
HP Software

**Running HP Business Service
Management (BSM) in Virtual
Environments**

Best Practices



i n v e n t

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Introduction

HP Business Service Management (BSM) is a suite of software that acts as a performance dashboard to present a comprehensive view of the network, software and system operations of a corporate data centre. This software can include:

- Applications Performance Management – software designed to keep your business healthy by monitoring applications across traditional, mobile, virtual and cloud environments. It provides insight into every transaction, for quick resolution of application issues, and helps reduce costs by giving you a common tool for pre-production and production. Application Performance Management improves application performance by monitoring end-user experience and aligning IT performance with business goals. Detailed diagnostics and real-time topology-based analytics improve application quality.
- Operations Management i - universal event-correlation software for diverse IT domains. Via the HP Run-time Service Model (RTSM), OMi uses IT topology to automatically correlate related events for quicker and easier root-cause identification—essential in today’s complex virtualized and cloud environments—and for heightened efficiency of ITIL event and incident management.
- Network Node Manager i - provides powerful capabilities to enable your network operations team to efficiently manage a network of any size, reduce the business risk of downtime, and increase network service levels. NNMI is the one solution for managing fault, availability, performance and advanced network services for your physical, virtualized, hybrid, and cloud network environments.

HP BSM uses a number of data collectors to aggregate and report on the performance of a data center. Data collectors that are optional to HP BSM, but cannot be run without HP BSM include:

- HP Business Process Monitor (BPM)
- HP Real User Monitor (RUM)
- HP Transaction Vision (TV)
- HP BSM Connector

Data collectors that can integrate with HP BSM, but can also be run independently include:

- HP SiteScope
- HP Operations Manager (integrates via Operations Manager i)
- HP Network Node Manager (integrates via Network Node Manager i)
- HP Diagnostics

HP BSM can be installed on either physical or virtual servers. There are, however some best practices that need to be adhered to if this software is going to be successfully installed in a virtual environment. A list of supported virtual environments and a best practices section follows.

Officially Supported Virtual Environments

The following virtual environments are officially supported for HP BSM and for each of its data collectors:

- **HP Business Service Management (BSM) – Version 9.2x**
 - VMware ESX 3.x, 4.x, ESXi 5.x
 - Microsoft Hyper-V 2008 R2

- **HP BSM Data Collectors:**
 - **HP Business Process Monitor (BPM) – Version 9.22**
 - VMware vSphere Hypervisor (ESXi) 5.0
 - **HP Real User Monitor (RUM) – Version 9.22**
 - VMware ESX 3.x, 4.x, ESXi 5.x
 - **HP Transaction Vision (TV) – Version 9.22**
 - VMware ESX 4.x and VMware ESXi 5.x
 - **HP BSM Connector – Version 9.21**
 - No virtual platforms officially supported per documentation
 - **HP SiteScope – Version 11.22**
 - VMware VirtualCenter 2.x
 - VMware VirtualCenter 3.x
 - VMware ESX 2.5 via VirtualCenter 2.x
 - VMware ESX 3.x, 4.0, 4.1
 - VMware ESX 3.x via VirtualCenter 3.x
 - VMware ESXi 4.0, 4.1, 5.0, 5.1
 - VMware vCenter Server 4.0, 4.1, 5.0, 5.1
 - Microsoft Hyper-V 2008 R2
 - vSphere 4.1, 5.0, 5.1
 - **HP Operations Manager (OMW/OMU) – OMW/ OMU Version 9.0**
 - VMware ESX
 - VMware ESXi
 - VMware GSX / VMware Server
 - Microsoft Hyper-V
 - **HP Network Node Manager (NNM) – Version 9.22**
 - VMware ESX 3.5, 4.x
 - VMware ESXi 4.x, ESXi 5.x
 - Microsoft Hyper-V 2008 R2
 - Oracle Solaris Zones (Solaris 10)
 - HP Integrity Virtual Machines
 - **HP Diagnostics – Version 9.21**
 - VMware ESX 3.x, 4.x, ESXi 5.x

Best Practices

Introduction

HP Business Service Management (HP BSM) and each of its data collectors run as high performance software. Typically, each software application is designed to run as the sole or the primary software application on a physical server, with immediate and uninterrupted access to all of the servers' physical resources.

