Oracle® Enterprise Manager

System Monitoring Plug-in Metric Reference Manual for Virtualization Management

Release 5 (5.0)

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Contents

Preface

This manual is a compilation of the plug-ins metrics provided in Oracle Enterprise Manager for Virtualization Management.

Audience

This document is intended for Oracle Enterprise Manager users interested in plug-ins metrics for Virtualization Management.

Documentation Accessibility

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Related Documents

For more information, see the following documents in the Oracle Enterprise Manager 10*g* Release 2 documentation set:

- *Oracle Enterprise Manager Concepts*
- *Oracle Enterprise Manager System Monitoring Plug-in Installation Guide for VMware ESX Server*
- *Oracle Enterprise Manager Grid Control Quick Installation Guide*
- *Oracle Enterprise Manager Grid Control Installation and Basic Configuration*
- *Oracle Enterprise Manager Configuration for Oracle Collaboration Suite*
- *Oracle Enterprise Manager Advanced Configuration*
- *Oracle Enterprise Manager Policy Reference Manual*
- *Oracle Enterprise Manager Extensibility*
- *Oracle Enterprise Manager Command Line Interface*
- *Oracle Enterprise Manager SNMP Support Reference Guide*
- *Oracle Enterprise Manager Licensing Information*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

How to Use This Manual

The *System Monitoring Plug-In Metric Reference Manual for Virtualization Management* lists all the plug-ins metrics for database management that Enterprise Manager monitors. This manual shows all the metric help available online, eliminating the need to have the Grid Control Console up and running.

This preface describes:

- Structure of the Metric Reference Manual
- Background Information on Metrics, Thresholds, and Alerts

Structure of the Metric Reference Manual

This manual contains a chapter for the VMWare ESX Server. The metrics in this chapters appears in alphabetical order according to category.

Metric Information

The information for each metric comprises a description and user action if available:

- Description

  Provides an explanation following the metric name. This text defines the metric and, when available, provides additional information pertinent to the metric.

- User Action

  Suggests how to solve the problem causing the alert.

Definitions of Columns in Metric Summary Tables

The Metric Summary table in Enterprise Manager Grid Control is part of the overall metric information. The following table provides descriptions of columns in the Enterprise Manager Metric Summary table.

Column Header	Column Definition
Target Version	Version of the target, for example, 9.0.2.x and 10.1.0.x. The x at the end of a version (for example, 9.0.2.x) represents the subsequent patchsets associated with that release.
Server Evaluation Frequency	The rate at which the metric is evaluated to determine whether it has crossed its threshold. For server-generated alerts, the evaluation frequency is determined by Oracle Database internals. For example, if the evaluation frequency is 10 minutes, when the Average File Write Time degrades to the point an alert should trigger, it could be almost 10 minutes before Enterprise Manager receives an indication of the alert. This column is present in the Metric Collection Summary table only for Oracle Database 10*g* metrics.

Column Header	Column Definition
Collection Schedule	The rate at which the Management Agent collects data. The collection frequency for a metric comes from the Enterprise Manager default collection file for that target type.
Upload Interval	The rate at which the Management Agent moves data to the Management Repository. For example, upload every nth collection. The upload frequency for a metric comes from the Enterprise Manager default collection file for that target type. This column is present in the Metric Collection Summary table only when the Upload Frequency is different from the Collection Frequency.
Comparison Operator	The comparison method Enterprise Manager uses to evaluate the metric value against the threshold values.
Default Warning Threshold	Value that indicates whether a warning alert should be initiated. If the evaluation of the warning threshold value returns a result of TRUE for the specified number of consecutive occurrences defined for the metric, an alert triggers at the warning severity level.
Default Critical Threshold	Value that indicates whether a critical alert should be initiated. If the evaluation of the critical threshold value returns a result of TRUE for the specified number of consecutive occurrences defined for the metric, an alert triggers at the critical severity level.
Consecutive Number of Occurrences Preceding Notification	Consecutive number of times a metric's value reaches either the warning threshold or critical threshold before a notification is sent.
Alert Text	Message indicating why the alert was generated. Words that display between percent signs (%) denote variables. For example, `Disk Utilization for %keyValue% is %value%%` could translate to `Disk Utilization for d0 is 80%`.

