>Application, database, print server, or web server</td>
</tr>
</tbody>
</table>

**Instructions:**
- Do not alter the content of the first column of the csv file, namely PHYSICAL_SERVER_PK.
- Update the values in the rest of the columns only if the existing values are null or empty.
- To add new servers, keep the values in the PHYSICAL_SERVER_PK column blank and add values in the rest of the columns.
- The length of the input strings must not exceed the string length as shown.
- You can add tags as new columns at the right of the table.
- You can add multiple tags of the same tag type with a ; separator. For example, you can add two tag names, PostPaid and PrePaid, of the same tag type, CUST_PRIMARY_BU, to a server by combining the tag names as PostPaid;PrePaid.

### Table 56. CFG_VIRTUAL_MACHINE

<table>
<thead>
<tr>
<th>COLUMN NAME</th>
<th>DATA TYPE</th>
<th>COLUMN LENGTH</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIRTUAL_MACHINE_PK</td>
<td>BIGINT</td>
<td></td>
<td>Primary key</td>
</tr>
<tr>
<td>PS_HOST_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Host name of physical server</td>
</tr>
<tr>
<td>VMID</td>
<td>VARCHAR</td>
<td>256</td>
<td>ID of the virtual machines</td>
</tr>
<tr>
<td>HOST_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Host name of virtual machine</td>
</tr>
<tr>
<td>IP_ADDRESS</td>
<td>VARCHAR</td>
<td>256</td>
<td>IP address of virtual machine</td>
</tr>
<tr>
<td>FQDN</td>
<td>VARCHAR</td>
<td>256</td>
<td>Fully qualified domain name</td>
</tr>
<tr>
<td>CPU_MIN</td>
<td>BIGINT</td>
<td></td>
<td>CPU reservation</td>
</tr>
<tr>
<td>CPU_MAX</td>
<td>BIGINT</td>
<td></td>
<td>CPU limit</td>
</tr>
<tr>
<td>CPU_DESIRED</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>MEMORY_MIN</td>
<td>BIGINT</td>
<td></td>
<td>Memory reservation</td>
</tr>
<tr>
<td>MEMORY_MAX</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>MEMORY_DESIRED</td>
<td>BIGINT</td>
<td></td>
<td>Currently not used</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Name of operating system</td>
</tr>
<tr>
<td>OPERATING_SYSTEM_VERSION</td>
<td>VARCHAR</td>
<td>256</td>
<td>Operating system version</td>
</tr>
<tr>
<td>MIDDLEWARE_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Middleware name</td>
</tr>
<tr>
<td>MIDDLEWARE_VERSION</td>
<td>VARCHAR</td>
<td>256</td>
<td>Middleware version</td>
</tr>
<tr>
<td>DATA_SOURCE</td>
<td>VARCHAR</td>
<td>64</td>
<td>Source of configuration data of virtual machine. Do not edit this information.</td>
</tr>
<tr>
<td>PHYSICAL_SERVER_PK</td>
<td>BIGINT</td>
<td></td>
<td>Physical server primary key</td>
</tr>
<tr>
<td>VM_NAME</td>
<td>VARCHAR</td>
<td>256</td>
<td>Display name of virtual machine</td>
</tr>
<tr>
<td>WORKINGSET</td>
<td>VARCHAR</td>
<td>50</td>
<td>Flag indicating that virtual machine is part of working set</td>
</tr>
<tr>
<td>CITY_CENTER</td>
<td>VARCHAR</td>
<td>50</td>
<td>If multiple locations, city or data center name location of server or host</td>
</tr>
<tr>
<td>CRITICALITY_SLA</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business criticality or service level agreement info</td>
</tr>
<tr>
<td>CUST_PRIMARY_BU</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business unit with most significant dependency on this server</td>
</tr>
<tr>
<td>CUST_PRIMARY_BUSINESS_APP</td>
<td>VARCHAR</td>
<td>50</td>
<td>Business application with most significant dependency on this server</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>VARCHAR</td>
<td>50</td>
<td>Production, development, test, data management zone, or eminent security zone</td>
</tr>
<tr>
<td>SERVER_FUNCTION</td>
<td>VARCHAR</td>
<td>50</td>
<td>Application, database, print server, or web server</td>
</tr>
</tbody>
</table>