HP BSM and many data collectors have, however been installed successfully and have had some performance testing completed in virtual environments. As corporate data centers move more towards a virtualized environment, it is HP Software's desire to provide for **properly designed** installations of HP BSM and its data collectors on virtual servers.

Key Concerns

Many information technology organizations work in a business environment that is not able to make special considerations for running specialized, high performance software in a virtual environment. This type of deployment environment is characterized with the following traits:

- Deployment of virtual servers and the applications running on these servers is uniform across the enterprise. No exceptions can be made to this policy.
- All resources must be shared across large physical server. An administration team may allocate more **initial** resources to specific virtual instances or may **prioritize** specific virtual instances (required use of VMWare Distributed Resource Scheduler across the enterprise), but all resources **will be shared** across the physical server. Dedicated resources are not possible.
- No physical resources can be dedicated to a specific virtual instance or software application
- All virtual servers **must** be able to be dynamically moved to a different virtual machine on the same physical server or on a different physical server while applications are running (use of Vmotion on the VMware platform is required for all instances).
- All virtual servers **must** be able to be dynamically failed over to a different virtual machine on the same physical server or on a different physical server while the applications are running (use of VMWare failover clusters is required for all instances).
- Communication between the team that administers the software application and the team that administers the virtual infrastructure is limited. Virtual administrators are unaware of any special considerations that need to be made for HP BSM.

If HP BSM and its data collectors are to be installed in a virtual environment, flexibility and special consideration is key. Data centers which do not have a way to provide this flexibility or are not able to utilize virtual platforms that are officially supported by HP will be better served to install HP BSM and each of its data collectors on dedicated, physical servers.

Data centers who are setting up production, enterprised-sized monitoring infrastructure using HP BSM and its data collectors will be better served by installing HP BSM on dedicated, physical servers.

Virtual servers work well for limited-sized HP BSM installations that are typically used for:

- Proofs of concept
- Development, test and staging environments

Virtual servers can also work for larger BSM systems where:

- Physical servers can be dedicated
- Dynamic movement and failover of virtual servers can be disabled
- Distributed Resource Scheduling can be disabled
- There is close communication between the team that administers the software application and the team that administers the virtual infrastructure

Please consider that HP Software's official support for your virtual platform does not imply that any performance benchmark testing has ever occurred on that virtual platform.

Recommendations

HP Business Service Management (BSM) – Version 9.2x

- VMware ESX 3.x, 4.x, ESXi 5.x and Microsoft Hyper-V 2008 R2 are officially supported
- Use of virtual servers is not advised for **Extra-Large** sized **Model** deployments (as defined on the **Admin->Platform->Setup and Maintenance->Server Deployment** page of the BSM application)
- Use of a virtual server is **strongly discouraged for the BSM Database Server** (either Oracle or SQL Server).
- If virtual servers are being used for a production BSM system, we recommend:
 - Dedicating physical infrastructure for BSM (no additional virtual instances or applications running)
 - Using the same physical infrastructure for the Data Processing and Gateway servers
 - Disabling all dynamic movement (Vmotion) and failover of virtual servers that are hosting HP BSM
 - Disabling the VMware Distributed Resource Scheduler (DRS) to ensure that HP BSM's virtual servers have dedicated access to its assigned physical resources
- HP Software has not conducted or documented any performance benchmark testing of BSM 9.x on any virtualization platform. HP Software has performance benchmark testing of HP BSM 9.x with VMware on its future product roadmap. HP Software has performance benchmark tested [HP BAC 8.04 on VMware](#).
- HP BSM 9.x has had success on virtual servers for **Small** and **Medium** sized **Model** deployments typical of Development, Test and Proof of Concept type environments.
- If you are already on virtual servers and are moving to a physical environment, the priority of this move should be:
 1. BSM Database Server
 2. BSM Data Processing Server
 3. BSM Gateway Server(s)
 4. BSM Data Collectors – Depending on how highly loaded and your concerns

