AVANCE USER'S GUIDE R2.1.3

Stratus Technologies

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Section One: Getting Started

The Avance Management Console provides browser-based remote management of the Avance unit, its physical machines (PMs), and virtual machines (VMs).

Avance Management Console Requirements

- Your computer must be able to access the subnet containing the Avance unit.
- Use a compatible browser from the Avance Compatibility Matrix at http://avance-productinfo.stratus.com.
- Make sure your computer has an up-to-date version of the Java™ Runtime Environment (JRE™). Java downloads are available at http://www.java.com/en/.

Logging in to the Avance Management Console

Type the Avance unit's IP address or host name into the browser:

`http://`*`IP_address`* `–OR– http://`*`host_name`*

Where *`IP_address`*, is the Avance unit's static IP address, supplied during installation, and *`host_name`* is the fully-qualified host name assigned to that IP address.

For example:

`http://192.168.1.60 –OR– http://avanceserver`

Avance Unit Preferences

When logging in the first time, click **Preferences** on the navigation menu and configure those options not specified during the install process:

System Preferences	
Owner Information(optional)	Contact information, communicated via SNMP alerts to a service provider.
Product License	Upload license and activation keys. Displays the Site ID required for service calls.
IP Configuration	Avance Management Console, Gateway, and DNS server IP addresses.
Date & Time Configuration	Time Zones, Date & Time, and NTP servers.
Active Directory(optional)	Authenticate user access via domain groups.
Hardware	
UPS(optional)	Power monitoring method (default is none).
Help & Debug	
Diagnostics	Exports a diagnostic file for use in troubleshooting.
Notifications	
e-Alerts (optional, but recommended)	Email alerts alert language recipients, and SMTP server name.
SNMP Alerting (optional)	SNMP requests and traps, community, and list of trap recipients.
Remote Support	
Call-Home & Dial-in (optional, but recommended)	Call-Home automatically/securely sends alerts and diagnostics to the Stratus Active Service Network and an incident management system. Supplies the service provider with debug information. Dial-in provides a secure tunnel to the Avance unit for troubleshooting.
Proxy Configuration(optional)	An explicit proxy server used when sending eAlerts or Call-Home messages outside the company's firewall.

User Accounts

In the Avance Management Console, click **Users & Groups** to do the following:

- Control domain member access to the Console.
- Add, edit, or delete local user accounts.

For details, click **Help**.

UPS Integration and Power Monitoring Options

Avance provides three ways to monitor power:

No Monitoring:	Default. Treats PM power supply loss the same as other predictive hardware faults.
Internal Monitoring:	UPS model independent. Avance initiates a PM shutdown policy if it detects power loss for over 2 minutes.
External Monitoring:	UPS model dependent. Vendor application executes shutdown policies via an Avance command line interface (CLI) script.

To configure power monitoring:

1. In the Avance Management Console, click **Preferences**. Click **UPS**.
2. Select the power monitoring state from the menu.

Determining UPS Battery Requirements

Minimum battery capacity in minutes depends on the memory allocated to VMs:

- 2 to cover short blackouts
- 3 to shutdown VMs
- 2 to shutdown PMs
- Time for VM migrations, equal to { total memory of all VMs (GB) } / 2

For example, VMs with 8GB memory require a UPS battery capacity of 2 + 3 + 2 + (8/2) = 11 minutes.

No Monitoring (Default)

When Avance detects that a PM has lost a redundant power supply, it immediately generates an alert and “live-migrates” VMs from that PM to its partner.

Internal Monitoring

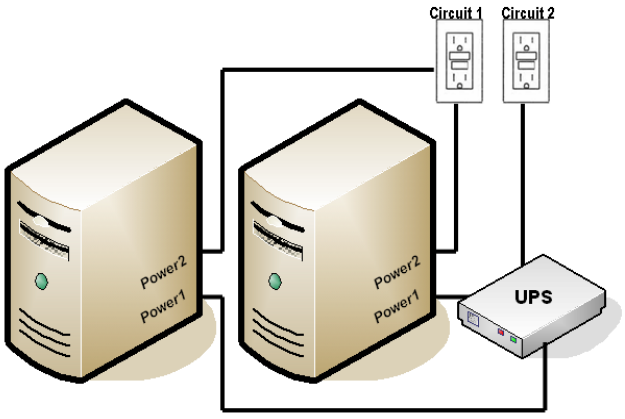
Avance monitors the PM's redundant power supplies and executes these policies on power loss:

- Power lost over 2 minutes on one PM: the VMs are live-migrated to the other PM, and then the affected PM is shut down.
- Power lost over 2 minutes on both PMs: the VMs are shutdown, and then both PMs are shutdown.

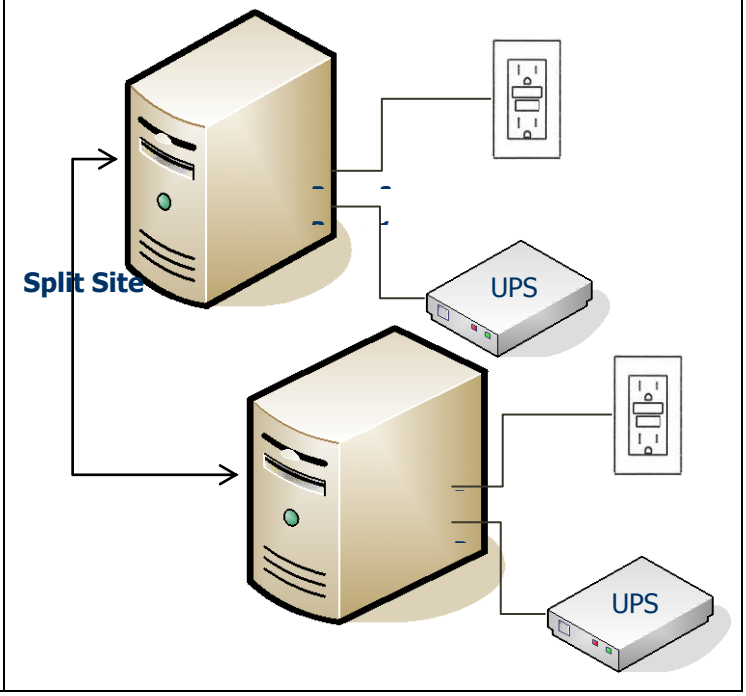
Shutdowns cannot be cancelled once begun.

Internal monitoring requires redundant power supplies for each PM, with one supply connected to wall power and the other to a UPS:

Single site, shared UPS configuration



Split site UPS configuration



External Monitoring

External monitoring is used with a UPS power-management application such APC's PowerChute Network Server (PCNS). These applications monitor the UPS for low battery and power loss, and can initiate shutdowns. For Avance, the application would execute a shutdown script containing Avance CLI (AVCLI) commands. The power-management application must be implemented in an external client. Avance does not support running a UPS agent directly in the Avance base layer.

