# HP Operations Smart Plug-in for Virtualization Infrastructure

for HP Operations Manager for Windows®

Software Version: 1.00

## Deployment and Reference Guide

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# Contents

# 1 Installation

This chapter contains instructions for installing the Smart Plug-in for Virtualization Infrastructure.

The Virtualization Infrastructure SPI (VI SPI) helps administrators monitor virtualized infrastructure on the network. It is an extension for a number of business application services on HP Operations Manager (HPOM) for Windows operating system.

## Requirements

Before installing the Virtualization Infrastructure SPI, make sure that you have installed only the supported versions for hardware and software. Refer to the *HP Operations Manager Smart Plug-in for Virtualization Infrastructure Release Notes* for information about the management server versions, the managed node operating system versions, and the performance product versions that are supported by Virtualization Infrastructure SPI.

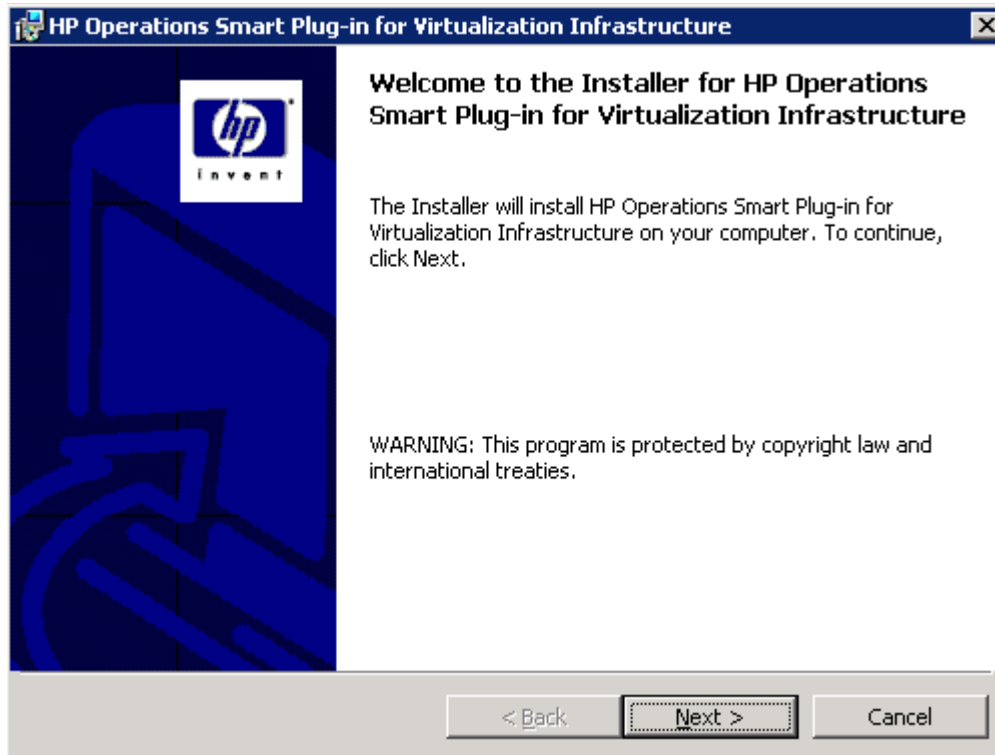## Installing the Virtualization Infrastructure SPI

▶  Read the rest of this guide before you start the installation wizard to plan your decisions and gather the information that you need.

Follow these steps:

1   Close all open applications.

2   Stop the HPOM for Windows console if it is running:

   a   Click File->Exit on the HPOM for Windows console menu.

      This opens the Microsoft Management Console window.

   b   Click Yes if you want to save the console settings to HP Operations Manager.msc.

3   Download the VI SPI software from either of the URLs (account and password required):

   • HP Download Center (DLC):

     ```
     https://h10078.www1.hp.com/cda/hpdc/display/main/secure/
     home.jsp?zn=bto&cp=54_4012_100
     ```

   • HP Software Partner Portal (SWPP):

     ```
     https://h20229.www2.hp.com/partner/protected/download/index.html
     ```

4   Extract the Virtualization Infrastructure Smart Plug-in Installer package to a temporary directory.

5 Go to the Virtualization Infrastructure Smart Plug-in Installer package temporary
directory and run the VI SPI msi executable file.

