

QuickSpecs for HP-UX 11i v2 & v3 describes the features and functionality delivered by the HP-UX 11i v2 and HP-UX 11i v3 operating environments and related software, plus considerations for a successful, optimized HP-UX 11i deployment.

Table of contents

OVERVIEW	4
DESCRIPTION.....	4
OPERATING ENVIRONMENTS	5
HP-UX 11i FOUNDATION OE.....	5
HP-UX 11i ENTERPRISE OE.....	5
HP-UX 11i MISSION CRITICAL OE.....	6
VIRTUALIZATION.....	6
HP VIRTUAL SERVER ENVIRONMENT	6
MANAGEMENT AND AUTOMATION	6
CENTRAL POINT OF CONFIGURATION – HP SIM.....	6
HP SYSTEM MANAGEMENT HOMEPAGE (HP SMH)	7
IGNITE UX	7
GLANCEPLUS PAK.....	7
HP OPENVIEW STORAGE DATA PROTECTOR.....	8
HP INTEGRITY ESSENTIALS VIRTUALIZATION MANAGER	8
HP INTEGRITY ESSENTIALS CAPACITY ADVISOR.....	8
HP-UX WORKLOAD MANAGER/HP INTEGRITY ESSENTIALS GLOBAL WORKLOAD MANAGER.....	8
PROCESS RESOURCE MANAGER	9
WEB-BASED ENTERPRISE MANAGEMENT (WBEM).....	9
EVENT MONITORING SERVICES (EMS).....	9
PARTITION MANAGER.....	9
HP SERVICEGUARD MANAGER.....	9
HYPER-THREADING FOR HP-UX 11i v3.....	10
FILE SYSTEM AND STORAGE.....	10
HP SERVICEGUARD STORAGE MANAGEMENT SUITE	10
JFS, ONLINE JFS, VxFS, BASE VxFS	11
HP LOGICAL VOLUME MANAGER AND MIRRORDISK/UX	12
VERITAS VOLUME MANAGER (VxVM), BASE VxVM	13
THE HP CIFS PRODUCT SUITE.....	13
NETWORK FILE SYSTEM	14
NEXT GENERATION MASS STORAGE STACK (HP-UX 11i v3 ONLY).....	15
AVAILABILITY AND CLUSTERING.....	16
HP SERVICEGUARD	16
EXTENDED DISTANCE (CAMPUS) CLUSTER.....	16
METROCLUSTER	17
CONTINENTALCLUSTERS.....	17
HP SERVICEGUARD EXTENSION FOR SAP.....	18
HP SERVICEGUARD EXTENSION FOR RAC.....	18
HP SERVICEGUARD EXTENSION FOR FASTER FAILOVER	18

SECURITY	18
SECURITY CONTAINMENT.....	19
IDENTITY MANAGEMENT AND ACCOUNTABILITY	19
COMMON CRITERIA CERTIFICATION	20
DIRECTORY-ENABLED COMPUTING.....	20
NETSCAPE DIRECTORY SERVER V6.2 FOR HP-UX 11i v2.....	21
RED HAT DIRECTORY SERVER v7 FOR HP-UX 11i.....	21
NOVELL eDIRECTORY FOR HP-UX 11i	21
LDAP-UX INTEGRATION	21
HP-UX IDENTITY MANAGEMENT INTEGRATION	22
PARTITIONING	22
HP nPARTITIONS	22
HP VIRTUAL PARTITIONS.....	22
HP INTEGRITY VIRTUAL MACHINES	23
HP SECURE RESOURCE PARTITIONS	23
INTERNET AND NETWORKING.....	24
IPv6	24
HP-UX MOBILE IPv6 A.01.00.....	25
HP-UX QUALITY OF SERVICE	25
MULTIMEDIA PROTOCOLS.....	25
BIND 9.3.2	26
SOCKETS	26
STREAMS	26
NETWORK TUNING AND PERFORMANCE (HP-UX 11i v3).....	26
HP-UX WEB SERVER SUITE	27
INTERNET EXPRESS.....	27
HP AUTO-PORT AGGREGATION (HP APA).....	27
DEVELOPERS TOOLS	28
HP FORTRAN.....	28
HP aC++	28
HP C/ANSI C DEVELOPER'S BUNDLE	29
HP CODE ADVISOR.....	29
HP WDB DEBUGGER.....	29
PERL.....	29
JAVA™ 2 PLATFORM STANDARD EDITION™ (J2SE) FOR HP-UX 11i.....	29
ARIES TECHNOLOGY FOR HP 9000 TO HP INTEGRITY TRANSITION.....	30
VISUAL THREADS	31
PARALLELIZED SCIENTIFIC SUBROUTINE LIB (MLIB)	31
HP STK FOR PLATFORM TRANSITIONS	31
CELL LOCAL MEMORY SUPPORT	32
SHELLS	32
DYNAMIC LOADER	32
DATA LINK PROVIDER INTERFACE (DLPI).....	32
DYNAMICALLY LOADABLE KERNEL MODULES.....	33
STANDARDS.....	34
POSIX.1 AND FIPS 151-2.....	34
IEEE STANDARD 1003.1-1996.....	34
OPEN GROUP STANDARD XNS 5.2 NETWORKING STANDARD (SOCKETS).....	34
IEEE STANDARD 1003.2-1992.....	34