Avance takes no action when a PM loses power from a redundant supply in this situation, because the application executes the appropriate policy. Avance sends an e-Alert or SNMP trap if enabled, but does not send a call-home.

The power-management application can also execute power-up sequences by controlling UPS outputs.

Starting the Avance Unit

1. Press the power button on each Avance PM. (The shut-down Avance unit is not accessible from the Avance Management Console.) The PMs take 10–15 minutes to return to service.
2. Log in to the Console.
3. Click **Physical Machines**.

   Note that the PMs run in maintenance mode until you return them to normal “running” mode.
4. Select a PM.
5. Click **Finalize**. The PM displays **running** under Activity.
6. Repeat for the second PM.

After the first PM is removed from maintenance mode, any VMs that were running at shutdown automatically restart.

Shutting Down the Avance Unit

Use the Avance Management Console to shut down the Avance unit. This shuts down the VMs, then the PMs.

⚠ **Use *only* this method to shut down the Avance unit. Make sure both PMs are running before shutting down. Other methods (such as shutting down or removing power from the PMs individually) can cause data loss.**

1. In the Console, select the unit under **Avance Unit**.
2. Click the **Shutdown** button.

   Shutdown can take up to 10 minutes. When the unit shuts down, the Console is unavailable.

   If the Avance unit does not shut down completely:
   - Use the VM console or a remote desktop application to log in to the VM. Use operating system commands to shut down the VM.
   - If unsuccessful, log in to the Avance Management Console. Click **Virtual Machines**. Select the VM. Click **Power Off**.

   When the VMs shut down, the Avance unit continues shutting down.

Upgrading Avance Software

You can upgrade Avance software without interrupting running applications (VMs).

Navigate to the **Avance Upgrade Kits** page in the Avance Management Console and click on the help icon.

Section Two: Virtual Machines

Virtual Machine Page Overview

An Avance Unit may host multiple virtual machines (VMs) running a variety of OS versions and applications. You can create and manage VMs from the Virtual Machines page of the Avance Management Console.

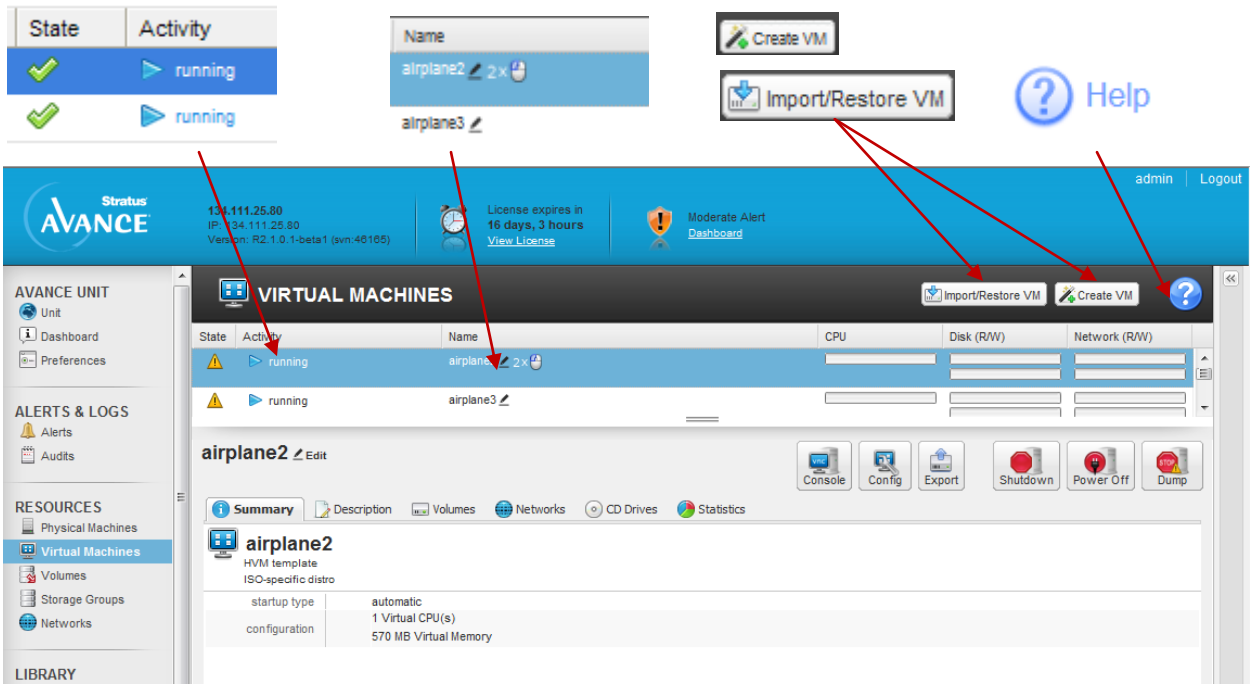
1. In the Avance Management Console, click **Virtual Machines**.
2. Click **Create VM**, **Import/Restore VM** install virtual machines or
3. Select a VM to view state/configuration information or perform maintenance.
    - Click the tabs to view configuration details.

States & Activities
Running, Maintenance, Off, Broken, Booting, etc.

Virtual Machines
Select to view, double click to rename

Buttons to create, import and manage virtual machines

Online Help and Troubleshooting.

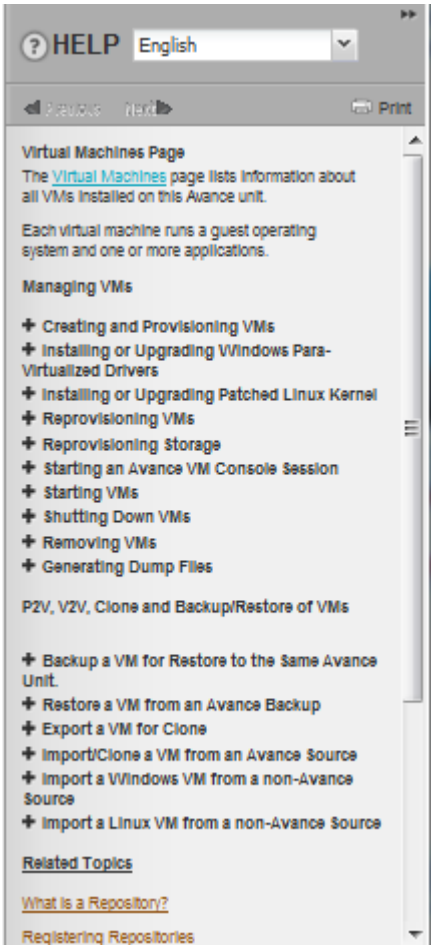


Virtual Machine Online Help

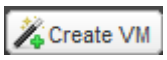
Help

Help Instructions:

- Click ? to display online help for the current page.
- Click + and – to expand/reduce topics.
- Blue text provides links to Avance UI page.
- Yellow text provides link to further information.