Abbreviations and Acronyms

To reduce the page count in this document, the following abbreviations and acronyms are used:

Abbreviation/Acronym	Name
Agent	Oracle Management Agent
Database	Oracle Database
OMS	Oracle Management Service
Repository	Oracle Management Repository

Background Information on Metrics, Thresholds, and Alerts

A metric is a unit of measurement used to determine the health of a target. It is through the use of metrics and associated thresholds that Enterprise Manager sends out alerts notifying you of problems with the target.

Thresholds are boundary values against which monitored metric values are compared. For example, for each disk device associated with the Disk Utilization (%) metric, you can define a different warning and critical threshold. Some of the thresholds are predefined by Oracle; others are not.

After a threshold is reached, an alert is generated. An alert is an indicator signifying that a particular condition has been encountered and is triggered when one of the following conditions is true:

■   A threshold is reached.

■   An alert has been cleared.

- The availability of a monitored service changes. For example, the availability of an application server changes from up to down.

- A specific condition occurs. For example, an alert is triggered whenever an error message is written to a database alert log file.

Alerts are detected through a polling-based mechanism by checking for the monitored condition from a separate process at regular, predefined intervals.

> **See Also:** See the *Oracle Enterprise Manager Concepts* manual and the Enterprise Manager online help for additional information about metrics, thresholds, and alerts

Editing

Out of the box, Enterprise Manager comes with thresholds for critical metrics. Warning and critical thresholds are used to generate an alert, letting you know of impending problems so that you can address them in a timely manner.

To better suit the monitoring needs of your organization, you can edit the thresholds provided by Enterprise Manager and define new thresholds. When defining thresholds, the key is to choose acceptable values to avoid unnecessary alerts, while still being notified of issues in a timely manner.

You can establish thresholds that will provide pertinent information in a timely manner by defining metric baselines that reflect how your system runs for a normal period of time.

The metrics listed on the Edit Thresholds page are either default metrics provided by Oracle or metrics whose thresholds you can change.

Specifying Multiple Thresholds

The Specifying Multiple Thresholds functionality allows you to define various subsets of data that can have different thresholds. By specifying multiple thresholds, you can refine the data used to trigger alerts, which is one of the key benefits of using Enterprise Manager.

The key in specifying multiple thresholds is to determine how the comparison relates to the metric threshold as a whole. What benefit will be realized by defining a more stringent or lax threshold for that particular device, mount point, and so on?

For example, using the Average Disk I/O Service Time metric, you can define warning and critical thresholds to be applied to all disks (sd0 and sd1), or you can define different warning and critical thresholds for a specific disk (sd0). This allows you to adjust the thresholds for sd0 to be more stringent or lax for that particular disk.

Accessing Metrics Using the Grid Control Console

To access metrics in the Grid Control Console, use the All Metrics page associated with a particular target by doing the following:

1. From the Grid Control Console, choose the target.

2. On the target's home page, click All Metrics in the Related Links section.

3. On the All Metrics page, choose the metric of interest and click Help. The help for that metric appears.

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VMWare ESX Server Metrics

This chapter provides descriptions for all VMWare ESX Server metric categories, and tables list and describe associated metrics for each category.

1.1 VMWare ESX Server Metrics

VMWare ESX Server metrics consist of the following categories:

- ESX Server CPU Summary
- ESX Server Disk Summary
- ESX Server Disks
- ESX Server Memory Summary
- ESX Server Network
- ESX Server Network Summary
- ESX Server Resource CPU Summary
- ESX Server System
- ESX Server System Summary
- ESX Server Virtual CPU
- Response
- VM CPU Summary
- VM Disk Summary
- VM Disks
- VM Memory Summary
- VM Network
- VM Network Summary
- VM Resource CPU Summary
- VM Status
- VM System Summary
- VM Virtual CPU

Note: Some metrics are applicable only for version 3.0.1.