This Virtualization Infrastructure SPI installation wizard opens.



6 Follow the on-screen instructions and progress through the installation process using the
**Next** and **Install** buttons.

7 Read and accept the License agreement and click **Next**.

8 The Virtualization Infrastructure SPI installation starts installing files on the
management server.

9 The installation wizard displays the Installer Completed dialog box after you complete the
installation.

**Installer Completed**

The Installer has successfully installed HP Operations Smart Plug-in for Virtualization Infrastructure. Click Finish to exit the wizard.
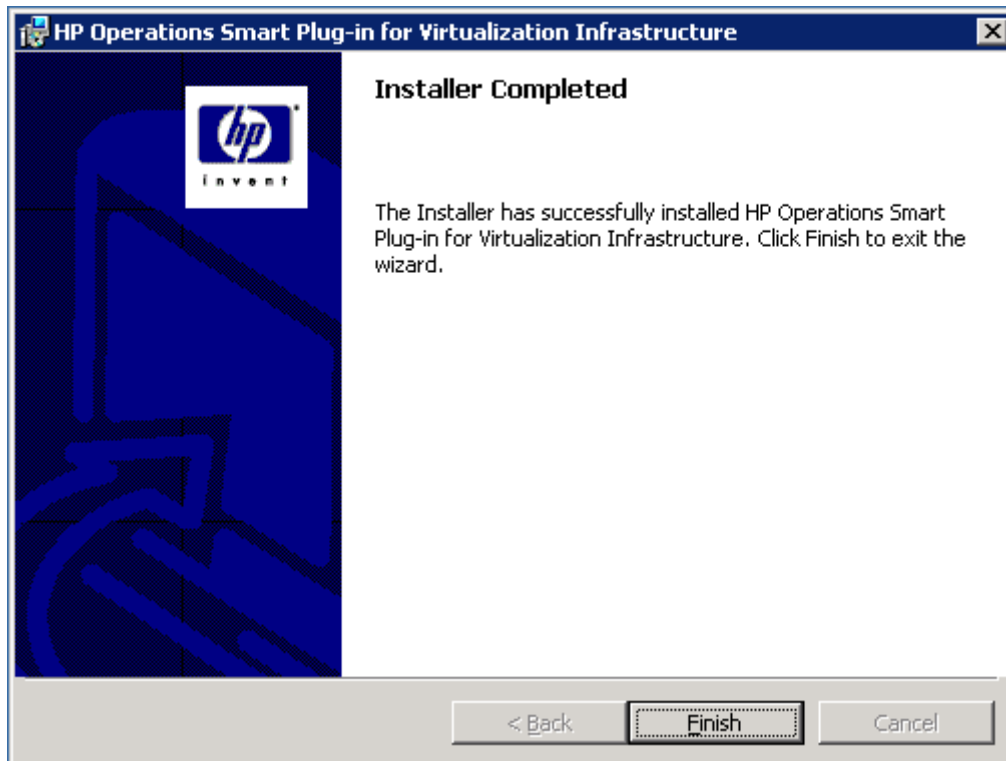
10  Click **Finish** to complete the installation.

# 2 Deployment

## Configuring the VMware ESX Server

VMware ESX Server is a virtualization platform that runs directly on system hardware without requiring an additional underlying operating system. It is referred to as the host operating system because it can host virtualized operating systems, which are also known as guest operating systems. To monitor the VMware ESX Servers, you must configure them as managed nodes.

Refer to the *HP Operations Manager Smart Plug-in for Virtualization Infrastructure Release Notes* for information about the management server versions, the managed node operating system versions, and the performance product versions that are supported by Virtualization Infrastructure SPI.

### Configuration Steps

To configure VMware ESX server as a managed node, follow these steps:

1  Close all open applications.

2  Install the HP Operations Agent on the managed node, if it is not already installed.

   For information on how to install HP operations Agent see *HPOM Install and Deployment Guide.*

3  Deploy the HP Performance Agent deployable package from the HPOM for Windows console, if it is not already deployed.

4  Set the HP Performance Agent data collection interval to 60 seconds as follows. The HP Performance Agent data collector SCOPE, by default, runs at a collection interval of 300 seconds.