Creating VMs

The VM Creation Wizard is launched by clicking 

on the **Virtual Machines** page. The Wizard will step you thru the process of allocating CPU, Memory, Storage and Network resources to the VM.

Before starting the wizard please review the following materials and considerations

1. Preparing a installation image:
    - Creating a VCD or
    - Registering Linux Repositories and Kickstart Files.
2. Allocating Virtual CPUs
3. Allocating Memory
4. Allocating Storage

Linux installation reboots twice, and closes the Console window. To continue monitoring, select the VM on the **Virtual Machines** page. Click **Console**.

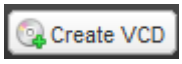
⚠ **Make sure you change the VM's time zone to match that in the Avance Management Console. Otherwise, the VM's time zone will change whenever VMs restart or migrate.**

⚠ **Install the PV drivers immediately after creating a Windows VM. These drivers are needed for correct VM operation, proper VM migration between PMs under fault conditions, and good network connections.**

Creating a Virtual CD

The Virtual CD Creation Wizard installs an ISO image to a storage device on the Avance unit. This image is then available to the VM Creation Wizard as a virtual CD (VCD).

This procedure can also be used to create VCDs required for installing applications.

1. Navigate to the Virtual CDs page in the Avance Management Console.
2. Click 

to launch the VCD Creation wizard.
3. Select an install source.
    - Local storage (via upload).
    - Network source.
    - Physical CDrom/DVD drive.

See "

Accessing Newly-Created Disks"

Windows Based VMs

Installing Windows Para-Virtualized Drivers

Avance includes “para-virtualized” (PV) network and disk drivers designed to maximize Windows VM performance:

- Significantly enhance performance for network and storage subsystems.
- Enable use of Windows disk configurations with more than three volumes.
- Ensure that under fault conditions, VMs properly migrate from the failed to the operating PM (node) without interruption.

Procedure:

1. In the Avance Management Console, click **Virtual Machines**.
2. Select the Windows VM.
3. Click the **CD Drives** tab.
4. Click **Eject CD** to remove any CD listed.
5. Select **xen-win-pv-drivers—*x.x.x***. Click **Insert a CD**.
6. Connect to the new Windows VM using the Avance Management Console’s VM console or another remote desktop application, such as Windows Remote Desktop Connection.
   - **To use the VM console:** Click **Virtual Machines**. Select the VM. Click **Console**.
7. In the Windows VM, open **My Computer**. Double-click **xen-win-pv-driver (D:)**.
8. Double-click **xensetup.exe**.
9. Accept the license agreement.
10. Type the installation path. Click **Install**. The **Reboot now** prompt appears.
11. In the Avance Management Console, click **CD Drives**. Click **Eject CD**.
12. When prompted, click **Reboot now**. Click **Finish**. *Do not delay restarting*.

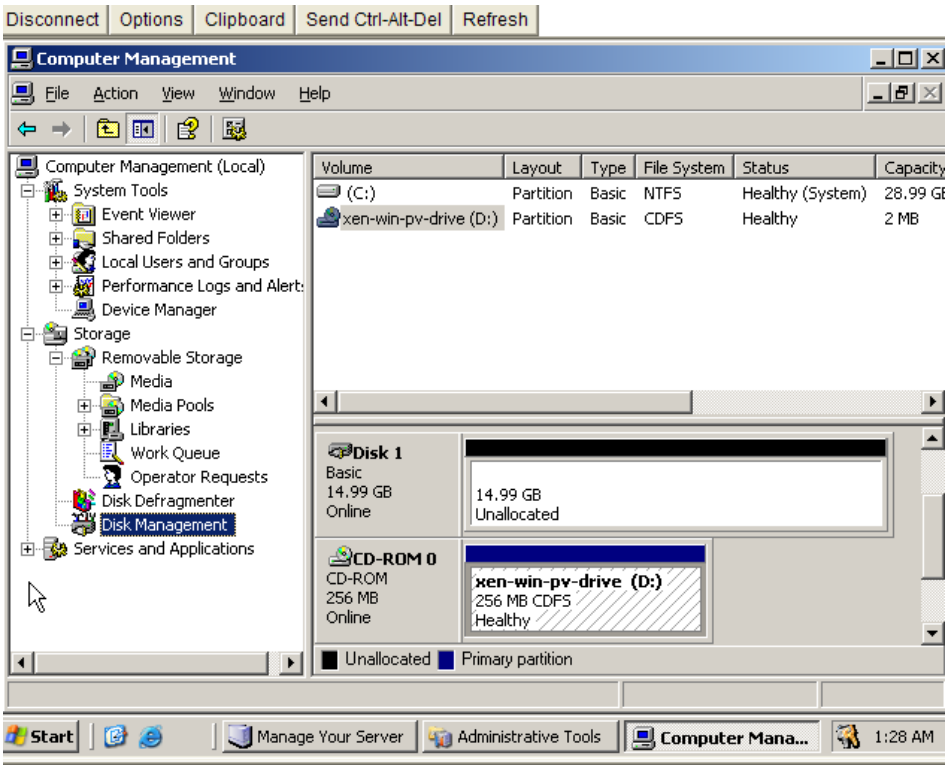
The virtual disk volumes appear in the VM and are used as if they were physical disks. For more information, see “Windows VMs: Accessing Newly-Created Disks” on page 12.

If you install a Windows Server 2008 VM, disable hibernation (enabled by default in some cases).

Accessing Newly-Created Disks

To format new drives

1. Use a remote desktop application to connect to the VM.
2. Select **Start >Administration Tools>Computer Management**.
3. Select **Disk Management**.

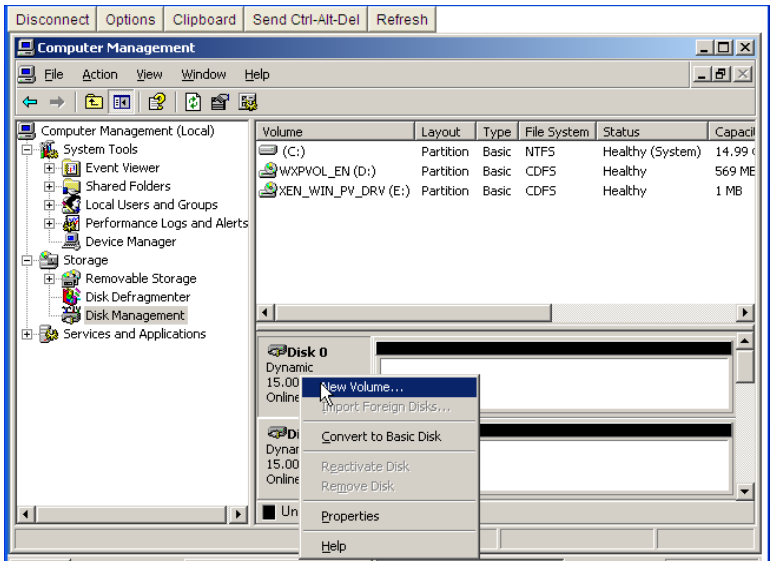


4. If the **Initialize and Convert Disk Wizard** does not start, right-click a disk and select **Convert to Dynamic Disk**.
5. If prompted to initialize disks, select the disks. Click **Next**.
6. When prompted, select the virtual disks to convert to dynamic disks. Click **Next**.
7. Click **Finish** to start creating volumes.

