Overview

HP Scalable Visualization Array Software Version 2.0 provides a high performance visualization capability to users of an HP Cluster Platform system equipped with the HP Scalable Visualization Array option. This capability is provided in a shared, multi-user, multi-session environment, based on the XC System Software. Rendered 3D images may be delivered locally, or may be delivered remotely by using optional software.

Product Overview

HP Scalable Visualization Array Software (HP SVA Software) extends HP XC System Software to provide a comprehensive set of services for deployment of visualization applications, allowing them to be conveniently run in a Linux clustering environment. Key capabilities include:

- Extends XC System Software for scheduling and running of visualization applications within the XC environment
  - Supports capturing and managing visualization-specific cluster information
  - Manages visualization resources and provides facilities for requesting and allocating resources for a job in a multi-user, multi-session environment
  - Provides display surface configuration tools to allow easy configuration of multi-panel displays
  - Provides launch tools, both generic and tailored to a specific application, that launch applications with appropriate environments and display surface configurations
  - Provides tools that extend serial applications to run in a clustered, multi-display environment
- Extends XC System Software to include qualified versions of the necessary graphics drivers and open source libraries for the supported configuration, with these properties:
  - Best/appropriate version of each module
  - Built and qualified on the CP/XC platform
  - Verified integration with other Open Source modules
  - Verified integration with elements of XC and CP
- Provides a parallel compositing library that simplifies the task of distributed rendering and image compositing
- Provides online documentation within a graphical interface for ease of access

HP SVA Software together with HP XC System Software and HP StorageWorks Scalable File Store provide a seamless solution for computing, storing and visualizing data. This combination of software on the Cluster Platform System also provides a reference platform for certification of third-party and Open Source middleware and applications.

Standard Features

Technology Components

HP Scalable Visualization Array Software contains the following main pieces of visualization support infrastructure:

- Visualization System Software (VSS): VSS is a set of HP-developed tools that provide additional resource management, configuration and application launch components specific to the HP SVA hardware option. VSS support includes a number of useful features to help in a variety of important tasks:
  - A Display Configuration Tool lets system administrators define single and multi-panel displays.
  - User Interface support makes it possible to integrate an application's 2D user interface with the rendered 3D image on the display device.
  - The Application Launch Components simplify the use of installed launch scripts. These scripts encapsulate a series of commands and functions for running a distributed visualization application. Underlying the scripts is a set of useful functions, environment variables, and a cluster configuration database. Users can customize the scripts and use features of the configuration database to develop site-specific and user-specific launch characteristics. Both single and multi-user systems are supported.
- Drivers: Linux drivers for the NVIDIA® FX 1500, FX 3450, FX 3500, FX 4500, FX 5500, and G-Sync graphics cards.
- Open Source Technology Components (see the table below).
- Remote Access: Using the optional HP Remote Graphics Software, users can launch, manipulate, and view rendered images on hosts external to the SVA.

The following table lists the Open Source components that have been included with the HP SVA Software. The table shows the version number and source URL used for integration in the HP SVA Software. All of this technology is covered by HP software support contracts for Scalable Visualization Array Software, provided that the only changes made to the software are those authorized by Hewlett-Packard.

Key Open Source Technology Components		
Name	Version	URL
freeglut	2.2.0	http://freeglut.sourceforge.net/
Chromium	1.9	http://sourceforge.net/projects/chromium/

Installation and Configuration

HP Scalable Visualization Array Software is delivered on a single CD, which includes all the rpms (software installation packages) and a complete online Help Library. Generally, new HP SVA systems arrive at the customer site with HP XC System Software and the HP SVA Software and online Help Library pre-installed. The configuration is recorded in a Site Configuration File by HP before it leaves the manufacturing facility.

A full installation of an SVA system begins with a typical HP XC System Software installation on the head node. The system administrator is then prompted to insert the HP SVA Software CD, which installs the rpms needed to completely image the head node. Once that process finishes, the resulting image is propagated to all the other nodes in the SVA System using standard HP XC System Software installation procedures. Any site-specific configuration takes place at this point, for example, auto-mounting and NIS data specification.