   Edit `/var/opt/perf/parm` file and set the **collectioninterval global=60** in the file.

5  Restart the HP Performance Agent by running the following command:

   **- ovpa restart all**

6  Restart the HP Operations Agent by running the following command:

   **ovc -restart**

### Verify Configuration of the Managed Node

#### HP Operations Agent Processes

Ensure that HP Operations Agent is deployed and the certificate is installed by running the following command:

    a    ovc -status (/opt/OV/bin must be present in the PATH env variable)

    b    ovcert -status (to check if certificates are installed fine)

## HP Performance Agent Processes

Ensure that HP Performance Agent is deployed by running the following command:

ovpa status all (/opt/perf/bin must be present in the PATH env variable)

## HP Performance Agent Data Logging

Ensure that the HP Performance Agent has started logging data:

1    Start HP Performance Agent and wait at least 5 minutes.

2    Run **ovcodautil -support.**

    Check if *scope* appears in the list of enabled data sources.

3    Run **ovcodautil -dumpds scope**

    Check if *BYLS* metrics are listed.

If the above criteria are met, the managed node configuration is complete.

# 3 Troubleshooting

### System discovery does not start automatically.

Make sure the following are selected during installation:

- Intel x86/x64 as architecture
- RH EL 3 as operating system
- Linux 2.4 as the kernel version

### HP Operations Agent is deployed, but the certificate is not installed.

This error may occur due to the firewall on the ESX server, which may prevent the certificate request from the managed node to reach the server. Follow these steps:

1   Turn off the firewall, or add 383 to the list of non-blocked ports using the following esxcfg-firewall commands:

   a   run esxcfg-firewall --openPort 383, tcp, out, ovbbc (for outgoing communication via BBC TCP port 383)

   b   esxcfg-firewall --openPort 383,tcp,in,ovbbc (for incoming communication via BBC TCP port 383)

2   Run ovcert -certreq. Grant the certificate from the OMW console.

# 4 Virtual Infrastructure Management Concepts

This chapter explains virtual infrastructure management concepts and discusses how these concepts are used to manage virtualized infrastructure and system resources.

## Virtualization

Virtualization can be described as an paradigm where the computer resources can be divided into multiple execution environments. Virtualization abstracts the physical hardware layer to enhance IT resource utilization.

Virtual machines are used to consolidate the workloads of several under-utilized servers to fewer machines for effective utilization of hardware, environmental costs, management, and administration of the server infrastructure. Virtual machines are also used to run multiple operating systems simultaneously. These operating systems can be different versions, or even entirely different systems, which can be on hot standby. Virtualization enables existing operating systems to run on shared memory multiprocessors. Since virtual machines are logical entities and are separate from the physical resources they use, the host environment is able to dynamically assign the resources among them.

## Virtual Infrastructure Management

Virtualization infrastructure management maximizes resource utilization by providing monitoring services that allow you to visualize and manage your virtual infrastructure. The benefits of managing a virtual infrastructure are lower management costs, centralized management of heterogeneous resources, improved performance, and increased availability with greater visibility into your virtual systems.