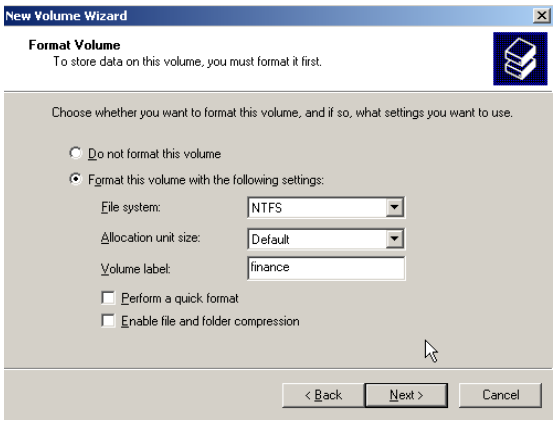
To create a new volume

Windows disk volumes in the VM are created on the virtual disk volumes defined when you created the VM.

1. Use a remote desktop application to connect to the VM.
2. Select **Start >Administration Tools>Computer Management**.
3. Right-click the virtual disk on which to create a volume. Select **New Volume** from the menu.



4. Click **Next**.
5. Select the volume type. Because Avance is already mirroring data at the physical level, volume redundancy is not required.
6. Select the virtual disk volumes to allocate to the new VM.
7. Select volume format settings. Click **Next**.



8. Review your selections. Click **Finish**. The new volume appears in Disk Management.
9. Restart Windows

Installing Applications on Windows Virtual Machines

You can install applications on a Windows VM from the network, or from an Avance VCD created from an application CD/DVD (see "Creating a VCD").

Each VCD consumes disk space. Consider deleting VCDs when finished with the installation.

Installing Applications from a VCD

1. In the Avance Management Console, click **Virtual Machines**.
2. Select the VM. Click the **CD Drives** tab.
3. Click **Eject CD** to remove any CD listed.
4. Select the VCD installer for the application. Click **Insert a CD**.
5. Connect to the VM from the Console or a remote desktop application.
6. The installation CD is in the VM's CD drive. Install the application following the vendor's instructions.
7. When installation is complete, return to the Avance Management Console. Click **Eject CD**.

Linux Based VMs

Creating a Linux Repository

As an example of how to create a repository, the following steps describe how to create a CentOS repository, from a distribution on CDs, on a Linux server running Apache.

1. If it does not already exist, create a directory to mount the CD-ROM as follows:

   ```
   $ mkdir -p /mnt/cdrom
   ```

2. Create a `centos` directory in the Apache Web root directory. For example, for RedHat® Linux, create the `/var/www/html/centos directory`:

   ```
   $ mkdir /var/www/html/centos
   ```

3. Mount and copy each of the 4 CDs to the directory you just created:

   ```
   $ mount /dev/cdrom /mnt/cdrom
   $ cp –rf --reply=yes /mnt/cdrom/* /var/www/html/centos
   ```

   Repeat this step for the remaining CDs.

Registering Linux Repositories and Kickstart Files

If your installing a Linux based VM and you wish utilize a repository source:

- Please review your operating system documentation for information on creating, modifying, and using repositories and kickstart files
- Make sure the PMs have network access to the required repositories.
- Identify web-based Linux repositories containing the required third-party software images. For example, CentOS maintains repositories at http://vault.centos.org/.
- Optional: Create a Linux repository and include with the repository kickstart files. For details, see “Creating a Linux Repository” on page 16.

Registering Linux Repositories

1. In the Avance Management Console, click **Linux Repositories**.
2. Click **Add a Repository**.
3. Type the URL for the repository location.
4. Click **Finish**.

Registering a Kickstart file for a Linux Repository

1. In the Avance Management Console, click **Linux Repositories**.
2. Click **Add a Kickstart**.
3. Use **Select a Repository** to select the repository for which you are specifying a kickstart file. Only repositories registered with Avance are listed.
4. Type the **Location of Kickstart File (URL)** in the form of an URL.
5. Type a **Name of Kickstart**.
6. Type a **Description of Kickstart**.
7. Click **Finish**.

Applying Linux Kernel Patches

If you installed a Linux VM, see the *Avance Compatibility Matrix* to find supported Linux releases.

1. Use the **Downloads** tab to obtain needed kernel patches (source or binary packages).
2. Type these commands:

   ```
   rpm -ivh --force kernel-patch-file_name.rpm
   reboot
   ```

   Where *kernel_patch_file_name*.rpm is the downloaded patch file.
3. To install kernel patches at the same time as a VM:
   a. Add the patches to the repository and kickstart file.
   b. Add this command to the post section of the kickstart file:

      ```
      rpm –i server_name/ kernel-patch-file_name.rpm
      ```

      Where server_name is the repository server.

Creating Disk Volumes in Linux Virtual Machines

To create a new volume in a Linux VM, use the volume management tool or edit files as needed to create volumes in a Linux VM. See your Linux documentation for complete instructions.

In Linux VMs, disk device names are /dev/**x**vda through /dev/**x**vdh, instead of the standard /dev/sda through/dev/sdh.

The virtual disk volumes appear in the VM and are used as if they were physical disks.

Installing Applications in Linux Virtual Machines

You can install Linux applications only from a network. Use a remote desktop application to connect to the VM from a management PC and install the application.

Provisioning Virtual Machine Resources

Allocating Virtual CPUs

A virtual CPU (VCPU) is defined as:

- A single physical CPU **thread**, when Hyper-threading is **enabled**.
- A single physical CPU **core**, when Hyper-threading is **disabled**.

Avance supports a maximum of 8 VCPUs per VM. The total number of VCPUs available for multiple VMs running on the Avance unit is dependent on the number of CPU sockets, cores per socket and Hyper-Thread configuration.

When Hyper-threading is **enabled**, Avance will allow you to over-provision by two VCPUs (physical CPU threads). These are the two VCPUs dedicated for the Avance software. Example: Server has two sockets with six cores per socket and two threads per core:

24	Total Available VCPUs
-2	VCPUs dedicated for Avance software
22	**VCPUs available for VMs (Recommended)**
24	**VCPUs available for VMs (over-provisioned)**

When Hyper-threading is **disabled**, the user can over-provision by more than 2x the number of VCPUs (physical CPU cores). Example: Server (PM) has two sockets with six cores per socket and Hyper-Threading is disabled.