1.1.1 ESX Server CPU Summary Metrics

The metrics in this category provide details on CPU usage and reserved CPU capacity.

Table 1–1   ESX Server CPU Summary Metrics

Metric	Description
Total CPU Usage (%)	Percentage of CPU usage across system (total of Virtual Machines (VMs), service console, vmkernel, VMotion, etc.).
Total CPU Usage (MHz)	CPU usage in megahertz across system (total of VMs, service console, vmkernel, VMotion, etc.).
Total Reserved CPU Capacity Of VMs	Summation of CPU reservations of all VMs.

1.1.2 ESX Server Disk Summary Metrics

The metrics in this category contain the hard disk usage summary of the ESX Server.

Table 1–2   ESX Server Disk Summary Metrics

Metric	Description
ESX Disk Usage (KBps)	Disk usage of ESX Server in kilobytes per second.

1.1.3 ESX Server Disks Metrics

The metrics in this category contain the disks metrics for ESX server.

Table 1–3   ESX Server Disks Metrics

Metric	Description
ESX Disk Bus Resets	Disk bus resets of ESX Server. This metric is applicable only for 3.0.1.
ESX Disk Commands	ESX Server disk commands. This metric is applicable only for 3.0.1
ESX Disk Commands Aborted	ESX Server disk commands that were aborted. This metric is applicable only for 3.0.1
ESX Disk Read Rate (KBps)	ESX Server disk read rate in kilobytes per second.
ESX Disk Reads	Number of times disks were read in the ESX Server.
ESX Disk Write Rate (KBps)	ESX Server disk write rate in kilobytes per second.
ESX Disk Writes	Number of writes to disk for the ESX Server.

1.1.4 ESX Server Memory Summary Metrics

The metrics in this category contain the summary of the ESX Server memory.

Table 1–4   ESX Server Memory Summary Metrics

Metric	Description
ESX Free Memory in Heap (KB)	Kilobytes of free memory in heap in the ESX Server.
ESX Heap Memory (KB)	Kilobytes of heap memory in the ESX Server.
ESX Memory Consumed (KB)	This is the value from the calculation: Total memory - free memory (where total memory includes memory used by VMs, vmkernel, service console, and so on).
ESX Physical Memory Usage (%)	This is the value from the calculation: Total Memory Used by VMs / physical memory on machine. This metric is applicable only for 3.0.1.

Table 1–4   (Cont.) ESX Server Memory Summary Metrics

Metric	Description
ESX Reserved Memory Capacity (MB)	Amount of memory currently utilized to satisfy minimum memory values set for all VMs.
ESX Shared Common Memory (KB)	Amount of memory required for a single copy of shared pages in running VMs.
ESX Total Memory Available For VMs (KB)	Summation of total VM Memory across all VMs.
ESX Total Memory Mapped For VMs (KB)	Summation of VM Memory Mapped to ESX Server across all VMs.
ESX Total Memory Swapped In For VMs (KB)	Summation of VM Memory swapped In across all VMs. This metric is applicable only for 3.0.1.
ESX Total Memory Swapped Out For VMs (KB)	Summation of VM Memory swapped Out across all VMs. This metric is applicable only for 3.0.1.
ESX Total Memory Used By VMs (KB)	Summation of VM Memory used across all VMs.
ESX Total Memory Used For Swap Space By VMs (KB)	Summation of VM Memory being swapped across all VMs.
ESX Total Overhead Memory Of VMs (KB)	Summation of VM Overhead Memory across all VMs.
ESX Total Shared Memory For VMs (KB)	Summation of VM Shared Memory across all VMs.
ESX Total Zero Memory For VMs (KB)	Summation of VM Zero Memory across all VMs.
ESX VM Kernel Memory (KB)	Summation of VM Kernel Memory across all VMs. This metric is applicable only for 3.0.1.
ESX VM Memory Control (KB)	Summation of VM Memory Control across all VMs. This metric is applicable only for 3.0.1.

1.1.5 ESX Server Network Metrics

The metrics in this category contain the ESX Server Network details.