The Virtualization Infrastructure SPI monitors performance, capacity and availability aspects of the virtual resources. The following figure shows the infrastructure management aspects monitored by the Virtualization Infrastructure SPI.
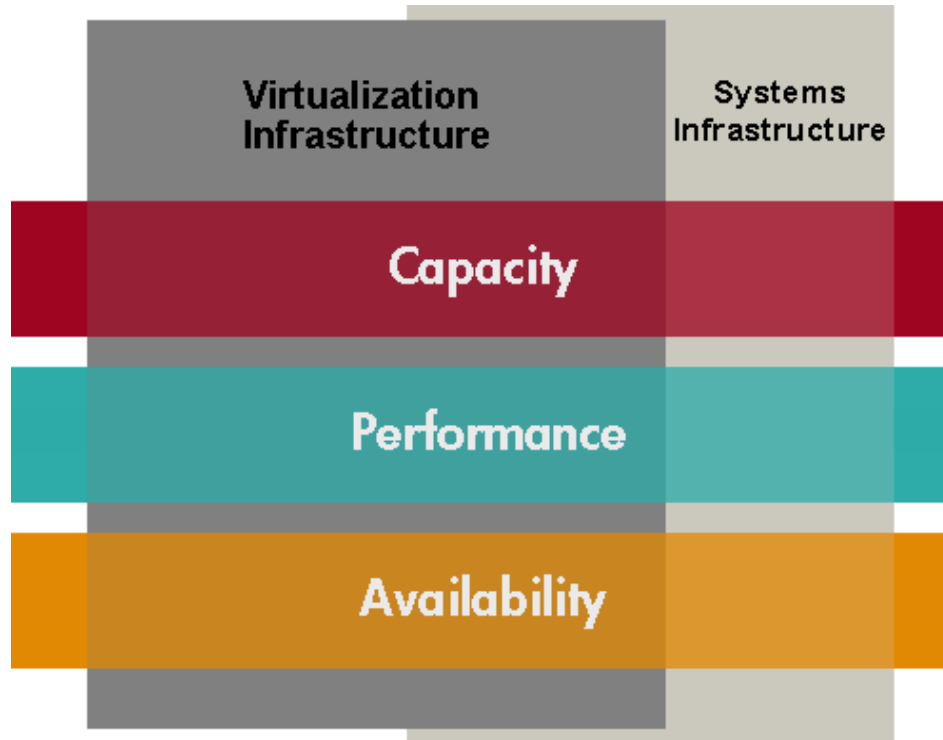
*Capacity monitoring* helps to deliver performance at the required service level and cost. It ensures that the capacity of the IT infrastructure corresponds to the evolving demands of the business. It helps identify the under-utilized and over-utilized resources.

*Performance monitoring* helps to preempt performance disruption and identify when the infrastructure issues can threaten service quality. The collected performance data is used to correlate events across the entire infrastructure of servers, operating systems, network devices, and applications in order to prevent or identify the root cause of a developing performance issue.

*Availability monitoring* helps to ensure adequate availability of resources. It is important to identify unacceptable resource availability levels. The current load on IT infrastructure is computed and compared with threshold levels to see if there is any shortfall in resource availability.

As the usage of IT resources changes, and functionality evolves, the amount of disk space, processing power, memory, and other parameters also change. It is essential to understand the current demands, and how they will change over time. Monitoring these aspects over a period of time is beneficial in understanding the impact on IT resource utilization. Infrastructure management analyzes current and historical performance to accurately predict future resource capacity needs.

