White paper

Fujitsu Software ServerView solution with VMware

VMware vSphere (ESXi – V5.x)

1. Overview

Virtualization solutions from Fujitsu

Fujitsu is committed to total virtualization – from servers to storage to networks – and to virtualization software and operation management tools. The partnership between VMware and Fujitsu brings you continuity of technology assets, more efficient resource use, and steps toward the elimination of IT complexity.

Fujitsu has considerable experience in developing mainframe solutions and developing proprietary virtualization technologies, and now combines that experience and solutions with best in class partners like VMware to provide bundled solutions for servers, storage and network – this allows for speedy implementation of a proven, easy-to-use system with fast return on investment.

VMware and Fujitsu Software ServerView integrated virtualization support

VMware vSphere is a suite of software products for providing virtualization solutions, which is the industry standard in terms of reliability, performance and ecosystem support. It is the industry-leading virtualization platform for building cloud infrastructures. vSphere accelerates the shift to cloud computing for existing datacenters and underpins compatible public cloud offerings. Fujitsu PRIMERGY rack, tower and blade servers have been optimized to support VMware's server virtualization technology since many years. All current-generation PRIMERGY server models from Fujitsu are tuned to deliver best results in performance, efficiency and reliability for VMware's cloud computing platform, providing a solid foundation stone for datacenter consolidation projects.

ServerView supports the CIM management standard, making it possible to monitor and manage VMware vSphere based environments more reliably and securely. Administrators can view all physical and virtual machines through a single interface, with automatic grouping of VMware vSphere hosts making administration simpler.

ServerView Operations Manager is the server monitoring software where PRIMERGY servers and associated storage extension units in the network can be monitored and analyzed, and it includes VMware management. It automatically detects virtual machines and can show the status of hosts and guests. This offers single point of console management and the advantage of ServerView Event Management for alerting.

2. Using the Fujitsu Software ServerView solution with VMware

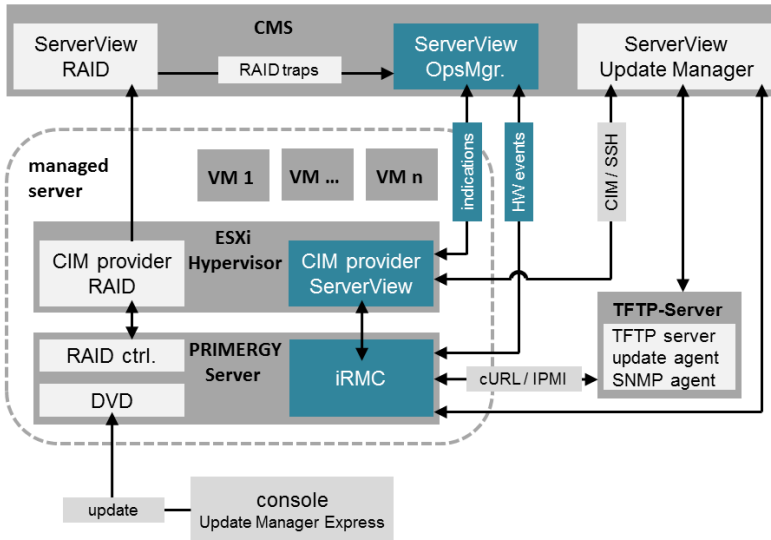**ServerView Operations Manager and ServerView ESXi CIM provider**

ServerView Operations Manager enables you to use the ServerView ESXi CIM providers to monitor VMware vSphere based servers. Fujitsu provides various possibilities for installating/upgrading or updating ServerView ESXi CIM providers – more information is available under "6. Software provision and installation notes". Additional information sources for ServerView Operations Manager for a VMware vSphere based server are the ServerView RAID Manager and the iRMC monitoring function.

Monitoring

ServerView Operations Manager provides a browser-based console for managing the servers and representing the information determined. The managed servers are automatically displayed in a server list, which can be structured as required. Integrated grouping and filter options offer improved clarity, particularly in larger networks.

ServerView Operations Manager detects VMware vSphere based servers with their network address, model, and operating system information. The virtual servers associated with the host server can be displayed in the server list under the entry for the host server with their current VMware names. In addition, there are individual views in which you can query information about the host server and the virtual machines installed on it.