Table 1–5   ESX Server Network Metrics

Metric	Description
ESX Network Packets Received	Number of network packets received by the ESX Server.
ESX Network Packets Transmitted	Number of network packets transmitted by the ESX Server.
ESX Network Receive Rate (KBps)	The rate at which the ESX Server receives packets.
ESX Network Transmit Rate (KBps)	The rate at which the ESX Server transmits packets.

1.1.6 ESX Server Network Summary Metrics

The metric in this category contains the ESX Server Network Summary details.

Table 1–6   ESX Server Network Summary Metrics

Metric	Description and User Action
ESX Network Usage (KBps)	Network usage of ESX Server in kilobytes per second.

1.1.7 ESX Server Resource CPU Summary Metrics

The metrics in this category contains the ESX Server Resource CPU Summary details. Active time is the time that a VM spent occupying a CPU. Runtime is the time that a VM spent actually running on a CPU. Scheduling Limit is amount of time that the VM did not run because this would violate the limit resource setting of the VM (even though the VM is ready to run, it is prevented from doing so).

Table 1–7   ESX Server Resource CPU Summary Metrics

Metric	Description
ESX Active Time for CPU - Fifteen Minute Average (%)	ESX Server CPU active time average percentage over 15 minutes.
ESX Active Time For CPU - Fifteen Minute Peak (%)	ESX Server CPU active time peak percentage over 15 minutes.
ESX Active Time For CPU - Five Minute Average (%)	ESX Server CPU active time average percentage over five minutes.
ESX Active Time For CPU - Five Minute Peak (%)	ESX Server CPU active time peak percentage over five minutes.
ESX Active Time For CPU - One Minute Average (%)	ESX Server CPU active time average percentage over one minute.
ESX Active Time For CPU - One Minute Peak (%)	ESX Server CPU active time peak percentage over one minute.
ESX Runtime For CPU - Fifteen Minute Average (%)	ESX Server CPU runtime average percentage over 15 minutes.
ESX Runtime For CPU - Fifteen Minute Peak (%)	ESX Server CPU runtime peak percentage over 15 minutes.
ESX Runtime For CPU - Five Minute Average (%)	ESX Server CPU runtime average percentage over five minutes.
ESX Runtime For CPU - Five Minute Peak (%)	ESX Server CPU runtime peak percentage over five minutes.
ESX Runtime For CPU - One Minute Average (%)	ESX Server CPU runtime average percentage over one minute.
ESX Runtime For CPU - One Minute Peak (%)	ESX Server CPU runtime peak percentage over one minute.
ESX Sample Count For CPU Utilization	Sample count for ESX Server CPU Utilization.
ESX Sample Period For CPU Utilization (ms)	Sample period in milliseconds for ESX Server CPU Utilization.

Table 1–7   (Cont.) ESX Server Resource CPU Summary Metrics

Metric	Description
ESX Scheduling Limit - Fifteen Minute Maximum (%)	ESX Server Scheduling Limit percentage for a maximum of 15 minutes.
ESX Scheduling Limit - Five Minute Maximum (%)	ESX Server Scheduling Limit percentage for a maximum of five minutes.
ESX Scheduling Limit - One Minute Maximum (%)	ESX Server Scheduling Limit percentage for a maximum of one minute.

1.1.8 ESX Server System Metrics

The metric in this category contains the ESX Server System details.

Table 1–8   ESX Server System Metrics

Metric	Description
ESX CPU Usage (MHz)	CPU Usage in megahertz for the ESX Server.

1.1.9 ESX Server System Summary Metrics

The metric in this category contains the ESX Server System summary details.

Table 1–9   ESX Server System Summary Metrics

Metric	Description
ESX Uptime (days)	The duration the ESX Server has been running after the last startup.

1.1.10 ESX Server Virtual CPU

The metrics in this category contain the ESX Server Virtual CPU details.

Table 1–10   ESX Server Virtual CPU Metrics

Metric	Description
ESX Virtual CPU Idle (ms)	Number of milliseconds the ESX Server Virtual CPU has been idle. This metric is applicable only for 3.0.1.
ESX Virtual CPU Usage (%)	ESX Server Virtual CPU usage percentage.
ESX Virtual CPU Used (ms)	ESX Server Virtual CPU usage in milliseconds. This metric is applicable only for 3.0.1.