12	Total Available VCPUs
-2	VCPUs dedicated for Avance software
10	**VCPUs available for VMs (Recommended)**
24	**VCPUs available for VMs (over-provisioned)**

Considerations When Over-Provisioning Virtual CPUs

In general Stratus recommends you avoid over provisioning CPU resources. You should only over-provision physical CPUs under the following conditions:

⚠ **The peak VCPU resources consumed by the combined VMs does not exceed the physical resources of the Avance unit.**

- One or more VMs are used at different times (such as off-peak backups).
- Peak total CPU use by VMs will not affect service level agreements or required response times.
- Each VM's CPU use is well understood, and its application(s) are not prone to resource leaks. When CPUs are over-provisioned, a leak in one VM can affect the performance of other VMs.

If the unit's capacity is exceeded, each VM is allocated a share of the physical processing capacity proportional to its allocated share of virtual processing capacity. The only way to divert more processing to a specific VM would then be to shut down one or more of the other VMs.

To view the Avance unit's VCPU allocation, click the unit name in the Console. Look at **CPU & Memory**. CPU utilization per VM can also be viewed on this page by clicking show details under statistics.

Limitations in Windows 2000 cause the Avance Management Console to report inaccurate CPU use, usually too heavy. Instead, use the performance monitoring tool in Windows 2000.

Allocating Memory

Avance does not allow over-provisioning of memory for running VMs. The total memory that can be allocated to VMs is equal to the total physical memory of the PMs, minus 1 GB for the OS. In addition, if the PMs have different physical memory capacities, Avance defines the maximum memory to equal that of the PM with the *least* memory.

For example, if PM1 has 16 GB memory and PM2 has 8 GB, the memory available for allocation to VMs would be:

8 GB (least memory of either PM) – 1 GB for OS = 7 GB

The minimum virtual memory allocation is 256 MB, but 64-bit operating systems require at least 600 MB.

If a VM is shutdown, its memory is freed up and can be re-provisioned to other running VMs. However, if that VM is to be returned to service, you must first shutdown or re-configure another VM to free the needed memory again.

Allocating VM Storage

How you allocate storage can have a dramatic impact on system performance and your ability to fully utilize available capacity. Please map out your storage allocation applying the following considerations.

- **Minimize stranded storage:** Since Avance volumes cannot span storage groups, plan volume assignments to minimize unusable "stranded" storage. This maximizes free space for new VMs and VCDs.
- **Maximum Volumes:** The Avance unit can have no more than 62 total volumes for VMs and VCDs.
- **Leave space for additional VCDs:** Leave at least 5 GB of free space in each storage group to allow room to create VCDs for installing additional VMs/Applications.
- **Separate boot and data volumes.** Separating the boot and data volumes helps preserve the data and makes it easier to recover if the boot volume crashes. Consider putting all boot volumes on one disk, with associated data in separate volumes.

- **Balancing storage utilization:**
  1. Click **Storage Group**s in the left navigation window and select a storage group.
  2. Click on the **Statistics** tab and select the desired **Time Span** to determine the read/write bandwidth demands on each storage group. Place the new volumes in the group with the lowest demands.
  3. Click on the **Volumes** tab to review the VM volumes assigned to the group. You can change the sorting on each column and re-order the columns as required.

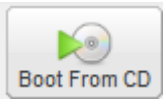
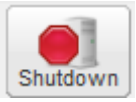
Allocating Network Resources

Avance pairs physical network ports across the two PMs to form a redundant virtual network interface (VIF). One or more VIFs can be assigned to each VM, and multiple VMs can use the same VIFs.

Avance allows unlimited over-provisioning of network resources, so be sure to profile a VM's network bandwidth/response time requirements before allocating VIFs. There is no way to proportionately allocate bandwidth resources between VMs sharing a VIF. Therefore, high use of network resources by one VM can reduce the performance of all VMs on that network. If a VM has a large bandwidth requirement, consider adding a dedicated NIC for that VM.

Virtual Machine Actions

When you select a VM, the following action buttons can appear, depending on the VM's state and activity.

Icon	Description
	Boots the selected VM.
	Boots a VM from the selected virtual CD.
	Opens a console for the selected VM.
	The **Export** process stores the image of a Windows or Linux VM into a set of OVF and VHD files. These files can then be used as a template for importing, cloning a VM onto Avance units. Open Virtual Machine Format (OVF) is an open standard for packaging and distributing physical or virtual machine data. The OVF format contains meta-data information about the VM. A Virtual Hard Disk (VHD) is a file that contains the virtual disk information. The VM must be shutdown prior to initiating the export.
	Shuts down the selected VM.
	Immediately stops processing in the selected VM and destroys its memory state. Use this *only* as a last resort, when the VM cannot be successfully shutdown.
	Launches the VM Re-Provisioning Wizard. The VM must be shutdown prior to launching this wizard.
	Permanently deleted the VM and (optionally) its attached data volumes.
	When a VM crashes, Avance automatically restarts it, unless it has fallen below its meantime between failure (MTBF) threshold. If the VM is below the MTBF threshold, Avance leaves it in the crashed state. You can then click this to restart the VM and reset the MTBF counter.
	Immediately stops processing of the selected VM, creates a dump of its memory state, and restarts the VM. Use this button only at the direction of your service provider, and only for troubleshooting a hung VM.

Actions Available During Virtual Machine States and Activities

State	Activity	Enabled Actions	Description
Busy	Installing		Avance software is installing the boot volume for a new VM.
	Stopped	**Start** **Config** **Export** **Boot From CD** **Remove**	VM has been shutdown or powered off.
	Booting	**Console** **Power Off** **Dump**	VM is starting.
	Running	**Console** **Shutdown** **Power Off** **Dump**	VM is operating normally on redundant physical machines.
Alert	Running	**Console** **Shutdown** **Power Off** **Dump**	VM is operating normally, but is not running on fully redundant resources.
	Stopping	**Power Off** **Remove**	VM is being shut down in response to the **Shutdown** action, or when the remaining physical machine is transitioning into maintenance mode.
	Crashed		VM crashed and is restarting. If enabled, e–Alerts and Call–Home messages are sent.
Critical	Crashed		VM crashed too many times and exceeded its MTBF threshold. The VM is left in a crashed state until **Reset Device** is clicked.
	Dumping	**Power Off**	Harvesting crash dump.

Re-provision Virtual Machines

Use the VM Re-Provisioning Wizard in the Avance Management Console to reconfigure virtual CPUs, memory, storage volumes and networks assigned to the VMs.

The Wizard displays current allocations. Modify these or leave unchanged as needed. You can also finish re-provisioning anytime the **Finish** button is available.

1. In the Avance Management Console, click **Virtual Machines**.
2. Select the VM. Click **Shutdown**.
3. When the VM status shows **stopped**, click **Config**. The VM Re-Provisioning Wizard opens.