HP Business Process Monitor (BPM) – Version 9.22

- Deployment of BPM on VMware vSphere Hypervisor (ESXi) 5.0 is officially supported
- Note that HP cannot guarantee accurate transaction response time metrics from BPM measurements on virtual servers due to the nature of the Hypervisor scheduling and resource allocation. HP recommends following these guidelines when deploying BPM servers in a virtual environment to minimize potential metric inaccuracies:
 - For most scripting protocols (tested using http/web protocols):
 - Using Virtual Machine Hardware Version: Windows 7 VMX (VMX-7) or higher
 - Using 2 virtual CPU cores, 4GB of RAM, 40GB Disk
 - Limit concurrent running scripts (mdrv.exe processes) to 12
 - Limit total number of scripts (or applications) to 130
 - Limit total number of transactions to 1000 (based on running transactions every 15 minutes)
 - For TruClient protocol (typically requires more memory and CPU per Vuser):
 - Record the script using TruClient
 - Replay the script using a single Vuser in the controller and record the average CPU and memory consumption of the mdrv.exe process using **process CPU usage** and **process private bytes** counters.
 - In accordance with your BPM machine's hardware and the memory and CPU consumption of the single Vuser, calculate the number of concurrent Vusers possible per virtual machine. This example illustrates a calculation that could be adjusted to determine your capacity:
 - Assume a single Vuser consumes 80MB of memory and 10% of the CPU on average for a specific Business Process
 - Assume the Load Generating virtual machine has:
 - 8 virtual CPU cores
 - 4GB of RAM (3GB available for the Vusers)
 - If we limit the CPU utilization to 70%, we can have up to 7 Vusers per core (consuming $7 \times 10\% = 70\%$ CPU utilization).
 - With a total of 8 CPU cores, we can have up to 8 CPU cores * 7 Vusers per core = **56 Vusers per BPM machine**
 - We have approximately 3GB of memory available. $3\text{GB} / 80\text{MB} =$ approximately **37 Vusers per BPM machine**.
 - Select the lower of the bold numbers above (**37 Vusers per BPM machine**).
- From the HP [Business Process Monitor Deployment Guide](#):
 - HP cannot guarantee accurate transaction response times for BPM measurements on VMware. Therefore, HP will not address or solve any support issues regarding transaction response times, except if the same behavior can be reproduced on a physical system.
 - Dedicated (not shared) resources for the BPM VMware instance (CPU cycles, memory, and so forth) is mandatory.
 - A Gigabit network should be used.
 - **Vmotion and DRS (Distributed Resource Scheduler) are not supported.**
 - The total amount of configured resources for all the virtualized environments within the same ESX server (for example, memory or CPU) must not exceed the ESX server's physical resources.
 - There is no hardware capacity calculator for determining the number of BPM scripts on a single BPM instance.
 - The key to effective performance benchmarking and service level management is having a consistent and reliable monitoring foundation. Consistency provides a basis for long term trending of metrics, comparison of metrics from one period to another, and the eventual support of contractual obligations associated with ServiceLevel Management. It is acceptable to have the metrics vary from the actual performance as long as they are consistent. If the metrics are not consistent in their variation or relation to the actual business service, then they cannot be used for production monitoring or performance analysis because no appropriate baseline will compensate for the variations. For this reason, response time metrics are not supported on VMware environments.

HP Real User Monitor (RUM) – Version 9.22

- VMware ESX 3.x, 4.x, ESXi 5.x are officially supported platforms for both the RUM Engine and the RUM Probe
- HP Software has not conducted or documented any performance benchmark testing of HP RUM on any virtual server.
- Per the [RUM Installation and Upgrade Guide](#): **For production systems, you must install the RUM Engine, Probe, and database on separate physical disks, or on any high performance storage system.**
- Read Chapter 6 of the [RUM Administration Guide: Duplicating Traffic for HP Real User Monitor with VMware](#). This chapter describes the challenges, considerations and solutions for deploying a RUM Probe on a VMware virtual server. This documentation describes and recommends:
 - Switch alternatives (regular virtual switch (VS) or distributed virtual switch (DVS))
 - Configuring ports and port mirroring
 - Limitations when using network taps and switch port mirroring
 - Limitations and best practices when attempting to monitor traffic when Vmotion is enabled
 - The alternative of using Virtual Dedicated Taps
 - The advantages of installing a RUM Probe on the same ESX server as the monitored application
 - The advantages of installing the RUM Server Collector on the same ESX server as the monitored application
 - Security considerations
 - Additional references