Finally, the system administrator uses a system configuration tool to record the SVA configuration in the Site Configuration File. This is required whenever a full install takes place or nodes are added or removed from the SVA. System administrators can also make changes to the Site Configuration File to suit their own site environments.

The software installation procedure and site configuration process are documented in the online Help Library.

Standard Features

File System

HP XC System Software supports NFS versions 3 and 4 including both client and server functionality. XC System Software also enables Lustre client services for high-performance and high-availability file I/O. These Lustre client services require the separate installation of Lustre software, provided with the HP StorageWorks Scalable File Share (SFS). See the HP XC System Software and the HP StorageWorks Scalable File Share QuickSpecs for more information. All of these file system resources are available to applications running on visualization nodes.

Visualization Resource Management

HP Scalable Visualization Array Software supplies tools to build and maintain a set of Configuration Data Files describing the visualization resources provided by the Scalable Visualization Array components. Both a Site Configuration File and multiple User Configuration Files are provided. These files are used by system administrators, users and the job launch system to manage and allocate visualization resources, including visualization nodes, attached display devices, and applications.

The Site Configuration File is created after installing HP SVA Software on the cluster. A post-installation discovery process (the svaconfigure Utility) can be run after software installation to identify all the nodes in the cluster, characterize them by role, and define all the Display Surfaces. Each Display Surface represents one or more display nodes and their associated display device, and is defined by the display nodes and the display devices that are physically attached to them. In the event that the user adds or removes nodes from the cluster, the system administrator must re-run the cluster discovery process using the svaconfigure Utility.

The initial generation of the Site Configuration File cannot automatically specify all the Display Surfaces because they are site-specific and may change. Furthermore, it cannot determine how multiple display devices are arranged when used as a single Display Surface. For example, if there are two display devices, they may be arranged from left-to-right or top-to-bottom. To complete the Display Surface definitions, the Display Surface Configuration Tool is provided for the system administrator. This tool lets the user do three tasks:

- List existing display surfaces (any user).
- Create new display surfaces (requires root privileges).
- Delete existing display surfaces (requires root privileges).

Each user of the system is provided an associated User Configuration File. This file is a convenient method of defining each user's specific preferences and requirements when using the SVA system. The User Configuration File can override some of the default assumptions set up in the Site Configuration File. If a user has access to several different SVA systems, a User Configuration File can be created for each system.

Visualization Application Launch

The HP Scalable Visualization Array Software provides the necessary tools and settings to allow visualization applications to be conveniently deployed on an XC system. HP SVA Software provides support for the following activities necessary to successfully launch an application:

- Define the desired display configuration
- Allocate the required resources such as visualization nodes and display surfaces
- Setup the environment and launch necessary servers and processes
- Run the visualization application
- Terminate the application cleanly, stopping servers and releasing resources

Standard Features

Parallel Compositing Library

The HP Scalable Visualization Array Software provides a tuned implementation of the Parallel Compositing Specification V1.1. This library enables applications to use the resources of a cluster such as the HP Scalable Visualization Array to render images in parallel. The library greatly simplifies the task of rendering partial images on different nodes in the cluster and then combining the multiple images to create and display the final image. The version released with V2.0:

- Optimizes the use of the network and graphics cards sold with HP SVA
- Conforms to V1.1 of the Parallel Compositing Specification
- Comes with a set of C & C++ code examples that illustrate using the library
- Supports depth compositing and alpha blending
- Can drive multi-tiled displays

Serviceability

HP Scalable Visualization Array Software includes components that facilitate the serviceability of the Scalable Visualization Array System and the HP SVA Software. The following tools are provided:

- An Installation Verification Procedure is provided to verify that HP SVA Software components were properly installed and functional. This procedure may be run after installation of the software and anytime changes are made to the configuration of the HP SVA System.
- During a visualization session, the launch templates rely on system and user data contained in the Configuration Data Files. These files are editable and may become corrupted. The Configuration File Checker Utility will verify that the Configuration Data Files are valid. In some cases it may also be able to correct errors in the files.