For monitoring purposes, the following information sources are evaluated:

- o   CIM-based using the ServerView ESXi CIM providers,
- o   Monitoring messages from iRMC, and
- o   Information from ServerView RAID Manager.

Figure 1: Monitoring of VMware vSphere based servers with ServerView
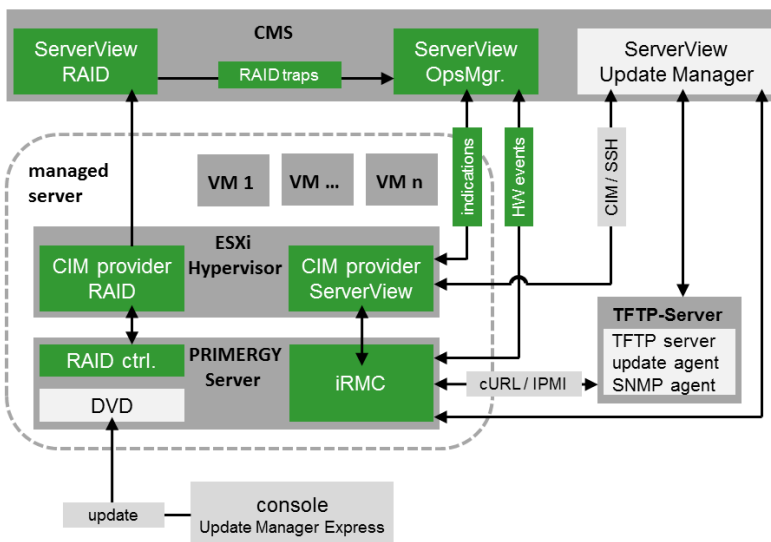
Additional monitoring tools:

In addition to ServerView Operations Manager, an extended ServerView environment provides additional monitoring tools for monitoring a VMware vSphere-based server:

- o   The ServerView RAID Manager console for information from the RAID CIM provider
- o   The iRMC monitoring function for the iRMC monitoring data

Event Management

The configurable alarm system in ServerView Event Manager ensures that reliable information about faults that occur is available rapidly. This results in a targeted response: System messages are detected, evaluated, filtered, forwarded and saved.

ServerView Event Manager integrates the following components into ServerView Operations Manager:

- o   Alarm Monitor:
  In the ServerView Operations Manager main window, the alarms for the selected servers are displayed.
- o   Alarm Configuration:
  You can configure settings for handling alarms: Alarm rules, filter rules, and general settings.

The messages of the ServerView ESXi CIM providers, that are CIM-based recorded, and the iRMC messages are evaluated.

Integration in VMware vCenter

Fujitsu has implemented the ServerView Plug-in for VMware vCenter to the vSphere Web Client for vCenter. Via the ServerView Plug-in for VMware vCenter, the system event log of an PRIMERGY system can be viewed including specific cause and resolution information. For further information see "3.   Integration in VMware vCenter".

Figure 2: Event Management of VMware vSphere based servers with ServerView (up to V5.3)

Alarm management with ServerView

In order to be able to communicate with a server using VMware vSphere, ServerView logs in as a "subscriber" on the Small Footprint CIM Broker (SFCB – CIMOM), which is part of VMware vSphere (1). This login qualifies ServerView to receive messages about defined events form VMware vSphere from now on.

The CIMOM (SFCB) informs the task-specific CIM providers which events messages are required for under the new subscription (2).

The CIM providers use hardware-related protocols to monitor the server infrastructure (3). They convert the data identified into specific messages and forward these to the CIMOM (SFCB) (4).

On the ServerView side, the indication notifications reach the CIM listener (5) via the CIM/XML protocol, which then forwards the event messages to the alarm manager of the ServerView alarm management (6).
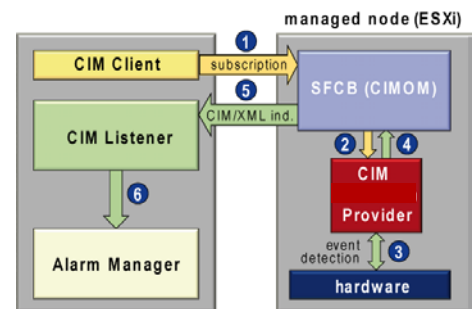
Alarm management for iRMC