1.1.11 Response Metrics

The metrics in this category contain the ESX Server response details.

Table 1–11   Response Metrics

Metric	Description
Response Time (ms)	Response time of an HTTP ping to the ESX Server.
Status	Current status of the ESX Server. The value can be Up or Down.

1.1.12 VM CPU Summary Metrics

The metrics in this category contain the VM CPU Summary details.

Table 1–12   VM CPU Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM CPU Usage (%)	VM CPU Usage normalized across the number of virtual CPUs
VM CPU Usage (MHz)	VM CPU Usage normalized across the number of virtual CPUs per CPU.

1.1.13 VM Disk Summary Metrics

The metrics in this category contain the VM Disk Summary details.

Table 1–13   VM Disk Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Disk Usage (KBps)	Shows the VM Disk usage in kilobytes per second.

1.1.14 VM Disk Metrics

The metrics in this category contain the VM Disk details.

Table 1–14   VM Disk Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Disk Bus Resets	Number of VM disk bus resets. This metric is applicable only for 3.0.1.
VM Disk Commands	Number of VM disk commands. This metric is applicable only for 3.0.1.
VM Disk Commands Aborted	VM disk commands that were aborted. This metric is applicable only for 3.0.1.
VM Disk Read Rate (KBps)	VM disk read rate in kilobytes per second.
VM Disk Reads	Number of times disks were read by VM.
VM Disk Write Rate (KBps)	Shows the VM disk write rate in kilobytes per second.
VM Disk Writes	Shows the number of writes to disk for VM.

1.1.15 VM Memory Summary Metrics

The metrics in this category contain the VM Memory summary details.

Table 1–15   VM Memory Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
Memory Available For VM Memory Control (KB)	Memory available for the VM Memory Control.
Memory Consumed by VM For Guest (KB)	Memory consumed by VM for a Guest.
Memory Used By VM Memory Control (KB)	Memory used by the VM Memory Control.
VM Memory Being Swapped (KB)	Amount of memory currently swapped out.
VM Memory Mapped To ESX (KB)	Amount of VM memory mapped to actual memory in ESX Server.
VM Memory Swapped In (KB)	Amount of memory that was read in from memory.
VM Memory Swapped Out (KB)	Amount of memory that was written out to memory.
VM Memory Usage (%)	This is the value of the calculation: VM Memory Used / the amount of memory configured for the VM.
VM Memory Used (KB)	Amount of memory that VM is actively using. If enough memory is not allocated to VM, VM Memory Used can be greater than VM Memory Mapped to ESX Server.
VM Overhead Memory (KB)	Amount of memory for data structures to hold information about VM.
VM Shared Memory (KB)	Summary of shared memory for the VM.
VM Swapped Memory Target (KB)	Amount of memory that vmkernel wants to be swapped.
VM Zero Memory (KB)	Zero memory for the VM.

1.1.16 VM Network Metrics

The metrics in this category contain the VM Network details.

Table 1–16   VM Network Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Network Packets Received	Number of network packets received by VM.
VM Network Packets Transmitted	Number of network packets transmitted by VM.
VM Network Receive Rate (KBps)	Rate at which VM has received network packets.
VM Network Transmit Rate (KBps)	Rate at which VM has transmitted network packets.

1.1.17 VM Network Summary Metrics

The metrics in this category contain the VM Network Summary details.

Table 1–17   VM Network Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Network Usage (KBps)	Summation of the network usage of VMs.

1.1.18 VM Resource CPU Summary Metrics

The metrics in this category contains the VM Resource CPU Summary details.