HP TransactionVision (TV) – Version 9.22

- VMware ESX 4.x and VMware ESXi 5.x are officially supported platforms
- HP Software has not conducted or documented any performance benchmark testing of HP TV on any virtual server.
- From the [BSM 9.22 TransactionVision Deployment Guide](#) please note:
 - Sizing guidelines for a regular installation are **not** applicable
 - Performance of TransactionVision on a virtual machine can be expected to be slower than in a regular installation
 - TransactionVision capacities and performance vary according to the various server resources, such as CPU, memory, and network bandwidth, allocated to TransactionVision components.
 - It is **highly recommended** that you use dedicated (physical) hardware for the Processing Server and database server in production environments where performance is a concern.
 - It is **strongly recommended** that you do not run a database server containing TransactionVision databases on a virtual machine if the database files reside on a virtual disk.
 - Use a Gigabit network card.

BSM Connector – Version 9.21

- No officially supported virtual platforms listed in the *HP BSM Connector Release Notes* or in the *HP BSM Connector Installation and Upgrade Guide*.
- HP Software has not conducted or documented any performance benchmark testing of HP BSM Connector on any virtual server.
- HP will not address or solve any support issues regarding BSM Connector performance unless the same behavior can be reproduced on a physical system

HP SiteScope – Version 11.22

- All information below is documented in the [HP SiteScope 11.21 Deployment Guide](#) and the [HP SiteScope 11.22 Deployment Guide](#).
- VMware VirtualCenter 2.x, VMware VirtualCenter 3.x, VMware ESX 2.5 via VirtualCenter 2.x, VMware ESX 3.x, 4.0, 4.1, VMware ESX 3.x via VirtualCenter 3.x, VMware ESXi 4.0, 4.1, 5.0, 5.1, VMware vCenter Server 4.0, 4.1, 5.0, 5.1, vSphere 4.1, 5.0, 5.1, Microsoft Hyper-V 2008 R2 are officially supported platforms
- For VMware, VMware tools must be installed on the guest operating system.
- The use of VMotion on VMware is **not supported** for ESX servers hosting SiteScope
- **For better performance and stability, especially in a highly-loaded SiteScope environment, it is recommended to use physical hardware.**
- HP Software has tested **SiteScope 11.21** on the following Virtual Platforms: VMware ESX 3.0 and 4.0, VMware Virtual Center 3.0, VMware vSphere 4.1 and 5.0. HP Software has not released performance benchmark testing documentation of HP SiteScope on any virtual server.
- The following configuration was functionally tested and is considered to be a guideline for production environments. These are not hard-and-fast support limitations, but going beyond this configuration and expectations will increase the risk of problems occurring:
 - VMware Configuration:
 - 4 VMware Virtual Machines (VM) on one physical server
 - Each VM with 2 CPUs at 2.39GHz, 8 GB memory, and 40 GB disk space
 - Storage used is HP EVA 8400/22G
 - Physical server: ESX host is HP BL490c G6 with 8x Intel Xeon x5570 CPU, 72GB RAM with VMware ESX 4.0 U1
 - No other VMs resident on this physical server
 - VMTools must be installed
 - The resources allocated to the SiteScope VM **should not be shared** with other VMs.
 - SiteScope Configuration:
 - 750 Remote Servers Monitored
 - 9000 Total Monitors
 - 900 Monitor Runs Per Minute
 - Minimum System Requirements (not a limitation, but a guideline)
 - Computer/Processor: 4 Intel Xeon physical processors, 2 GHz each
 - Operating System: Microsoft Windows 2003 Standard/Enterprise SP2
 - Memory (RAM): 4GB
 - Free Hard Disk Space: 20GB
 - Hard Disk Speed: 7200 rpm
 - Network Card: 1 **physical** gigabit Network Interface Card
 - Other Software: VMTools must be installed
 - Note: Monitor capacity and velocity can be significantly impacted by numerous factors including, but not limited to the following: SiteScope server hardware, operating system, patches, third-party software, network configuration and architecture, location of the SiteScope server in relation to the servers being monitored, monitor types and distribution by type, monitor frequency, monitor execution time, Business Service Management integration, and Database Logging. The published maximums should not be assumed to be possible in every environment.