SVID	35
REAL-TIME	35
HP MESSAGE PASSING INTERFACE (MPI)	35
SYMMETRIC MULTIPROCESSING (SMP)	36
THREADS	36
SHARED LIBRARIES	36
INTERNATIONALIZATION	36
UNICODE SUPPORT	36
EURO CURRENCY SUPPORT	36
CHINESE CHARACTER SET STANDARD GB18030	36
HARDWARE REQUIREMENTS	37
FILE PARTITION DISK SPACE ALLOCATION BY OPERATING ENVIRONMENT	37
SUPPORTED HARDWARE	37
HP-UX 11i v2	38
HP-UX 11i v3	39
RETIRED HARDWARE	40
HP INTEGRITY SERVER PLATFORMS:	40
HP INTEGRITY WORKSTATION PLATFORMS:	40
HP 9000 SERVER PLATFORMS:	40
OPTIONAL DEVICE SUPPORT	41
UTILITY PRICING AND LICENSING	41
INSTANT CAPACITY ON DEMAND FOR HP INTEGRITY AND HP 9000 SERVERS	41
PAY PER USE FOR HP INTEGRITY AND HP 9000 SERVERS	42
SOFTWARE LICENSING	43
SOFTWARE PRODUCT SERVICES	43

Note:

QuickSpecs are also available for HP Integrity systems, HP 9000 systems, HP-UX 11i layered software, HP storage products and more at www.hp.com/go/quickspecs.

Overview

Description

- Make IT an advantage by quickly satisfying new business demands in real real-time with dynamic, virtual workload capabilities
- Drive increased utilization and financial efficiency of IT with flexible, breakthrough capacity designed for your mission-critical applications
- Free your resources to focus on innovation with integrated efficiency by and simplifying management with unified control of enterprise resources

When it comes to running mission-critical applications, it's hard to beat the performance and programming flexibility of UNIX®. But as mission-critical applications grow and expand across your enterprise, the resulting complexity makes it more and more difficult to manage the environment and quickly respond to change. Meanwhile, end users demand ever-increasing service levels—and the business demands round-the-clock availability. To address this challenge, many companies are looking for ways to get more out of UNIX—without increasing cost and complexity. At HP, we believe the best way to get more out of UNIX for enterprises of all sizes is to choose a fully integrated operating environment, one in which mission-critical virtualization, advanced, integrated security, high availability, breakthrough capacity, and automated simplified management are all integral parts of a single environment—one like HP-UX 11i. Just as important, though, is your choice of server platform, so you can leverage all that HP-UX 11i has to offer. That's where having a flexible, high-performance, standards-based platform can make a huge difference in terms of enable IT to respond rapidly to changing business needs, drive greater return on IT assets, meeting service levels, managing change, and reducing total cost of ownership. So, as you explore the capabilities of HP-UX 11i, consider the added value that HP Integrity servers provide.

Operating environments

HP-UX 11i simplifies software procurement, installation and management with integrated, pre-tested Operating Environments (OEs). The HP-UX 11i Foundation, Enterprise and Mission Critical OEs provide the most popular software products in packages that are simple to order, use and maintain.

HP-UX 11i Foundation OE		HP-UX 11i Enterprise OE	HP-UX 11i Mission Critical OE
HP-UX 11i operating system	Internet Express (ships w/ kit)	Enterprise OE	Mission Critical OE
Network drivers	iCAP & Pay per use enablement	includes FOE plus:	includes EOE plus:
Host intrusion detection	CIFS client and server		
IPFilter	Logical Volume Manager	OnlineJFS	Serviceguard
IPSec	Base Veritas Volume Manager	Mirrordisk/UX	HP-UX Workload Manager
Secure Shell	Base Veritas File System	Process Resource Manager (PRM)	(WLM)
OpenSSL	EMS framework	Glanceplus Pak	WLM toolkit
PAM Kerberos	Software Distributor-UX	Event Monitorinig Services (EMS)	Serviceguard NFS Toolkit
Install time security	On-line diagnostics	HA monitors	Enterprise Cluster Master
Security Patch-check	Software Package Builder		
Bastille	Partitioning providers and Management tools		
LDAP UX integration	Trial gWLM agent		
CDE	Ignite-UX		
perl	Distributed Systems		
NFS	Systems Insight Manager		
RedHat directory server	System Management Homepage		
Mozilla Web browser	-Web-based systems		
HP-UX Web Server Suite	Management tool		
Java™ OOB tuning tools			
Java™ RTE, JDK, JPI			

HP-UX 11i Foundation OE

The HP-UX 11i Foundation OE is a fully-featured operating environment. In addition to the base HP-UX kernel, commands and management utilities, the HP-UX 11i Foundation OE provides numerous other Internet-focused capabilities, including the Apache Webserver, Java Runtime and Java Development Environment. The HP-UX 11i Foundation Operating Environment includes a number of features for industrial-strength system management, industry-leading scalability, multi-system interoperability, and the world's most advanced security.