When systems infrastructure identifies a managed node as a virtualized server, it initiates virtualization discovery policy. In a virtualized environment the system infrastructure monitored aspects, such as monitoring disk capacity and CPU performance, are applicable to the host system (managed node). The virtualization infrastructure, on the other hand, takes care of the same aspects for the virtual machines running on the host system.
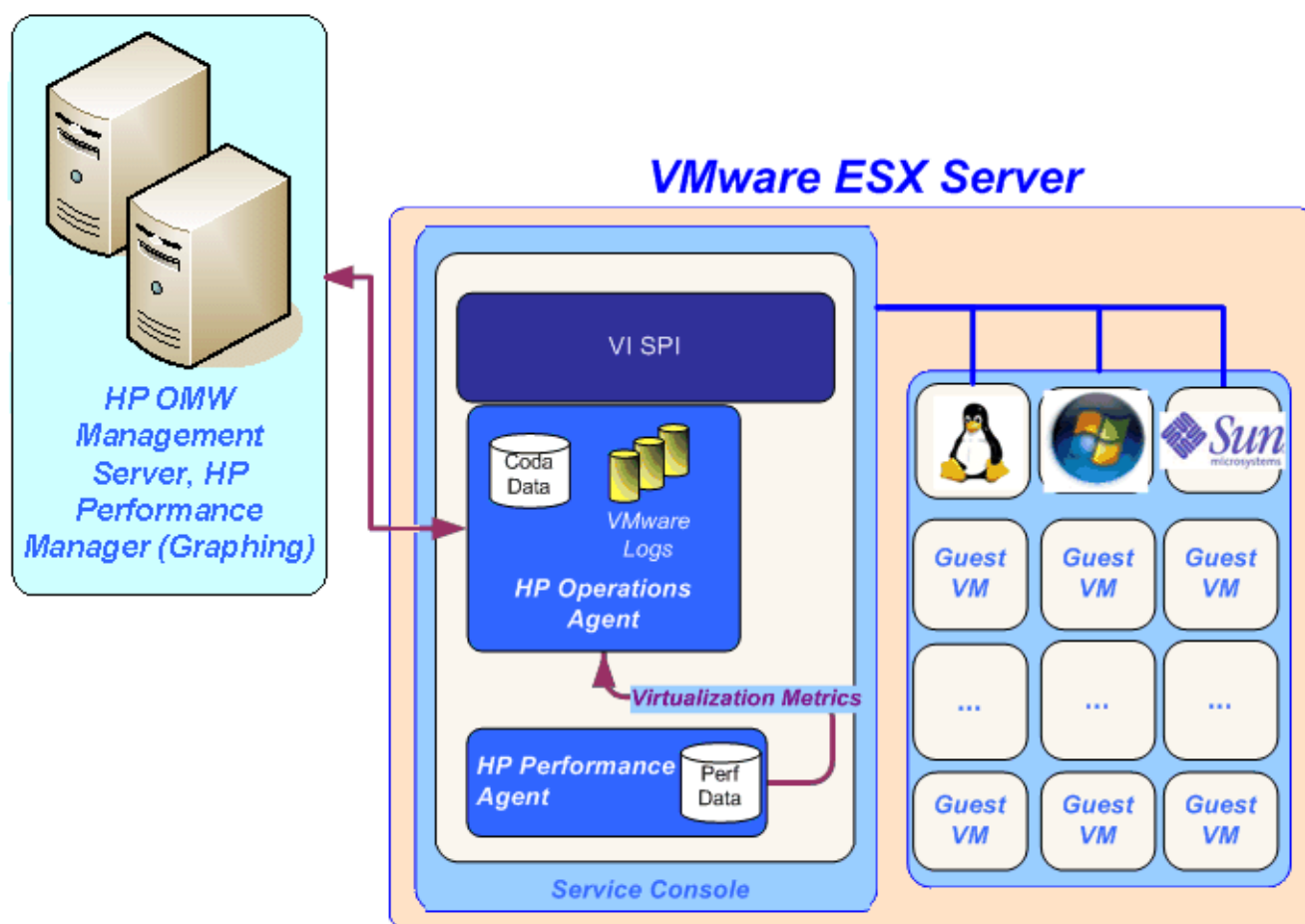
# Virtualization Infrastructure SPI Architecture

The Virtualization Infrastructure SPI extends the management scope of HP Operations Manager (HPOM) for Windows to manage your virtualized infrastructure. The Virtualization Infrastructure SPI architecture consists of the HPOM for Windows server for windows and VMware ESX server as a managed node.

- HP Operations Agent, HP Performance Agent, and the Virtualization Infrastructure SPI policies and instrumentation must be running on the service console on the VMware ESX server.

- HP Performance Manager must be running on the HPOM for Windows server.

Guest virtual machines are configured on the managed node. The supported versions for the above HP software are detailed in the *HP Operations Manager Smart Plug-in for Virtualization Infrastructure Release Notes*.

The following figure shows an overview of the architecture of the Virtualization Infrastructure SPI.



The HPOM for Windows management server deploys monitoring policies to the managed nodes. The Virtualization Infrastructure SPI monitors the availability and performance of resources in a virtual environment.

The Virtualization Infrastructure SPI performs automatic service-discovery and policy deployment. It discovers system resources on a virtual machine. The SPI also provides service-level performance monitoring for all managed virtual machines, including CPU utilization, disk usage, and memory utilization.

➤ Non-English display names for guest virtual machines are not supported. It can affect the working of HP Performance Agent and the Virtualization Infrastructure SPI.