- Do not allocate less than 256 MB (600 MB for 64-bit systems).
- **Windows 2003 or earlier:** If allocating more than 4GB of memory to a VM, make sure your installation supports PAE mode.
- If you are changing the number of assigned VCPUs in a Windows VM from 1 to *n* or *n* to 1, after restarting the VM at the end of the re-provisioning process, you must then shutdown and restart the VM again. This allows the VM to correctly reconfigure itself for Symmetric Multiprocessing (SMP). The VM displays odd behavior and is not usable until it is rebooted.

Reconfiguring Volumes:

- Add new volumes or attach existing volumes by clicking **Create another volume**.
- Click **Detach Volume** to disconnect a volume from the VM while preserving its data for future use.
- Click **Delete Volume** to permanently delete the volume and all associated data. **Keep Volume** undo's the delete.

Note: You cannot detach or delete boot volumes.

⚠ **Carefully review all changes prior to clicking Finish as they cannot be reversed after that point in time.**

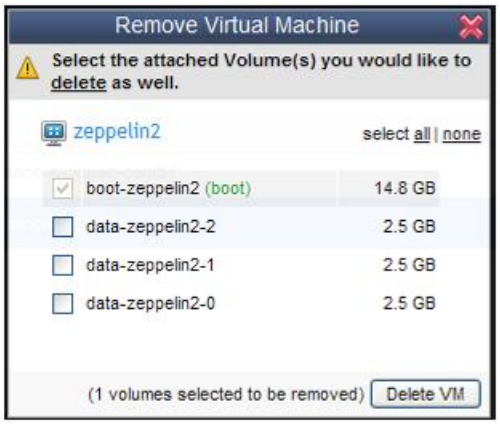
Recovering Virtual Machine Resources

To conserve storage space, remove VMs, volumes, and VCDs when no longer needed. You may also need to immediately recover storage when less storage is available than required for certain activities, such as creating a volume or VCD.

Removing VMs and Data Volumes

1. In the Avance Management Console, click **Virtual Machines**.
2. Select the VM to remove.
3. Click **Shutdown**.
4. When the VM shows **stopped**, click **Remove**.
5. Select any attached data volumes to remove. The boot volume is always selected.

   You can leave data volumes for archiving or use by another VM.



6. Click **Delete VM**.

Cleaning Up Virtual Disk Volumes

⚠ **Before deleting disk volumes, check with the administrator or other users to make sure the volumes are not being purposely saved.**

1. In the Avance Management Console, click **Volumes**.
2. Note any volumes marked ***None*** in the VM column. These are not associated with a VM and so are unused.
3. Select any unused volumes to delete.
4. Click **Remove**.

Cleaning Up Unused VCDs

1. In the Avance Management Console, click **Virtual CDs**.
2. Note any VCDs showing in the **Can Remove** column.
3. Select a removable VCD.
4. Click **Remove**.

Booting from a VCD

1. In the Avance Management Console, click **Virtual Machines**.
2. Select a VM. Click **shutdown**.
3. When the VM status shows **stopped**, click **Boot from CD**.
4. Select the VCD to boot from. Click **Boot**.

A VM booted from CD boots as a hardware virtual machine (HVM), and can access only the first three disk volumes.

Troubleshooting Unresponsive VMs

If a Windows VM does not respond to application requests, you can dump its memory to a file for use in troubleshooting.

Windows must be configured to generate crash dump files. See the Microsoft article, *How to generate a complete crash dump file or a kernel crash dump file by using an NMI on a Windows-based system* (Article ID: 927069). Follow the instructions in "More Information."

1. In the Avance Management Console, click **Virtual Machines**.
2. Select the unresponsive VM.
3. Click **Dump**.
4. Retrieve the dump file:
   - **For Windows VMs:** C:\WINDOWS\MEMORY.DMP.
   - **For Linux VMs:** dump files are not stored in the Linux file structure. Retrieve the dump file by generating a diagnostic file on the Preferences > Diagnostics page of the Avance Management Console (refer to the online help for instructions). Select **Dumps** or **Full**.

Section Three: Physical Machines

Physical Machine Page Overview

An Avance Unit consists of two physical machines (PMs), which can be managed from the Physical Machines page of the Avance Management Console.

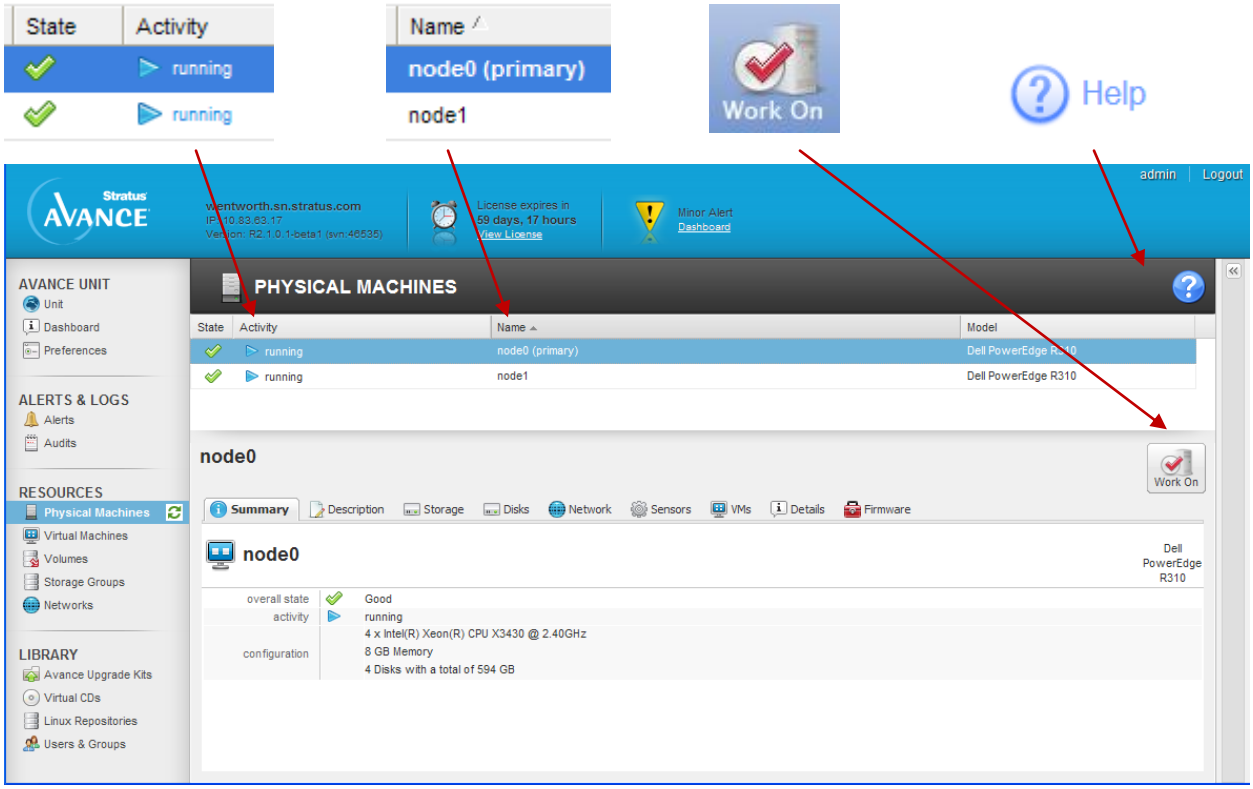
1. In the Avance Management Console, click **Physical Machines**.
2. Select a PM to view state/configuration information or perform maintenance.
3. Click the tabs to view configuration details, or to upgrade PM firmware (Dell, HP servers only).