As an autonomous system on the system board of a current PRIMERGY server, the iRMC features independent alarm management. The ServerView alarm management evaluates the iRMC alarm management. Furthermore, this alarm management enables you to configure how an alarm is forwarded to ServerView Operations Manager. If this SNMP trap forwarding is enabled, the iRMC send traps to the ServerView alarm management.
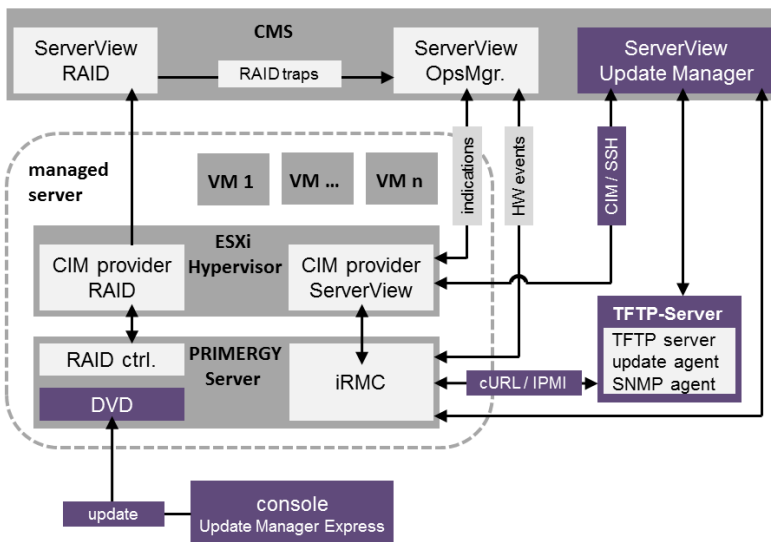

Figure 3: CIM-based information in ServerView Alarm management

Power Management

As well as power management for the physical host server, ServerView Operations Manager provides power control functions for the virtual machines that are installed on it.

Power management in ServerView Operations Manager is utilized by selecting the relevant server from the server list. The functions available (for example, Power ON, Power OFF, Shutdown) can be used on both physical servers and virtual servers.

Update Management

The ServerView Suite provides two separate tools, with which components of the managed servers can be updated:

Figure 4: Update Management of VMware vSphere based servers with ServerView

ServerView Update Manager Express

For the local modification of individual systems the ServerView Update Manager Express is used, which is included as a complete package on the ServerView Update DVD (see"6.   Software provision and installation notes"). The update is performed with the aid of self-extracting and self-installing packages, so-called Autonomous Support Packages (ASPs) for firmware and BIOS. You can update components of a VMware vSphere based server by booting from a ServerView Update DVD or the image of the ServerView Update DVD from a bootable USB stick.

ServerView Update Manager

Centralized Management of server updating provides the ServerView Update Manager (see "5.   Further documentation"). In this case, the software uses a previously created repository in the data center, which is filled with ASPs by download or via the installation DVD.

On a VMware vSphere based server ServerView Update Manager (version 6.2 and higher) enables you to update the BIOS and the firmware of the Baseboard Management Controller (iRMC) in case of a recent PRIMERGY server model with iRMC S3 or S4. Installed ServerView ESXi CIM providers on the VMware vSphere based server and enabled SSH access are required. For further information about steps and functioning (e.g. communication paths: CIM, SSH, IPMI and cURL) see the manual "ServerView Update Management" (see "5.   Further documentation").