Table 1–18   VM Resource CPU Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Active Time for CPU - Fifteen Minute Average (%)	CPU active time average percentage over 15 minutes for the VM.
VM Active Time For CPU - Fifteen Minute Peak (%)	CPU active time peak percentage over 15 minutes for the VM.
VM Active Time For CPU - Five Minute Average (%)	CPU active time average percentage over five minutes for the VM.
VM Active Time For CPU - Five Minute Peak (%)	CPU active time peak percentage over five minutes for the VM.
VM Active Time For CPU - One Minute Average (%)	CPU active time average percentage over one minute for the VM.
VM Active Time For CPU - One Minute Peak (%)	CPU active time peak percentage over one minute for the VM.
VM Runtime For CPU - Fifteen Minute Average (%)	CPU runtime average percentage over 15 minutes for the VM.
VM Runtime For CPU - Fifteen Minute Peak (%)	CPU runtime peak percentage over 15 minutes for the VM.
VM Runtime For CPU - Five Minute Average (%)	CPU runtime average percentage over five minutes for the VM.
VM Runtime For CPU - Five Minute Peak (%)	CPU runtime peak percentage over five minutes for the VM.
VM Runtime For CPU - One Minute Average (%)	CPU runtime average percentage over one minute for the VM.
VM Runtime For CPU - One Minute Peak (%)	CPU runtime peak percentage over one minute for the VM.
VM Sample Count For CPU Utilization	Sample count for VM CPU Utilization.
VM Sample Period For CPU Utilization (ms)	Sample period in milliseconds for VM CPU Utilization.

Table 1–18   (Cont.) VM Resource CPU Summary Metrics

Metric	Description
VM Scheduling Limit - Fifteen Minute Maximum (%)	Amount of time that the VM did not run because this would violate the limit resource setting of the VM (even though the VM is ready to run, it is prevented from doing so). This is for a maximum of 15 minutes.
VM Scheduling Limit - Five Minute Maximum (%)	Amount of time that the VM did not run because this would violate the limit resource setting of the VM (even though the VM is ready to run, it is prevented from doing so). This is for a maximum of five minutes.
VM Scheduling Limit - One Minute Maximum (%)	Amount of time that the VM did not run because this would violate the limit resource setting of the VM (even though the VM is ready to run, it is prevented from doing so). This is for a maximum of one minute.

1.1.19 VM Status Metrics

The metrics in this category contain the VM Status details.

Table 1–19   VM Status Metrics

Metric	Description
Boot Time	The time when the VM was booted.
Domain	The domain of the VM.
Health	Indicates the health of the VM. Values include Unknown, OK, problem(s) found, and potential problem(s) found.
Host	The host on which the VM is running.
Status	Current status of the VM. Values include On, Off, and Suspended.
Suspend Time	Time when the VM was last suspended.
Upper Bound of CPU Usage (MHz)	Current upper-bound on CPU usage. The upper-bound is based on the host the virtual machine is current running on, as well as limits configured on the virtual machine itself or any parent resource pool. Valid while the virtual machine is running.
Upper Bound of Memory Usage (MB)	Current upper-bound on memory usage. The upper-bound is based on memory configuration of the virtual machine, as well as limits configured on the virtual machine itself or any parent resource pool. Valid while the virtual machine is running.
VM	Name of the VM.

1.1.20 VM System Summary Metrics

The metrics in this category contain the VM System Summary details.

Table 1–20   VM System Summary Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Heartbeats	Number of heartbeats heard during the VM Uptime period. The heartbeat is a measurement of health and load of the VM.
VM Uptime (days)	The duration for which the VM has been running since the last startup.

1.1.21 VM Virtual CPU Metrics

The metrics in this category contain the VM Virtual CPU details.

Table 1–21   VM Virtual CPU Metrics

Metric	Description
VM UUID	Universal Unique Identifier (UUID) assigned to the VM.
VM Virtual CPU Extra Time (ms)	CPU time that is extra.
VM Virtual CPU Guaranteed Time (ms)	CPU time that is guaranteed.
VM Virtual CPU Time For System Processes (ms)	CPU time spent on system processes.
VM Virtual CPU Time Spent In Ready State (ms)	Milliseconds that the VM is ready to execute instructions, but cannot get scheduled on a CPU.
VM Virtual CPU Time Spent In Wait State (ms)	CPU time spent on wait state.
VM Virtual CPU Usage (MHz)	The average VM virtual CPU usage.
VM Virtual CPU Used (ms)	CPU time that is used.