HP Operations Manager (OMW/ OMU) – OMW/ OMU Version 9.0

- VMWare ESX, VMWare ESXi, VMware GSX / VMware Server, Microsoft Hyper-V are each supported
- VMWare Vmotion **is** supported for Operations Manager server
- Performance throughput (events per second) may be lower on virtual platforms, but Operations Manager will buffer all events in its application buffers. Data is not lost and application remains stable. Because of this, Operations Manager may be the least risky data collector to deploy on a virtual servers.
- If extensive performance degradation is noticed it is a best practice to increase available virtual resources.
- Please refer to your database vendor support site for virtualization specifications applicable to Oracle and Microsoft SQL Server VM environments. Operations Manager is dependent on a database that is validated as supportable by the database vendor.

HP Network Node Manager (NNM) – Version 9.22

- All information below is documented in the [NNM 9.22 System Support Matrix](#).
- VMware ESX Server 3.5, ESX Server 4.0 or later minor version, ESXi 4.1 or later minor version, ESXi 5.0 or later minor version.
 - Only supported for the Windows or Linux operating systems.
 - Virtual environment must meet the x86-64 or AMD64 hardware requirements listed here.
 - Bridged network environment required. NAT'ed network environments are **not** supported.
 - Note: Since ESX Server 3.5 only supports 4 CPU cores, it is only appropriate for the Entry or Small Tier.
 - VMware Vmotion of the NNMi management server **is** supported.
 - For Very Large Tier environments on VMWare ESXi, the [Deploying NNMi in a Very Large Tier VMWare ESXi Linux Environment](#) white paper must be read and adhered to.
- Microsoft Hyper-V 2008 R2
 - Host OS: Windows Server 2008 R2 x64 with Service Pack 1
 - Guest OS: Only supported for the Windows operating systems.
 - Only supported for Medium Tier environments or lower.
- Oracle Solaris Zones (Solaris 10)
 - Only supported for Medium Tier environments or lower.
- HP Integrity Virtual Machines
 - Only supported for the HP-UX operating system.
 - Only supported for Medium Tier environments or lower

HP Diagnostics – Version 9.21

- VMware ESX 3.x, 4.x, ESXi 5.x are officially on each server supported per the [Diagnostics Server 9.20 Support Matrix](#).
- System requirements for virtual server deployments are identical to system requirements on physical server deployments and are illustrated on page 29 of the [Diagnostics 9.21 Release Notes](#).
- Instructions for configuring a Diagnostics Collector for collection of data on VMware nodes are specified on page 123 of the [Diagnostics 9.21 Installation and Configuration Guide](#).
- There are additional requirements for Time Synchronization of Diagnostics Java Probes running on VMware on page 512 of the [Diagnostics 9.21 Installation and Configuration Guide](#).
- Diagnostics Java Probes running on VMware do not work on every Operating System. A list of Operating Systems is available by examining the 'Works in VMware' column in the [Diagnostics 9.20 Java Agent](#) document.
- There are additional requirements for Time Synchronization of Diagnostics .NET Probes running on VMware on page 628 of the [Diagnostics 9.21 Installation and Configuration Guide](#).

Conclusion

HP BSM and its data collectors can be installed on either physical or virtual servers. There are, however some best practices that need to be adhered to if this software is going to be successfully installed in a virtual environment. Users of HP BSM and its data collectors should use this document as a precautionary device. Performance of HP BSM and each of its data collectors installed on virtual servers will be significantly lower than deployments on physical servers.

The best practices listed above for HP BSM and for the data collectors you are using may be difficult or impossible to be adhered to in your environment. If this is the case, we recommend using physical servers for HP BSM and any of the data collectors that present adherence challenges.

For high performance, highly loaded production HP BSM systems, physical servers are recommended for the HP BSM servers to ensure peak performance at all times and to reduce risk.

For high performance, highly loaded BSM data collectors, it is imperative to review the support policies and best practices for the data collector. A thorough review of the support policies and best practices for each utilized data collector will provide guidance and help customers decide whether a physical or virtual system is appropriate.

For high performance, high loaded database servers (for either BSM or its data collectors), it is generally not a best practice to use a virtual server to host a database. Check with your database vendor for their support policies and performance implications.