States & Activities
Running, Maintenance, Off, Broken, Booting, etc.

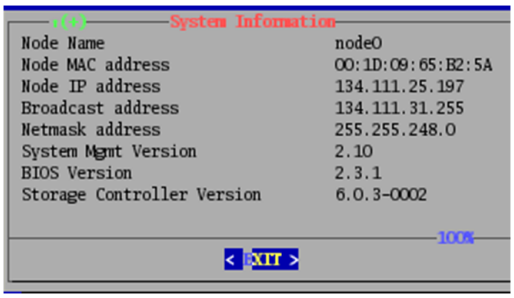
primary node generally runs all VMs.

Click to perform PM maintenance.

Online Help and Troubleshooting.



If the Avance Management Console is not available, use the Avance Emergency Console to view partial configuration information, or to extract a diagnostic file for troubleshooting PM failures.

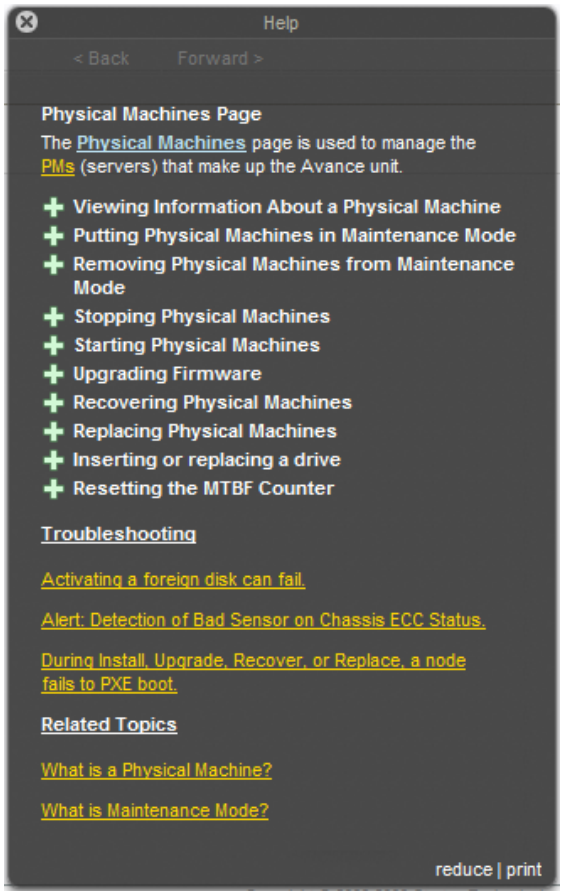
1. Attach a keyboard and monitor to the PM and press **Return.**	2. Login: User & PW = **avance**. 	3. Select **Display system info**. Click **OK**. 

Physical Machine Online Help

Help

Help Instructions:

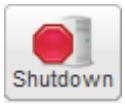
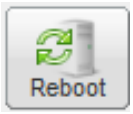
- Click **Preferences** > **Help System** to change language.
- Click Help to display online help.
- Click + and –to expand/reduce topics.
- Blue text provides links to Avance UI page.
- Yellow text provides link to further information.

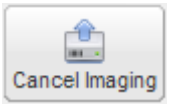


Managing Physical Machines

Avance displays PM management commands according to the PM's state and activity, as described in the following pages.

To ensure proper workflow, perform all PM maintenance through the Avance Management Console. Otherwise application downtime or degraded operation can result.

Commands	*Description*
	VMs running on this PM migrate to the other PM if in service. (Otherwise, re-confirm request and shut down VMs.) When VMs are migrated or shut down, displays *running (in Maintenance)*.
The following actions are available once a PM is placed in maintenance mode (via the Work On button)	
	Returns PM to *running* state.
	Shuts down PM. transitions to *off (in Maintenance)*.
	Analogous to disconnecting power cord. Use *only* if shutdown fails. Transitions PM to *off (in Maintenance)*. Only available on systems with a BMC.
	Reboots a PM. Available on all platforms but included as a means to remotely reboot a platform such as the S1200KP that does not have a BMC. This button is useful in cases where support requests a reboot of a node and physical access to the system is not available. PM starts and ends in to *running (in Maintenance)*.
	Re-images and recovers corrupted PM.
	Use when replacing PM or motherboard.
The following action is available after Avance has removed the PM from service and powered it off because an excessive failure rate.	
	PM failed three or more times with a mean time between failure (MTBF) of less than an hour. This action resets the MTBF counter so the PM can be brought back into service.

The following action is available when Avance is in the process of imaging or recovering a PM.	
	Use to cancel imaging if recovery or replacement is not progressing. Troubleshoot, then restart recovery or replacement.

Other PM states and activities

State	Activity	Available Commands	Description
	Imaging	**Work On**	PM is loading Avance image.
	Evacuating	**Finalize**	VMs are migrating from this PM to its partner.
	Running	**Work On**	PM is predicted to fail.
	Running	**Work On**	PM failed.
	Powered Off	**Work On** **Reset Device**	Avance has powered off the PM because of an excessive failure rate.
	Booting	**Finalize** **Power Off**	PM is booting.

Avance Storage Redundancy

Avance Virtual Machine Volumes

VM volumes (boot and data) are assigned to Avance Storage Groups defined as shared mirrors. Avance forms shared mirror groups by pairing logical disks from both PMs, and synchronously replicating VM block writes across paired logical disks.

This effectively creates RAID 1 mirrors (**shared mirrors**) across the PMs, enabling either PM to host VMs without external shared storage. Furthermore, if a PM's logical disk fails, the VMs can keep running by using the mirror storage on the other PM. Avance automatically re-synchronizes logical disks after a repair or upgrade.

Reduce PM storage costs by configuring logical disks (used by VMs) as single- or multi-disk RAID0 arrays.

Avance System Volumes (Partition)

Each PM must be set up with a highly available Avance system volume (partition).

- PMs with only one logical disk must have a minimum of two physical disks in a RAID1, 5, 6 or 10 configuration.

Avance requires each physical disk to be part of only one logical disk. To simplify maintenance, set up physical and logical disks identically on each PMs.