RAID Management

ServerView RAID Manager allows you to monitor and manage all RAID controllers installed in PRIMERGY servers centrally and based on CIM.
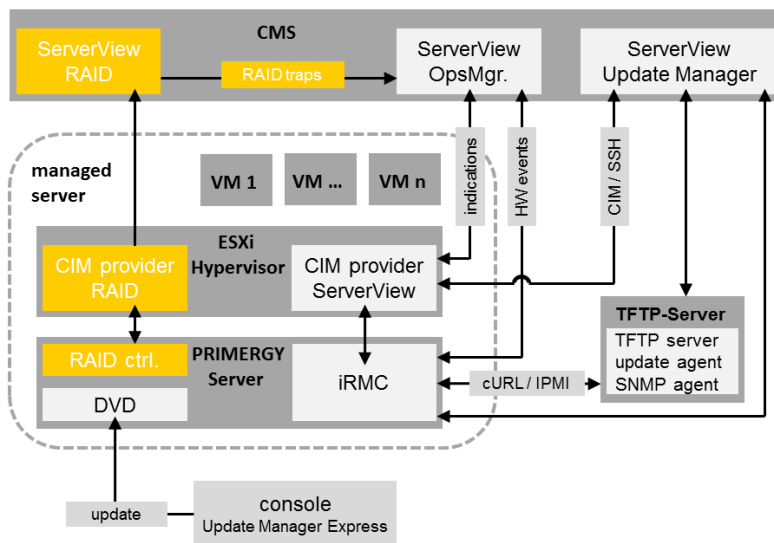

Figure 5: Update RAID Management of VMware vSphere based servers with ServerView

ServerView RAID Manager forwards its alarms, so that you can access it using the ServerView Operations Manager interface.

In addition, ServerView RAID Manager has its own graphical interface and a command line interface. To manage VMware vSphere based servers, ServerView RAID Manager is installed on the central management station.

Integration in VMware vCenter

Fujitsu has implemented the ServerView Plug-in for VMware vCenter to the vSphere Web Client for vCenter (see "3.   Integration in VMware vCenter") which shows the values of a host system provided by the ServerView ESXi CIM providers and the LSI CIM providers. The *Storage* view of the ServerView Plug-in for VMware vCenter offers an overview of the RAID controllers found on the host and details on their logical drives an physical disks.

3.   Integration in VMware vCenter

ServerView ESXi CIM providers and VMware vCenter

ServerView ESXi CIM providers are following the CIM standards defined by the DMTF (see section "Architecture" - "Hardware management with CIM"). Due to the importance of hardware mangement, PRIMERGY servers are equipped with a high number of sensors, which are not covered within the CIM standard definition. ServerView ESXi CIM providers are therefore using also non-standard objects, which are presented in Fujitsu Software ServerView. Fujitsu PRIMERGY servers are also providing sensor information to VMware vCenter. VMware vCenter presents hardware related information at the hardware tab to the administrator. That information on PRIMERGY servers and their components is not as comprehensive as using Fujitsu Software ServerView, since vCenter will search for objects following the common part of the CIM specifications.

ServerView Plug-in for VMware vCenter

Fujitsu has implemented the ServerView Plug-in for VMware vCenter to the vSphere Web Client for vCenter. Located in the hosts Monitoring subtab of the vSphere Web Client, the ServerView Plug-in for VMware vCenter provides detailed information about PRIMERGY servers. This information includes properties of the system, fans, temperature sensors, power supplies, system processors and memory modules. In addition, the system event log can be viewed including specialized cause and resolution information. It provides the ability to turn the system identification led on/off and start the iRMC web interface or a remote console. If the server is a blade, the MMB configuration web application can be started as well. For further information see the manual "ServerView Plug-in vor VMware vCenter" (see "5.   Further documentation").

4.   Architecture

VMware vSphere

VMware vSphere is a suite of software products for providing virtualization solutions for data centers. The suite is made up of serveral components – like e.g. VMware ESXi, vCenter Server, VMware vSphere (Web) Client. For licensing these components are combined into different VMware vSphere Editions and VMware vSphere Kits (see "6.   Software provision and installation notes").

VMware vSphere and CIM

VMware vSphere 5 bases on the VMware ESXi hypervisor architecture. Management tasks for VMware ESXi are performed using a remote command line interface, a Web interface or the VMware vSphere Client. For interaction with ServerView VMware ESXi has been equipped with CIM providers, which compy with system management standards.