**Instructions:**
- Do not alter the content of the first column of the csv file, namely VIRTUAL_MACHINE_PK.
- Update the values in the rest of the columns only if the existing values are null or empty.
- To add new servers, keep the values in the VIRTUAL_MACHINE_PK column blank and add values in the rest of the columns.
- The length of the input strings must not exceed the string length as shown.
Appendix B. Editing knowledge base

Knowledge base data consists of rules, the server model catalog, user-defined benchmark values and virtualization overhead values. This data that is loaded into the Capacity Planner can be adjusted as the environment requires.

The sample files that are loaded by default during installation are available in CSV format in the `TIP_HOME/ITMFVSDash/dbinstaller/samples/` directory. You can edit these files and update them in the tool using the Refresh Knowledge Base Content window, shown in Figure 63 on page 163.

**Rules**  
See “Importing rules in Capacity Planner” on page 162.

**Server Model Catalog**  
This file contains the server models that are listed in the Add Physical Server window. If you need to make changes to the models available for adding new servers, this file can be modified. The file format is as follows:

<table>
<thead>
<tr>
<th>Column name</th>
<th>Maximum column length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER_MODEL_CATALOG_PK</td>
<td>19</td>
<td>This column should be blank.</td>
</tr>
<tr>
<td>MODEL_DESCRIPTION</td>
<td>50</td>
<td>Description of the model. This column can be left blank.</td>
</tr>
<tr>
<td>VENDOR</td>
<td>20</td>
<td>Model vendor. This column can be left blank.</td>
</tr>
<tr>
<td>MODEL</td>
<td>50</td>
<td>Model name, for example, System X3550.</td>
</tr>
<tr>
<td>PROCESSOR</td>
<td>50</td>
<td>Processor Family, for example, Intel Xeon E5335.</td>
</tr>
<tr>
<td>PROCESSOR_SPEED_MHZ</td>
<td>10</td>
<td>Processor speed in MHz.</td>
</tr>
<tr>
<td>PROCESSOR_CHIPS</td>
<td>10</td>
<td>Number of processor chips. This column can be left blank</td>
</tr>
<tr>
<td>PROCESSOR_CORES</td>
<td>10</td>
<td>Number of processor cores.</td>
</tr>
</tbody>
</table>

A sample entry can be as follows:

```
,,IBM,System X3200,Intel Xeon X3210,,,4
```

**USER_DEFINED_BENCHMARK.csv**  
This file contains the benchmark values for the server models. These values are used to match comparative benchmarks for the server models and the result of the matching is displayed in the `Status` column in the Physical Server Inventory view. The file format is as follows:

<table>
<thead>
<tr>
<th>Column name</th>
<th>Maximum column length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>USER_DEFINED_BENCHMARK_PK</td>
<td>19</td>
<td>This column should be blank.</td>
</tr>
<tr>
<td>VENDOR</td>
<td>20</td>
<td>Server vendor. This column can be left blank.</td>
</tr>
</tbody>
</table>
Table 58. User-defined benchmark (continued)

<table>
<thead>
<tr>
<th>Column name</th>
<th>Maximum column length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVER_DESCRIPTION</td>
<td>50</td>
<td>Server description. This column can be left blank.</td>
</tr>
<tr>
<td>FAMILY</td>
<td>20</td>
<td>Server family. This column can be left blank.</td>
</tr>
<tr>
<td>PROCESSOR</td>
<td>128</td>
<td>System name with Processor architecture, for example, IBM System x3550 M3 (Intel Xeon X5650).</td>
</tr>
<tr>
<td>PROCESSOR_SPEED_MHZ</td>
<td>10 (Integer)</td>
<td>Processor speed. This column can be left blank.</td>
</tr>
<tr>
<td>PROCESSOR_CHIPS</td>
<td>10 (Integer)</td>
<td>Number of processor chips.</td>
</tr>
<tr>
<td>PROCESSOR_CORES</td>
<td>10 (Integer)</td>
<td>Number of processor cores</td>
</tr>
<tr>
<td>CPU_BENCHMARK_CAPACITY</td>
<td>19 (Integer)</td>
<td>Benchmark value. The value can be 0 - 100000.</td>
</tr>
<tr>
<td>CPU_OLTP_BENCHMARK_CAPACITY</td>
<td>19</td>
<td>Currently not used.</td>
</tr>
<tr>
<td>OS</td>
<td>50</td>
<td>Operating system. This column can be left blank.</td>
</tr>
<tr>
<td>DATE</td>
<td>10</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>UVALUES</td>
<td>10 (Integer)</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>HEIGHT_MM</td>
<td>10</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>WIDTH_MM</td>
<td>10</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>DEPTH_MM</td>
<td>10</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>MAX_HEAT_BTU</td>
<td>19</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>MAX_POWER_WATTS</td>
<td>19</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>NOTES</td>
<td>50</td>
<td>Currently not used. This column should be blank.</td>
</tr>
<tr>
<td>MODEL</td>
<td>50</td>
<td>Currently not used. This column should be blank.</td>
</tr>
</tbody>
</table>