Hardware Requirements

Overview of Processors and Systems Supported

HP Scalable Visualization Array Software must be installed and run on each visualization node as well as the head node of a valid configuration, such as an HP Cluster Platform 3000 or 4000, properly configured for HP XC System Software, with the HP Scalable Visualization Array option. The supported Cluster Platform 3000 systems are based on HP ProLiant DL140, DL360 and 380 servers and xw8200, xw8400, and DL140G3 visualization nodes, each of which use Intel® Xeon™ processors with Intel® Extended Memory 64 Technology. The supported Cluster Platform 4000 systems are based on HP ProLiant DL145, DL385 and DL585 servers and xw9300 visualization nodes, each of which uses AMD Opteron™ processors. The supported XC System Interconnects for Cluster Platform 3000 and Cluster Platform 4000 systems are GigaBit Ethernet, InfiniBand and Myricom Myrinet-2000. Valid hardware configurations and options must comply with the XC System specification provided in the *HP Cluster Platform 3000 or HP Cluster Platform 4000* CD-ROM at http://www.hp.com/techservers/clusters/ucp/index.html or that are electrically equivalent to such a specification. Any other hardware configuration or option may be considered invalid unless the software documentation explicitly states otherwise. HP SVA Software installation instructions can be found in the *HP Scalable Visualization Array Software Installation Guide*.

Not all configurations are supported by the HP SVA Software. Conversely, there may be customizable hardware configurations that are capable of being supported by the HP SVA Software. For more information on customizable configurations, please contact your HP sales representative. The following section describes the HP SVA configurations that are supported by HP Scalable Visualization Array Software V2.0. For further details, consult the pertinent Reference Guides (http://www.hp.com/techservers/clusters/ucp/index.html)

Supported Visualization Nodes

The Cluster Platform 3000 or Cluster Platform 4000 system may be configured with the HP Scalable Visualization Array option consisting of an array of supported visualization nodes. These are configured in Visualization Building Blocks (VBBs) racks housing up to 8 workstation nodes each, or Compute Building Blocks (CBBs) of ProLiant DL140 servers with a varying number of embedded graphics options. Version 2.0 of HP SVA Software supports a maximum of 96 visualization nodes, with a maximum of 8 synchronized display channels per job.

XC System Interconnect

The XC System Interconnect provides high-speed connectivity for parallel applications. The XC System supports several different switch fabrics for use as an XC System Interconnect. For systems with the HP Scalable Visualization Array option included, the supported interconnects are GigaBit Ethernet, InfiniBand and Myricom Myrinet-2000. All nodes of the XC System, including the visualization nodes in the HP SVA option, are directly attached to the XC System Interconnect using one adapter per node. For the Myrinet-based systems, each XC System supports one of two possible adapters; the Myricom Myrinet-2000 PCI module Rev D or Rev E. For the Gigabit Ethernet-based systems, the network connection requires the addition of an option card in the xw8200 and xw8400. For InfiniBand, either the PCI-X or PCI-E (4X) adapter may be used.

Nodes (Cluster Platform 3000)

The Cluster Platform 3000 with the HP Scalable Visualization Array option consists of ProLiant DL140, ProLiant DL380, ProLiant DL360 servers and xw8200, xw8400, and DL140G3 visualization nodes. One of the servers – usually a ProLiant DL380 server – is designated as the head node. This node must have an internal disk drive, two processors, must have a DVD drive and must be attached to the Cluster Platform 3000 rack-mounted keyboard/monitor.

Configuration Information

Nodes (Cluster Platform 4000)

The Cluster Platform 4000 with the HP Scalable Visualization Array option consists of ProLiant DL145, ProLiant DL385, ProLiant DL585 servers and xw9300 visualization nodes. One of the servers – usually a ProLiant DL385 server – is designated as the head node. This node must have an internal disk drive, two processors, must have a DVD drive and must be attached to the Cluster Platform 4000 rack-mounted keyboard/monitor.