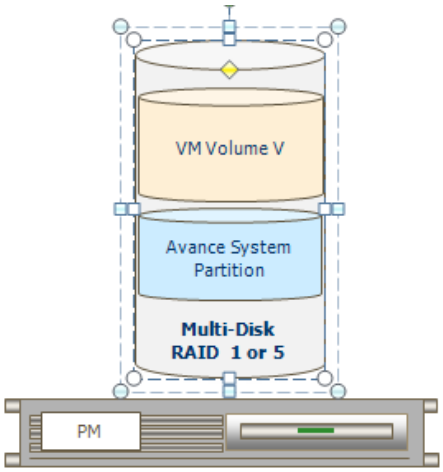
PMs with single logical disk

Storage Redundancy:

- Avance system partition is protected via a RAID 1, 5, 6 or 10 logical disk.
- VM volumes synchronously mirrored between PMs.
- VM volumes re-synchronized after logical disk repair or upgrade.
- Logical disk can host multiple VM volumes.

Key Requirements:

- Requires at least 2 physical disks.
- *RAID0 is not supported* in this configuration.



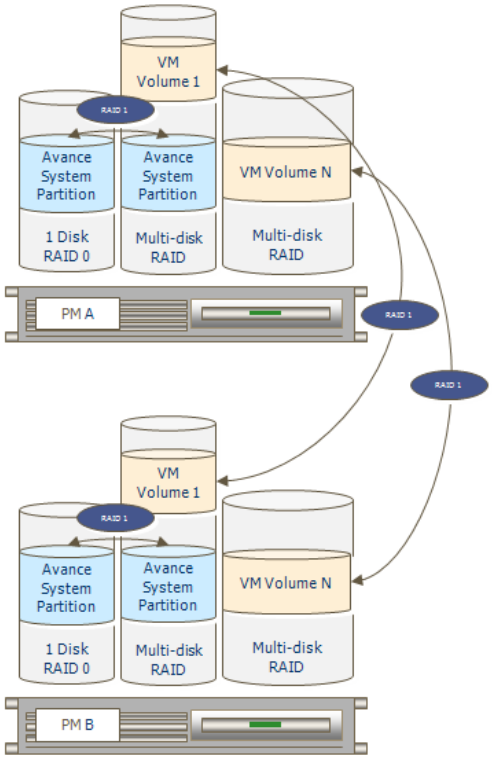
PMs with multiple logical disks

Storage Redundancy:

- Avance installs and mirrors system volumes on first two logical disks within PM.
- VM volumes synchronously mirrored between PMs.
- VM volumes re-synchronized after logical disk repair or upgrade.
- Logical disk can host multiple VM volumes.

Key Requirements:

- Each physical disk is part of only one logical disk.



Section Four: Licensing

License keys include two license expiration dates, one for the product and one for service.

An activated product license is required for full functionality of the product. If the product license has expired or has not been activated then Avance will block creating new VMs, starting stopped VMs, and restarting running VMs in the event of a node failure.

A valid service license is required for upgrades of Avance systems. Upgrade will be blocked in the event that the service has expired.

The Avance Foundation License, available only on servers based on the Intel S12000KP (Kenosha Pass) server board, limits Avance configurations to a maximum of 2 running Virtual Machines with up to a total of 8 VCPUs and 8 GB memory. Servers with additional memory or CPUs will run but the resources will not be used by Avance.

License Activation on Install

Avance polls the Stratus license server via an internet connection to alas.stratus.com (port 443, https) on initial install to activate a new license and to determine the license and service end dates. License activation can also be performed manually in the event that a connection to the internet is not available from the Avance unit. The License page of the Avance Management Console Help contains detailed instructions on how to manually activate a license.

Periodic License Polling

Avance continues to poll the Stratus license server every 24 hours after an install or upgrade for any service renewal. The license poll can also be initiated manually using a button on the license page. Note that a successful poll is only needed in cases where the service contract has been extended or the license has not yet been activated.

A minor alert will appear in the dashboard in the event that the unit cannot communicate with the Stratus license server. This alert can be hidden so that it no longer appears in the main dashboard or on the alerts pane of the Avance Management Console.

Glossary

Term	Description
Active Service network (ASN)	Allows you to configure responses to certain events on the Avance unit or physical machines.
Avance Management Console	Web-based tool for managing Avance unit, physical machines and virtual machines.
Avance unit	Two PMs operating in parallel, providing a high-availability server platform for virtual machines.
Business network	Network through which business applications communicate with servers, services, and clients.
Call-home message	Alerts sent to Stratus Customer Assistance Center or your authorized Stratus service representative when an event requires attention.
e-Alert	Email or pager alerts sent to administrators or service personnel when an event requires attention.
Fault tolerant state (FT state)	Indicates that both Avance PMs are running and synchronized. The Avance Management Console shows all green checkmarks in the navigation pane.
Kickstart file (template file)	A script file that automates installation of a virtual machine, answering questions normally be asked Linux installation.
Live migration	When Avance detects a fault, it “live migrates” (moves) virtual machines from the unhealthy PM to the healthy PM. Applications continue running normally.
Mean time between failure (MTBF)	When a system component or disk fails, the MTBF for the device is recalculated based on the device fault history. If this falls below a defined threshold, the device is left out of service, which stops the automatic repair process from continuing when a device has a hard failure.
Node	One of the two physical machine (PMs) making up an Avance unit.
Physical machine (PM)	The hardware running the Avance software. Each Avance unit consists of two physical machines: node0 and node1.
Primary physical machine	The physical machine running the Avance management process. The management process always runs on the healthiest physical machine, so the primary physical machine is not fixed. To see which physical machine is primary, click **Physical Machines** in the Avance Management Console.
Private network	A dedicated network used by Avance physical machines to communicate.
Secondary physical machine	The physical machine *not* running the Avance management process. The management process runs on the healthiest physical machine, so the secondary physical machine is not fixed. To see which physical machine is secondary (not primary), click **Physical Machines** in the Avance Management Console.
Storage syncing	Automatic synchronization of storage groups between physical machines. ⚠ Do not power down physical machines while synchronizing. Data corruption or loss can result.
Virtual CD (VCD)	ISO image on the Avance unit. Used to create virtual machines.
Virtual CPU (VCPU)	A virtual CPU (VCPU) is defined as: • A single physical CPU **thread**, when Hyper-threading is **enabled**. • A single physical CPU **core**, when Hyper-threading is **disabled**.
Shared mirror (logical disk)	A pair of disks, one from each PM, that provide a single logical disk for use in creating volumes for VMs. Also used to store virtual CDs.
Volume	Fundamental storage container assigned to a VM, appearing as a disk in the VM. These are stored on a shared mirror, and are formatted and partitioned within the VM before use. Volumes are fully fault tolerant.
Virtual machine	A software-based equivalent of a physical machine, running a guest operating system and applications.

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