Overview

Currently shipping versions:

- HP Integrity VM (HP-UX 11i v3 VM Host) v4.2
- HP Integrity VM (HP-UX 11i v2 VM Host) v3.5

Integrity Virtual Machines (also called Integrity VM or HPVM) is a hypervisor product that can be used to carve an individual hard partition or server into several smaller virtual servers, each with their own operating system, shares of resources, and applications. Operating system guests within the Integrity virtual machines can be booted from SAN or the network (via Ignite/UX). Any application or operating system related failure can impacts the virtual machine (VM) in which it is executing-and does not affect other VMs executing on the same system.

HP Integrity Virtual Machines increases server utilization by enabling customers to partition any Integrity server, HP hard partition (nPartition), or Integrity blade, and its associated processor, memory and I/O resources, into separate, secure virtual machines, each with its own O/S instance, which can be tuned to individual application needs.

HP Integrity Virtual Machines provides the ability to allocate processor and I/O resources to an application at a granularity less than that of the physical hardware, yet keeps applications separate from one another in their own operating system instance. This allocation model allows customers to increase their server utilization (by running more applications on a server), while maintaining application fault and security isolation.

The physical processor, memory, and I/O resources are virtualized for the Virtual Machines (VMs). Processor and I/O resources can be shared across virtual machines reducing cost and increasing utilization.

Features for the HP-UX 11i v3 VM Host and HP-UX 11i v3 guests

- Other guests may have other restrictions - see the manuals for more information

HP-UX 11i v3 VM Host capabilities

- Native multi-pathing solution
- New mass storage stack (to simplify administration of guest storage)
- Integration with HP-UX 11i v3 Dynamic nPartitions to provide cell on-line addition of processors and memory to the VM Host "pool" of resources
- Accelerated Virtual I/O benefits for HP-UX 11i v3 guest storage
- Improved Accelerated Virtual I/O performance for HP-UX guests overall
- Isolation:
  - Provides complete software fault and security isolation within a server or nPartition*
  - Failure is isolated to that specific virtual machine; other VMs are unaffected*
- Provides operating system parameter independence-including version and patch configuration per VM*
- Individual reconfiguration and reboot of virtual machines
- Enables application-specific O/S tuning
  Online creation, modification, and deletion of VMs without a system or nPartition reboot. Some devices can be dynamically added to a VM.

Shared resources:

- Shared processor can be oversubscribed; up to 20 virtual servers per processor core*
- Capping of specified CPU resources
- Shared I/O*
- A storage reporting tool, which reports the mapping between guest virtual storage and physical storage.
- Performance analysis tool, hpvmsar

Overview

- Simultaneous access to: tapes, DVDs, DVD burners, and tape/DVD changers (to make backups faster, less manual, and less error-prone)

Dynamic:

- Built in dynamic processor, and I/O resource allocation, based on demand and entitlement*
- Processor shares are dynamically allocated to the Virtual Machines as needed)*
- Dynamic memory migration (shrink and grow-especially for disaster recovery scenarios)*
- Automatic memory reallocation, which provides the ability to specify guaranteed entitlements for memory, analogous to virtual CPU entitlements.
- New suspend/resume capability-to temporarily stop and restart a virtual machine. (General release, with Virtual I/O (VIO) and Accelerated Virtual I/O (AVIO) in v4.2.5.)

Virtualized resources:

- CPU, I/O, memory, network storage, switch, VLAN *
- Each virtual machine (VM) is tuned for up to eight virtual processor cores Guest-tagged VLAN support, so the VM itself can manage its network traffic for selected VLANs, (vs. such being done automatically by the virtual switch.) Virtual switches can now be backed by VLANs, to ease network management of trunked VLANs (v4.2 + April 2010 patches)
  * Also provided on HP-UX 11i v2 VM Host

Well-integrated with HP Converged Infrastructure:

- Has multiple ways for deploying, managing and providing high availability, via integration with Insight Dynamics - VSE for HP UX 11i and other tools
- Full featured command line interface
- Simplified blades I/O configuration with Virtual Connect (that is separate from the blades in the enclosure)
- Failover/migration capabilities:
  1. Offline VM migration through hpvmmgrate command
  2. Online VM Migration (optional) - live dynamic movement of VM to another VM Host/server
  3. High availability (failover) or migration of VMs and workloads (using HP Serviceguard, (which is automatic upon failover):
     - VMs: Virtual Machines as Serviceguard packages, (i.e., Serviceguard on the VM Host for automatic VM failover or proactive off-line VM migration)-with suggested use of the Serviceguard for Integrity VM Toolkit
     - Workloads: Virtual Machines as Serviceguard cluster nodes (protecting applications running in the VM)
- Integrity VM Serviceguard Toolkit was enhanced in v4.2 to include:
  - Application monitoring automation (for health of applications within a VM)
  - Automated multi-node packaging of SLVM backing storage
  - Improved ease of: use, deployment, and management
- Visualization and configuration via:
  - GUI, Integrity VM Manager (vmmgr), that is WBEM based, and plugs into HP Systems
  - System Management Home (SMH) page
  - HP Virtualization Manager (vman)
- Fast deployment via Ignite/UX
- Additional CPU and memory resources through Instant capacity (iCAP)
- Automatic, policy-driven resource allocation between VMs via HP Glogbal Workload Manager (gWLM)

Overview

Configuration

Processor cores:

- The individual virtual machines (VMs) are tuned up to eight virtual processor cores

Memory:

- 512 MB - 64 GB memory per Virtual Machine (minimum and maximum size supported varies by guest operating system type)
- Memory is virtualized, but not shared so there must be enough physical memory on the VM Host to accommodate the memory requirements of all running virtual machines

Storage, I/O and networking:

- Storage and networking (Ethernet only) I/O that is supported on the version of HP UX running on the VM Host is also supported by the Integrity VM Host
- Device classes currently virtualized by Integrity VM: Serial port, SCSI-2 mass storage, Ethernet networking, and USB DVD
- Integrity VM virtualizes the Intel Gigabit Ethernet card
- All mass storage is visible to guests as SCSI disks regardless of the physical connection
- VM storage can reside on a SAN controller (managed from the Integrity VM host) - SAN management cannot be done from a VM
- Virtual machine storage can be mapped to logical storage that is locally attached or connected via SAN and includes files, logical volumes, disks, and RAID array LUNs.
- Tape drives (SCSI and FC, including SAN tape drives), USB DVDs, and optical media (CD/DVD) burners and changers are accessible from a VM via Attached I/O (which uses a SCSI pass-thru driver).
- SAN based management of storage arrays must be performed from the VM Host, not from the VMs
- Accelerated virtual I/O (AVIO) provided more streamlined I/O networking and storage performance (starting with Integrity VM v3.5, with the additional Accelerated Virtual I/O (AVIO) drivers:

Restrictions:

- Integrity Virtual Machines cannot be used in the same nPartition as HP-UX Virtual Partitions
- Applications that depend on the following will not run in an Integrity virtual machine:
  - Devices not virtualized by Integrity VM, such as: FC HBAs, storage array controllers, and USB devices other than DVD
  - Devices requiring direct hardware control
- Targeted for non-performance-sensitive workloads
- Overhead of virtualization technology:
  - depends on the particular workload being run
  - impacts only the nPartition or server that the Integrity Virtual Machines are running in
  - similar overhead to comparable offerings
- Certain applications/tools provide functionality appropriate for the VM Host, but are not necessary in the VMs (e.g., iCAP, APA, Glance). These applications will not fail in the VMs, but add little if any value when executed there.
- Certain other applications should only run in the VM Host. (They will not run in the individual Virtual Machines.) These include: Veritas Volume Manager, Veritas Cluster Volume Manager, Veritas Cluster File System, and multi-pathing software from various 3rd parties.
- Customer workloads are to be executed in virtual machines and are not supported on the VM Host
- The combination of HP-UX Virtual Machines as Serviceguard packages and HP-UX Virtual Machines as Serviceguard nodes on the same VM Host is NOT supported. In other words, a virtual machine running HP-UX can be part of a SG package or a member of a SG cluster-but not both.