Disk Space Requirements for System Files

The storage configuration must comply with the *Cluster Platform 3000 Reference Guide* (http://www.hp.com/techservers/clusters/ucp/index.html). Precise file system and partition size requirements are provided in the HP Scalable Visualization Array Software Installation Guide, which is part of the *Scalable Visualization Array Software Documentation Kit*. Each node must have one local disk with at least 36 GB to be used for system files, swap and user data. Typical minimal disk requirements for each node are:

/	8.0 GB
/boot or /boot/efi	0.2 GB
/var	4.0 GB
/cluster	2.0 GB
swap	Same as memory size to closest 2 GB.

These sizes are approximate; actual sizes may vary depending on the user's system environment, configuration, and software options.

Memory Requirements

At least 2 GB of memory is required on each visualization node of the Scalable Visualization Array option.

Software Requirements

HP Scalable Visualization Array Software requires the installation of a licensed version of HP XC System Software version V3.1 or later. See the *HP XC System Software V3.1 QuickSpecs* for more information.

Optional Software

For access to the HP SFS *Lustre* file system, it is necessary to install the HP SFS client software that is compatible with HP XC System Software V3.1.

Users desiring remote delivery of graphics to the desktop and collaboration can order the optional *HP Remote Graphics Software* (RGS). Order one RG088AA for each SVA workstation that will be running RGS. Order one PY684A for each remote desktop that will interact with SVA using Remote Graphics Software. See the product datasheet for more information and other options.

HP Remote Graphics Software Kits

Part Number	Description	Short Product Name
RG088AA	Single-seat sender-receiver license for an HP System	HP Remote Graphics SW V4 for HP Sys LTU
RG090AA	Single-seat, receiver-only license	HP Remote Graphics SW V4 Receiver LTU
	CD-ROM Media only, no license	HP Remote Graphics SW V4 CD-ROM Media

Software Licensing Information

Use of HP Scalable Visualization Array Software is subject to an HP base license, an HP quantity-specified license, and the license terms in files in the physical media. Using the software indicates acceptance of all of these license terms. HP SVA Software contains portions of third-party software, some of which is proprietary to that third party, and some of which is open source software, including but not limited to: NVIDIA Linux graphics drivers, freeglut, Chromium and dmx (the Bundled Products). License and warranty terms associated with the Bundled Products appear in files with the Bundled Products, which are distributed, for example, in a CD kit.

The HP Software License Terms apply to that binary-only portion of the HP SVA Software that is proprietary to HP or to a third-party and does not apply to or override, expressly or by implication, the terms associated with the Bundled Products. The HP Software License Terms include a license grant in which HP grants you a nonexclusive, non-transferable license to Use one copy of the HP SVA Software on the Quantity Of Nodes contained in a Conformant System. A "Conformant System" is an HP computer or a connected collection of HP computers that conform to the hardware configuration specifications provided in the Software associated documentation. The quantity of nodes for which the license applies (Quantity Of Nodes) is the total of the number of nodes specified as part of the HP quantity-specified license. "Use" means storing, loading, installing, executing, or displaying the Software. Other terms of the HP Software License are provided on the license agreement that is delivered with the HP SVA Software.

For more information about the Hewlett-Packard Company licensing terms and policies, contact your local Hewlett-Packard office.

License Management Facility Support

HP Scalable Visualization Array Software supports the FLEXlm™ License Management Facility. The FLEXlm license key is delivered with the software node license (see the ORDERING INFORMATION section of these QuickSpecs). For more information about installing the HP SVA Software license keys, refer to the *HP Scalable Visualization Array Software System Administration Guide*.

Software and Services Warranty

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. For example, HP warrants only that HP Software will not fail to execute its programming instructions due to material defects in materials and workmanship, and will operate in substantial conformance with the associated Specifications, when properly installed and used on the Conformant System designated by HP, for a period of ninety (90) days from delivery. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Ordering Information

The following information is valid at time of release. Please contact your local Hewlett-Packard office for the most up-to-date information.