# Setting Thresholds for Virtualization Infrastructure SPI Policies

Most policies have multiple threshold levels, It is essential to set the threshold values carefully for each level because the message alert on the HPOM for Windows console depends upon the set threshold value.

Virtualization Infrastructure SPI policies enable you to set and modify the threshold values in the following ways:

## Customizing Threshold Values using Script Parameters

If the default values do not suit your particular environment, you can change the type of threshold as well as the defined threshold limits.

### To modify thresholds for Measurement Threshold type policies:

1 Start the HP Operations GUI and use the Console Tree to browse to the SPI for Infrastructure policy group.

2 Locate the policy you want to modify by expanding the appropriate policy group Virtualization Infrastructure or Systems Infrastructure and their appropriate subordinate groups.

3 Double-click to open the policy window.

4 Select the Script-Parameters tab and set the new threshold value for the thresholds as appropriate. In the absence of the Script-Parameters tab in the policy, you can use the Threshold levels tab to set threshold values.

5 Click OK to save the changes.

6 Redeploy the policy to the appropriate managed nodes.

## Customizing Threshold Values using Threshold Overrides

The threshold overrides concept provides additional flexibility to the Virtualization Infrastructure SPI by controlling how a set of threshold values is applied to the target managed nodes. The *ThresholdOverrides* policy enables you to override the thresholds for multiple polices on a managed node.

You can set the threshold value across multiple policies in one step. You can create a list of all threshold parameter names and values, and override the thresholds across policies on a managed node. You can use this list of threshold parameters to standardize these setting on multiple managed nodes. In case you want to change values for a node, you can modify the values in the list and deploy the *ThresholdOverrides* policy on that particular managed node.

Additionally, you can modify the threshold values in a policy directly by using XPL configuration settings. To view and change the settings for policy thresholds in the XPL, use the following commands:

- View the XPL configuration settings namespace:

    **`ovconfget eaagt`**

- Change the threshold values:

    **`ovconfchg -ns eaagt -set <threshold name> <threshold value>`**

Example:

```
ovconfchg -ns eaagt -set VMFSUsageCriticalThreshold 91
                    -set VMFSUsageMajorThreshold 86
                    -set VMFSUsageMinorThreshold 81
                    -set VMFSUsageWarningThreshold 76
```

## Adaptive Thresholds

The adaptive threshold concept is used to determine threshold values using the historical records for performance characteristics and usage patterns of infrastructure resources, instead of using fixed threshold values specified in the policies.

Constant threshold values set in the policies may be ideal for one situation but not for all situations. Therefore, it may be necessary to change the threshold values according to the environment setup for infrastructure performance. Distributed system environments generally follow predictable trends over time. Adaptive threshold helps to automatically calculate the threshold values according to available performance data for previous days.

When policies that use adaptive threshold are deployed on managed nodes, the adaptive threshold script establishes a baseline from the historic samples. The sampled data is collected from the HP Embedded Performance Component or HP Performance Agent. These samples help identify previous trends in infrastructure performance. Based on these trends the threshold values are automatically calculated. Once the automatic threshold values are set, the standard deviations are calculated for the current sample against these threshold values. Comparing the current performance data with the adaptive thresholds indicates whether the current infrastructure resource utilization is normal or not. An alert is generated when abnormal behavior is detected.