Hardware management with CIM

With the Common Information Model (CIM) the Distributed Management Task Force (DMTF) devised an object-oriented standard for management information in IT environments, which defines the description of the managed units, their construction and their relationships with one another. Object orientation makes CIM a comparatively powerful model, which can handle classes, inheritance and relationship concepts, object paradigms and methods. When implemented, CIM and WBEM use an infrastructure consisting of CIM Object Manager (CIMOM) and CIM providers:

CIMOM is the central software component that receives and processes WBEM queries. CIMOM knows which classes exist and which system components they correspond to. To keep CIMOM as flexible as possible, it does not access the managed system resources directly. Instead, WBEM makes use of a modular concept, with a CIM provider used for each instance of a class. Thus, a CIM provider is a software component that allows management access to device drivers and hardware components. Conceptually, these providers specialize in a particular management task and are designed for as small a range of programs as possible. CIMOM forwards external queries, e.g. from management software, to the CIM providers and/or collates their information and returns the result to the requesting application using standard APIs.
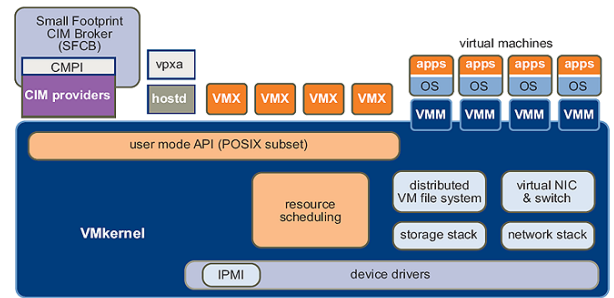
Figure 6: Architecture or VMware vSphere
(Source: www.vmware.com)

5.   Further documentation

Documentation on ServerView Suite:
Further documentation on the "Fujitsu ServerView solution with VMware", "ServerView Operations Manager", "RAID Management", "ServerView Installation Manager", "ServerView Update Management", and other ServerView Suite products is available on the Fujitsu website at
http://manuals.ts.fujitsu.com :   x86 Servers – Software – ServerView Suite – Operation/Virtualization.
The image of the ServerBooks DVD is available at ftp://ftp.ts.fujitsu.com/images/serverview.

Documentation on VMware vSphere:
Further documentation on the VMware vSphere products is available on the VMware website at
http://pubs.vmware.com/vsphere-55/index.jsp

6.   Software provision and installation notes

Fujitsu provides the following possibilities for installation/upgrading or updating ServerView ESXi CIM providers:

Fujitsu Custom Offline Bundle ESXi

Image for **updating** a VMware vSphere Hypervisor installation
– It contains the latest VMware ESXi patch, the ServerView ESXi CIM providers (incl. RAID), and the latest drivers for PRIMERGY hardware.
Installing *Fujitsu Custom Offline Bundle ESXi* is described in "Quick Guide. Installation of ESXi-based PRIMERGY Servers for Server Management with ServerView" (http://manuals.ts.fujitsu.com or ServerView DVD).
You can also use *vCenter Update Manager* for the installation of *Fujitsu Custom Offline Bundle ESXi*. More information on this is available in the VMware documentation.

Fujitsu Custom Image ESXi

Image for the **initial installation** of a VMware vSphere Hypervisor installation or for the **upgrade** of an existing installation to the following VMware vSphere major-version (e.g. from 4.1 to 5.0)
– It contains the latest VMware ESXi patch, the ServerView ESXi CIM providers (incl. RAID), and the latest drivers for PRIMERGY hardware.
ServerView Installation Manager supports this installation procedure.

ServerView ESXi CIM-Provider

Individual components for updating
– The update of the *ServerView ESXi CIM providers* (incl. RAID) on an existing VMware vSphere system is the same as a classical VMware vSphere update.
The VMware documentation describes in more detail how to install, remove, and update VMware vSphere enhancements.
Please note: The ServerView ESXi CIM Provider for Event Management is not available until ESXi version 5.0 or later.
ServerView ESXi CIM providers versions:
- *ServerView ESXi CIM providers* version 6.20.01 or former are released with the vib acceptance level *VMwareAccepted*. They are released for ESXi V4.x and V5.x.
- *ServerView ESXi CIM providers* version 6.21.01 or later are released with the vib acceptance level *PartnerSupported.* They are released for ESXi V5.x.