Combined Software License and Support Parts

On an HP Scalable Visualization Array System, all of the visualization nodes must be licensed. Every HP SVA System must also include a base license for the appropriate processor architecture. The quantity licenses can be combined. For example, a system with 17 nodes could be licensed by combining two 8-node licenses with one 1-node license and one base license. Alternatively, if you plan to upgrade your system later, you could order a single 32-node license plus a base license, which would then leave some room for later system expansion without requiring additional software licenses. Licenses are combined with software support. Standard software support includes 9x5 telephone support, media kits for new distributions, and rights to new versions for the specified period of time (one year or three years). 24x7 software support extends the telephone support window to round-the-clock access. See the section below on Software Product Services.

BASE LICENSE KITS		
Part Number	Description	Short Product Name
BA615A	Unlimited Xeon base license, media and online documentation	HP SVA for XEON MEDIA/DOC/LIC
BA634A	Unlimited Opteron base license, media and online documentation	HP SVA for Opteron MEDIA/DOC/LIC
LICENSES BUNDLED WITH 1 YEAR 9 X 5 SUPPORT AND UPDATES		
Part Number	Description	Short Product Name
BA618A	Unlimited 1-node use license and 1 year software support	HP SVA 1-node LIC 1 YR SW SUPPORT
BA619A	Unlimited 2-node use license and 1 year software support	HP SVA 2-node LIC 1 YR SW SUPPORT
BA620A	Unlimited 8-node use license and 1 year software support	HP SVA 8-node LIC 1 YR SW SUPPORT
BA621A	Unlimited 32-node use license and 1 year software support	HP SVA 32-node LIC 1 YR SW SUPPORT
LICENSES BUNDLED WITH 1 YEAR 24 X 7 SUPPORT AND UPDATES		
Part Number	Description	Short Product Name
BA622A	Unlimited 1-node use license and 1 year 24x7 software support	HP SVA 1-node LIC 1 YR 24x7 SW SUPPORT
BA623A	Unlimited 2-node use license and 1 year 24x7 software support	HP SVA 2-node LIC 1 YR 24x7 SW SUPPORT
BA624A	Unlimited 8-node use license and 1 year 24x7 software support	HP SVA 8-node LIC 1 YR 24x7 SW SUPPORT
BA625A	Unlimited 32-node use license and 1 year 24x7 software support	HP SVA 32-node LIC 1 YR 24x7 SW SUPPORT

Ordering Information

LICENSES BUNDLED WITH 3 YEARS 9 X 5 SUPPORT AND UPDATES		
Part Number	Description	Short Product Name
BA626A	Unlimited 1-node use license and 3 years software support	HP SVA 1-node LIC 3 YR SW SUPPORT
BA627A	Unlimited 2-node use license and 3 years software support	HP SVA 2-node LIC 3 YR SW SUPPORT
BA628A	Unlimited 8-node use license and 3 years software support	HP SVA 16-node LIC 3 YR SW SUPPORT
BA629A	Unlimited 32-node use license and 3 years software support	HP SVA 32-node LIC 3 YR SW SUPPORT
LICENSES BUNDLED WITH 3 YEARS 24 X 7 SUPPORT AND UPDATES		
Part Number	Description	Short Product Name
BA630A	Unlimited 1-node use license and 3 years 24x7 software support	HP SVA 1-node LIC 3 YR 24x7 SW SUPPORT
BA631A	Unlimited 2-node use license and 3 years 24x7 software support	HP SVA 2-node LIC 3 YR 24x7 SW SUPPORT
BA632A	Unlimited 8-node use license and 3 years 24x7 software support	HP SVA 8-node LIC 3 YR 24x7 SW SUPPORT
BA633A	Unlimited 32-node use license and 3 years 24x7 software support	HP SVA 32-node LIC 3 YR 24x7 SW SUPPORT

Distribution Media

HP Scalable Visualization Array Software is available on CD-ROM and its documentation is also available on the same CD-ROM. The CD-ROM is included in the base license kit. Additional copies may be obtained by ordering the architecture-specific media kit, HP Scalable Visualization Array Software V2.0 Media Kit for Intel® Xeon™ (BA616A) or HP Scalable Visualization Array Software V2.0 Media Kit for Opteron® (BA635A). Patch kits may be required, and can be downloaded from the website http://www1.itrc.hp.com/.