Standard deviation is calculated by subtracting each individual sample from the average of the entire sample set, squaring the result, and adding each square to an aggregate counter. The aggregate count is divided by the number of samples minus one. Standard deviations have a trust factor denoting the variance level that goes up with the number of points in the statistical sample and the standard deviation compared to the maximum value. This *trust* factor dictates if an alert is generated when abnormal behavior is detected or not. If a value has a trust factor of 40% or lower, the alert is not processed. This eliminates false alarms when there is insufficient data.
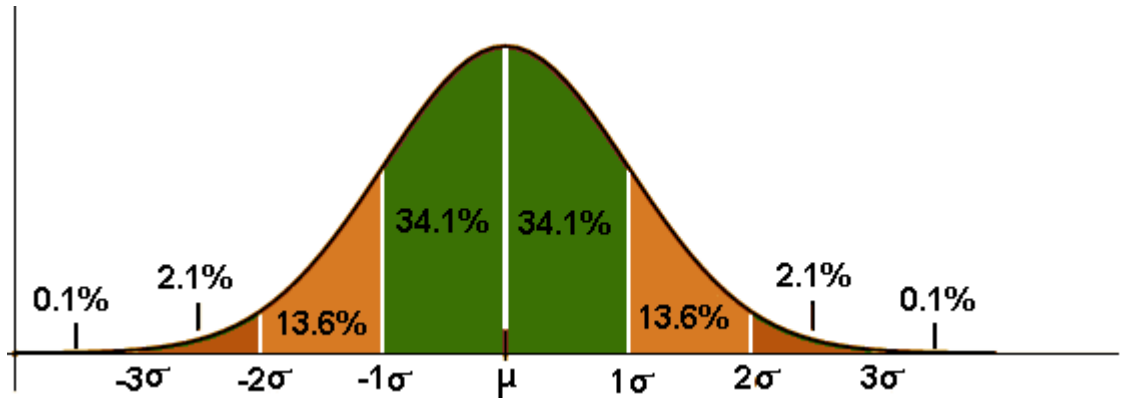
The script compares the current data average with the standard deviation levels, to determine if the current data exceeds or precedes either one standard deviation or two standard deviations of the baseline data.

The data within one standard deviation, represented in the diagram from -1σ to μ and μ to 1σ, is not processed due to t he *trust* factor. If the current value exceeds the one standard deviation, but not two standard deviations, then the policy generates warning severity message. If the current value exceeds two standard deviations, the policy generates a major severity message. Similarly if the current value exceeds three standard deviations, the policy generates critical severity message.

The infrastructure resources that have sporadic usage at intervals greater than one month may not be suitable candidates for implementation of adaptive thresholds. For example, if you have an analysis server that only really works hard during quarter end processing then the baseline data will not be helpful in calculating an adaptive threshold.

# 5 User Scenarios

This section presents some possible scenarios of the Virtualization Infrastructure SPI.

In this example, *Newbie*, a recently employed usability engineer, has been given the responsibility of installing and deploying the Virtualization Infrastructure SPI. She approaches *VISPI Expert* for assistance in understanding the product. They have the following conversations.

*Newbie:* While installing the HP Operations Agent on the managed node, system discovery did not start automatically. Did I miss a step in the installation?

*VISPI Expert:* While installing the Virtualization Infrastructure SPI select the correct options for architecture, operating system, and kernel version. When the installation completes, the system discovery will start automatically as expected.

To review the options that can be selected while installing the Virtualization Infrastructure SPI, see System discovery does not start automatically.

*Newbie:* After installing HP Operations Agent, I checked for the certificate. The certificate did not get installed. What happened?

*VISPI Expert:* This error may occur due to the firewall on the ESX server. The presence of a firewall can prevent the certificate request from the managed node to reach the server. To resolve this turn off the firewall.

To review the steps for turning off the firewall, see HP Operations Agent is deployed, but the certificate is not installed.

*Newbie*: I that some messages on the HPOM for Windows console for VI SPI show the virtualized infrastructure performance to be above normal while others are below normal. I understand the above normal threshold, but what does below normal mean?

*VISPI Expert:* This is due to automatic determination of thresholds for VI SPI policies. This is a new feature that is based on the Adaptive Thresholds Concept.

Distributed systems environments normally follow very predictable trends over time. Let's say that every Monday morning between 8am and 9am, the business domain controllers show excessive load because everyone is logging in after the weekend. This excessive load does not mean that there is anything wrong with server performance.

*Newbie*: This is expected high load. I would not want an alert for this.

*VISPI Expert:* Right. To overcome this problem, Virtualization Infrastructure SPI performance policies use adaptive thresholds, where the HP Operations agent learns from the performance characteristics and patterns, and statistically determine if the current utilization is normal or not. The thresholds are automatically calculated according to historic data.

Along with over-utilization of resources, it detects under-utilization of resources as well.

For more information see Adaptive Thresholds.

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