You can obtain the required software components in the following ways:

Fujitsu Custom Image ESXi	*Fujitsu Custom Offline Bundle ESXi*	*ServerView ESXi CIM Provider*
o *Download from the Fujitsu website:* http://support.ts.fujitsu.com Drivers & Downloads – Vmware – [vSphere Version] – ESXi Images	o *Download from the Fujitsu website:* http://support.ts.fujitsu.com Drivers & Downloads – Vmware – [vSphere Version] – ESXi Images	o *Download from the FUJITSU ServerView Software Suite DVD:* ServerView – Agents and Providers – Linux and VMware Content: http://support.ts.fujitsu.com/prim_supportcd/ Image: ftp://ftp.ts.fujitsu.com/images/serverview
o *Download from the VMware website:* https://my.vmware.com/en/web/vmware/downloads VMware vSphere: Downlaod Product – Select Version:<version> – Custom ISOs Click the **>** sign in front of *OEM Customized installer CDs*.		o *Download from the Fujitsu website:* http://support.ts.fujitsu.com Drivers & Downloads – Vmware – [vSphere Version] – Server Management Software – ServerView ESXi CIM Provider
o *Order with a new PRIMERGY Server:* "Embedded VMware vSphere Hypervisor" is available as an option for certified PRIMERGY servers.		

ServerView Suite – Update DVD

Contains the Update Manager software and the Update Repository (updates of BIOS, firmware, agents or drivers for PRIMERGY servers). Download from the Fujitsu website: ftp://ftp.ts.fujitsu.com/images/serverview

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7.   Licensing the software

Licenses for VMware vSphere are available from Fujitsu or from VMware.

License for ServerView Suite

The ServerView ESXi CIM providers are subject to the general terms and conditions of business from the software usage and service agreement with Fujitsu Technology Solutions. The ServerView Suite is a licensed software component of the PRIMERGY server hardware. It may only be used with hardware, software, or services from Fujitsu Technology Solutions. The terms of the end user license agreement for the Serverview Suite, regulating copying and distribution of the software to third parties, must be complied with. Further information can be found in the end user license agreement (EULA) on ServerView Suite DVD or at http://support.ts.fujitsu.com/prim_supportcd/SVSSoftware/start.html.

License for VMware vSphere

VMware offers VMware vSphere Hypervisor as a free product to get started with virtualization at no cost. But from Version 3.5 Update 4 VMware has restricted write privilegs to am VMware based server. This means that various functions are not available – including starting and stopping virtual machines or correctly displaying the status of the VMware based host. If you are using VMware vSphere Hypervisor with a free license, you must switch to a version with a paid license.

VMware vSphere includes a variety of functions whose availability depends on the license for the relevant VMware vSphere Edition or Kit. An upgrade of those editions or kits is possible by entering the relevant license key without the need to install or upgrade the image.

VMware currently supplies the following levels (in increasing order of the range of functions):

Edition	Target group
VMware vSphere Standard	Entry-level solution for basic server consolidation
VMware vSphere Enterprise	Robust solution that customers can use to optimize IT assets, ensure cost-effective business continuity and streamline IT operations through automation
VMware vSphere Enterprise Plus	Ideal solution for cloud computing

Update to VMware vSphere 5 - You must obtain new licenses to deploy VMware vSphere. Your existing vSphere 4 licenses will not work on vSphere. The vSphere 4 Advanced edition will be not anymore available with vSphere 5. Customers who currently have vSphere 4 Advanced edition will bei mapped to vSphere 5 Enterprise edition.

Further information can be found at: http://www.vmware.com – Products – Datacenter Products – VMware vSphere

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8. Security issues

The "lean" virtualization of the bare metal solution VMware vSphere makes it easy to safeguard the server environment:

- o The reduced code basis means that VMware vSphere provides significantly fewer opportunities for attacks and security gaps than other virtualization solutions.
- o VMware vSphere is independent of a higher-level partition or a console, which is based on an all-purpose operating system. This results in fewer interfaces, which could also be used for attacks.
- o Unstructured, console-based administration interactions are replaced by authenticated and tested interfaces such as the VI client and remote CLI.

Virtualization software, like other infrastructure software, requires a possibility to manage the solution components. This is done using a management interface, which combines virtualization ghosts, management servers, IP-based storage and additional services, for example authentication and monitoring. Isolation of virtual machines from the hypervisor interfaces is the most important step towards achieving secure virtual provision in development and implementation of a strict separation or the management level from other network traffic. This reduces the risk of attacks on virtual machines, with effects on the virtualization levels of the other virtual machines.

Up to VMware vSphere 5: The ESXi management interface is protected by a service-oriented and stateless firewall, which you can configure – for example – at the command line with excli interfaces.