Software Documentation

Documentation is included in the same Media kits as the software. The HP Scalable Visualization Array Software CD-ROM includes online versions of the documentation in an online Help Library. This Library lets users easily navigate among all the documentation available for the SVA. The online Help Library includes the following documents:

- *HP Scalable Visualization Array Software Installation Guide*
- *HP Scalable Visualization Array Software Users Guide*
- *HP Scalable Visualization Array Software VSS Reference Guide*
- *HP Scalable Visualization Array System Administration Guide*
- *HP Scalable Visualization Array Software Release Notes*

Ordering Information

Software Product Services

For the purposes of Hewlett-Packard Software Product Services, the product is regarded as HP Scalable Visualization Array Software only if it has not been modified by the customer. Although the software includes licenses permitting modification of certain parts of the software, such modifications – unless they are provided by HP under a support agreement, or provided by HP as a licensed product - will result in a variation of the software that may no longer be called HP Scalable Visualization Array Software, and that therefore is not the subject of any standard service agreement for HP Scalable Visualization Array Software.

Standard software support includes customer access to technical resources during standard hours (see later), problem analysis, escalation management and resolution. HP also provides unlimited access to an electronic facility that includes a knowledge database with known symptoms and solutions, software product descriptions, specifications, and technical literature. In addition, HP will also make available certain software patches, including security patches, to the HP Scalable Visualization Array Software. During the term of a standard software support contract, a customer is entitled to receive new versions of the software. With standard software support, customers can access technical resources via telephone, electronic communications or FAX where available, during standard business hours on standard business days, including the hours of 8:00 am and 5:00 pm, Monday through Friday excluding HP holidays. 24x7 software support extends the access-window to 24 hours a day, from Monday through Sunday, including holidays. Business terms and conditions governing software services can be found at the HP website http://legal.hp.com/legal/files/Standard_Agreements.asp.

A variety of customer service options are available from Hewlett-Packard for HP Scalable Visualization Array Software. Service offerings are also available for additional software packages that may be distributed along with HP SVA Software but that are otherwise not included as part of HP SVA Software. For more information, contact your local Hewlett-Packard office.

There are also Consulting and Integration Services available for HP Scalable Visualization Array Software and listed below.

Product Number	Description	
U5628A 001	One day on-site systems software knowledge transfer and five hours of customer integration management OR installation (factory or on-site) of SVA software on 1-32 nodes	
U5628A 002	Two days on-site systems software knowledge transfer and six hours of customer integration management OR installation (factory or on-site) of SVA software on 33-128 nodes	
U5628A 003	Three days on-site systems software knowledge transfer and six hours of customer integration management OR installation (factory or on-site) of SVA software on 129-256 nodes	
U5628A 004	Five days on-site systems software knowledge transfer and six hours of customer integration management OR installation (factory or on-site) of SVA software on 257-512 nodes	
U5628A 005	Ten days on-site systems software knowledge transfer and twelve hours of customer integration management	
Product Number	**Description**	**Duration**
U5617A	HPC Cluster Program Management	40 hours implementation management consulting
U5618A	HPC Cluster systems software QuickStart	5 days on-site consulting and six hours management coordination
U5619A	HPC Cluster Applications Migration, Development, and Optimization QuickStart	5 days on-site consulting six hours management coordination
U5626A	HPC Applications Programming and Migration	2 days on-site formal customer training
U5627A	HPC Cluster Systems Administration Course	4 days on-site formal customer training
U5620A	HPC Implementation Program Management	80 hours implementation management consulting
U5621A	HPC Cluster Systems QuickStart	10 days on-site consulting and twelve hours management coordination

Ordering Information

U5622A	HPC Cluster Applications Migration, Development, and Optimization QuickStart	10 days on-site consulting and twelve hours management coordination
U5626A	HPC Applications Programming and Migration	2 days on-site formal customer training
U5627A	HPC Cluster Systems Administration Course	4 days on-site formal customer training

For more details, please see your HP Consulting Services representative.

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