A sample entry can be as follows:

,...,IBM Corporation IBM BladeCenter HS21 XM (Intel Xeon E5430),,1,8,21200

VIRTUALIZATION_OVERHEAD.csv

This file contains the virtualization overhead values that are used in optimization generation. These values are by default set to 10% of CPU, memory, network bandwidth, and storage I/O resources. These values can be modified and loaded to the Capacity Planner as needed by the environment. The file format is:
Table 59. Virtualization overhead

<table>
<thead>
<tr>
<th>Column name</th>
<th>Maximum column length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIRTUALIZATION_OVERHEAD_PK</td>
<td>8</td>
<td>This column should be blank.</td>
</tr>
<tr>
<td>HYPervisor_TYPE</td>
<td>64</td>
<td>Hypervisor type, for example, VMware ESX.</td>
</tr>
<tr>
<td>HYPervisor_VERSION</td>
<td>64</td>
<td>Hypervisor version.</td>
</tr>
<tr>
<td>CPU_CORES_RANGE_LOWER</td>
<td>4 (Integer)</td>
<td>Lower limit for CPU cores range for which the overhead applies.</td>
</tr>
<tr>
<td>CPU_CORES_RANGE_UPPER</td>
<td>4 (Integer)</td>
<td>Upper limit for CPU cores range for which the overhead applies.</td>
</tr>
<tr>
<td>PERCENTAGE_CPU_OVERHEAD</td>
<td>4 (Integer)</td>
<td>CPU overhead value (percentage).</td>
</tr>
<tr>
<td>PERCENTAGE_MEMORY_OVERHEAD</td>
<td>4 (Integer)</td>
<td>Memory overhead value (percentage).</td>
</tr>
<tr>
<td>PERCENTAGE_NETWORK_OVERHEAD</td>
<td>4 (Integer)</td>
<td>Currently not used.</td>
</tr>
<tr>
<td>PERCENTAGE_INTERNAL_DISK_OVERHEAD</td>
<td>4 (Integer)</td>
<td>Currently not used.</td>
</tr>
<tr>
<td>PERCENTAGE_DISK_IO_OVERHEAD</td>
<td>4 (Integer)</td>
<td>Currently not used.</td>
</tr>
<tr>
<td>APPLICATION_TYPE</td>
<td>30</td>
<td>Currently not used.</td>
</tr>
</tbody>
</table>
Appendix C. Capacity Planner database recommendations

Recommended minimum disk space required is 300MB.

**Tuning parameters**
- update db cfg for itmdw2 using LOGFILSZ 8192
- update db cfg for itmdw2 using LOGPRIMARY 20
- update db cfg for itmdw2 using LOGBUFSZ 1024

See "Capacity Planner problems" on page 191 for additional database settings.
Support Information

If you have a problem with your IBM software, you want to resolve it quickly. IBM provides different ways for you to obtain the support you need, such as online or IBM Support Assistant.

**Online**

The following sites contain troubleshooting information:

- Go to the IBM Software Support site at [http://www.ibm.com/software/support/probsub.html](http://www.ibm.com/software/support/probsub.html) and follow the instructions.

**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 [http://www.ibm.com/software/support/isa](http://www.ibm.com/software/support/isa).
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