Overview

Support

A variety of service options are available from HP. For this product, there are software support services, ranging from standard reactive services up to mission critical support services, as well as implementation services, consulting services and training. For more information, please contact your local HP office or your HP authorized reseller.

Support for Windows when running as a guest OS on Integrity Virtual Machines:
HP Services support can provide full support of Integrity server environments with Windows Server 2003 and Windows Server 2008, including the capability to support Windows guests with Integrity Virtual Machines. HP Microsoft (product) support services will provide comprehensive support, engaging Microsoft on the customer's behalf, were it to be necessary.

Requirements

Hard partitions can contain multiple virtual machines; however, a virtual machine cannot span multiple hard partitions.

Hardware:

- HP Integrity VM (HP-UX 11i v3 VM Host) runs on any HP Integrity nPartition or server (including new HP Integrity blades, Integrity i2 blade servers, and Superdome 2 servers)Integrity VM v4.2.5is required for support of the new BL8x0c i2 or Superdome 2 servers. For, BL8x0c i2 servers, the following patches can instead be installed on top of v4.2, and are found at http://itrc.hp.com:
  - PHSS_40875 HPVM B.04.20 CORE PATCH
  - PHSS_40876 HPVM B.04.20 VMAGENT
  - PHSS_40901 HPVM B.04.20 VMMIGRATE PATCH

- HP Integrity VM (HP-UX 11i v2 VM Host) runs on any legacy HP Integrity nPartition or server (including HP Integrity blades), running HP UX 11i v2 December 2007 or beyond in the VM Host

- At this point, there are no restrictions on the I/O or storage devices supported beyond the valid HP UX 11i v2 or v3 configurations defined in the HP UX 11i v2 or v3 Ordering and Configuration Guidelines. However, only Ethernet network devices may be used for virtual machine networking.
- Minimum VM Host physical memory
  - HP-UX 11i v2 VM Host:
    - For VM Host: 750 MB plus 7.5% of remaining physical memory
    - For Virtual Machine guests: 107% of total memory required by the VMs
  - HP-UX 11i v3 VM Host:
    - For VM Host: 1.2 GB plus 8.5% of physical memory
    - For Virtual Machine guests: 108% of total memory required by the VMs
  - Swap space = 4 GB plus the size of total physical memory-including physical memory used by virtual machines
- Mass storage space of 15 GB for the VM host in addition to total mass storage requirements for individual virtual machines (guests)
- Virtual machine configuration:
- No specific requirements for virtual machines beyond those for the OS and applications.
  - However, HP Integrity Virtual Machines must be tested for appropriateness with particular workloads before purchase. Also, each virtual machine OS (memory, kernel parameters) should be appropriately tuned for its workload-as you would for the workload on a native server
  - Use recommended hardware configuration (e.g., memory size, disk space) for the operating system to be installed on the virtual machine
  - Include requirements for applications to be run on the virtual machine

Software:
Operating System:

Overview

- In the HP Integrity VM (HP-UX 11i v3 VM Host) license, an HP-UX 11i v3 Base OE license is included, for use (only) in the Integrity VM Host
  - Legacy Integrity servers and BL8x0c blades require HP UX 11i v3 September 2008 or beyond in the VM Host
  - Integrity i2 and Superdome 2 servers require HP UX 11i v3 September 2008 or beyond in the VM Host
- Separate HP-UX OE licenses must be purchased for the VM guests (unless the customer has purchased the HP-UX 11i v3 VSE-OE or DC-OE for the whole nPartition or server, wherein such is included)
- In the HP Integrity VM (HP-UX 11i v2 VM Host) license, an HP-UX 11i v2 Foundation OE license is included, for use (only) in the Integrity VM Host
- *Integrity Virtual Machine guest operating systems supported on all Integrity servers:*
  - HP UX 11i v2
  - HP-UX 11i v3

And on Integrity i2 blade servers:
OpenVMS v8.4

And on legacy Integrity servers:

- OpenVMS v8.4 guests (starting with the OpenVMS v8.4)
  - Requires Integrity VM v4.2.5 or the following April 2010 (or later) patches to v4.2, which can be found at http://itrc.hp.com:
    - PHSS_40875 HPVM B.04.20 CORE PATCH
    - PHSS_40876 HPVM B.04.20 VMAGENT
    - PHSS_40901 HPVM B.04.20 VMMIGRATE PATCH
  - Integrity VM OpenVMS v8.4 guest-specific notes:
    - Only Accelerated Virtual I/O (AVIO) guest drivers for network and storage are included with OpenVMS v8.4 (not legacy Virtual I/O (VIO)) - for best I/O performance
    - Supports OpenVMS clusters. Data sharing in a cluster is possible using MSCP-served disk volumes
    - Insight Dynamics VSE 6.0 (March 2010) supports OpenVMS v8.4
  - Restrictions at first release:
    - SAN only guest installation (not network)
    - Common system disk for VMSclusters is not yet supported; (requires future shared disk support via future NPIV or Direct I/O)
    - Integrity VM virtual machines manager (vmmgr) GUI support is planned in the future Insight Dynamics - VSE 6.2 release
    - No dynamic memory migration
    - No AVIO Attached I/O
    - No OpenVMS remote console support (at this time)
- Microsoft Windows Server 2003 Enterprise or Datacenter OS Editions + SP1 or SP2 for 64 bit prior to Integrity VM v4.2)- - Itanium based systems (including Japanese version), Microsoft Windows Server 2008 for 64 bit Itanium based systems (as of Integrity VM v4.1 + July patch)- Red Hat Enterprise Linux Advanced Platform (RHEL AP) 4.4 (before Integrity VM v4.2) and 4.5 for HP Integrity servers- Novell SUSE Linux Enterprise Server (SLES 10 update 1 (before Integrity VM v4.2) and update 2) for HP Integrity servers, (if on Integrity VM v4.0 and beyond)

For more details, see the Integrity VM manuals and release notes @: www.hp.com/go/hpux-hpvm-docs.

Windows VM requirements (beyond above):

- Installation from DVD, ISO file, PXE server
- Smart Setup Media (SSM) for Integrity VM and VSE components
- 32 bit apps through IA 32 Execution Layer (EL)

Linux Red Hat or SLES VM requirements (beyond above):

Overview

- Installation from DVD or ISO file
- Integrity Essentials for Linux Management CD installation for Integrity VM and VSE components

---

Miscellaneous

How the media for this product is currently distributed:

- HP-UX 11i v3 VSE or DC-OE Operating Environment orders: distributed on the HP-UX 11i v3 OE media
- For T2767CC-2AH, HP Integrity VM (HP-UX 11i v3 VM Host:
  - Stand-alone orders: distributed on the HP-UX 11i v3 Application Release
    NOTE: If HP Integrity VM (HP-UX 11i v2 VM Host) customers only have Windows or Linux guests, then they will have to separately purchase the HP-UX 11i v3 Application Release media
  - VSE Suite orders: distributed in the VSE Suite media
- For T2767AC, HP Integrity VM (HP-UX 11i v2 VM Host):
  - Distributed both stand-alone and as part of the VSE Suite media

Optional products to integrate in the VM Host:

- Other components of the HP Virtual Server Environment for HP UX: This includes: global Workload Manager (gWLM) (the intelligent policy engine), HP Serviceguard (for high availability), and utility pricing, so customers can pay for what they use (HP Instant Capacity [iCAP] and Pay Per Use [PPU]).
- GlancePlus, version 4.6 or later: provides performance monitoring on the VM Host.

More information:

- www.hp.com/go/partitions "Learn More" tab, including a pointer to the Integrity VM manuals and white papers at: http://www.hp.com/go/hpux-hpvm-docs/ which include:
  - "HP Integrity Virtual Machines Installation, Configuration, and Administration Guide" System Sizing Guidelines for Integrity Virtual Machines Deployment -- Hardware Consolidation with Integrity Virtual Machines (April 2010) white paper

The Integrity VM Sizer on http://www.hp.com/go/ActiveAnswers under "What's New", then" ActiveAnswer Tools" then "Solution Sizers".