HP-UX 11i Enterprise OE

The HP-UX 11i Enterprise Operating Environment provides all the capabilities of the HP-UX 11i Foundation OE plus certain critical add-on products for additional single system availability and performance management. The HP-UX 11i Enterprise Operating Environment is focused on midrange application servers that must be optimized for single-system (non-clustered) high availability and maximum performance.

The HP-UX 11i Enterprise OE adds OnlineJFS, Mirrordisk/UX, and Event Monitoring System (EMS) High Availability Monitors for additional single-system availability. The HP-UX 11i Enterprise OE also adds Process Resource Manager to manage application performance and response times and GlancePlus Pack to be monitor and optimize system performance.

HP-UX 11i Mission Critical OE

The HP-UX 11i Mission Operating Environment provides all the capabilities of the HP-UX 11i Foundation and Enterprise Operating Environments plus certain critical add-on products for additional multiple system availability and performance management. The HP-UX 11i Mission Critical Operating Environment includes Serviceguard to protect the highest-end, corporate-critical database servers in the case of both planned and unplanned downtime.

The HP-UX 11i Mission Critical Operating Environment adds the Serviceguard high-availability clustering software. The HP-UX 11i Mission Critical OE also includes the HP-UX Workload Manager – a resource management tool enables automated, dynamic allocation of server resources among applications according to predefined policies—so that resource utilization improves and service levels are maintained.

Virtualization

HP Virtual Server Environment

The HP Virtual Server Environment (VSE) enables companies to take advantage of consolidation and virtualization techniques to improve server utilization while reducing operating system management costs and increasing security levels. VSE provides a mechanism for consolidating applications within a single operating-system image. For more information, see <http://www.hp.com/go/vse>

Management and automation

HP-UX 11i provides a rich set of tools to support management in the Adaptive Enterprise. Designed based on direct customer input, the latest generation of HP-UX 11i system management tools reflects the real needs of today's IT administrators, who must manage a dynamic, highly virtualized environment with smaller staffs and reduced budgets.

With HP-UX 11i system management tools, administrators gain the performance, accessibility, and efficiency they need to succeed. HP-UX software deployment and configuration management capabilities automate routine administration and simplify many complex tasks, while providing deep-level system control where needed. The choice of an enhanced CLI, menu-driven TUI, and web-based GUI ensure that both experienced and junior administrators alike can be productive quickly when working with HP-UX 11i. In addition, these single-system tools also work seamlessly with higher level multi-system and enterprise management environments, including HP Systems Insight Manager and HP OpenView. As a result, administrators gain more visual abstracted views of their heterogeneous IT assets, while also having the ability to automatically launch HP-UX 11i management tools from within Systems Insight Manager or OpenView when system-level precision tuning is required.

Central Point of Configuration – HP SIM

HP Systems Insight Manager (SIM) is the foundation for HP's unified server-storage management strategy. It is a multiple operating system, hardware level management product that supports HP Integrity, HP ProLiant and HP 9000 servers. HP SIM is easily extensible, integrating other HP management products and value-add plug-ins such as HP Integrity Essentials.

HP Systems Insight Manager (SIM) and HP Integrity Essentials help you control IT infrastructure with unified management of your HP Integrity server environment running HP-UX 11i. HP Integrity Essentials provides modular, integrated system management software for complete Integrity server management for multiple operating systems, including HP-UX 11i.

HP System Management Homepage (HP SMH)

HP System Management Homepage (HP SMH) is the launch point for all single system management applications for HP-UX 11i. SMH provides web-based systems management functionality, at-a-glance monitoring of system component health and consolidated log viewing. SMH also provides Text-Based User Interfaces (TUI), Command Line Interface (CLI) and X-based interfaces.

HP Systems Insight Manager (HP SIM) is HP's solution for multi-system management and SMH for single-system management. Customers can seamlessly move from multi-system views in SIM to more detailed single system information in SMH.

Ignite UX

HP-UX can be installed from either a DVD or an Ignite-UX Install Server. Administrators have a choice of full, update, and cloned installations. Installation Services are available for those customers who would like an experienced HP Software Specialist to install the software.

Ignite-UX addresses the needs of HP-UX 11i system administrators who perform fast deployment for one or many servers. It provides the means for creating and reusing standard system configurations, enables replication of systems, permits post-installation customization, and is capable of operating in both interactive and unattended modes.

Software Distributor-UX (SD-UX) is the HP-UX 11i administration toolset used to deliver and maintain the HP-UX 11i operating system and layered software applications. Delivered as part of HP-UX 11i, SD-UX can help manage the HP-UX 11i operating system, patches, and application software on HP Integrity servers.

Update-UX is a tool for customizing the behavior and automating the process for HP-UX 11i operating environment updates.

Software Package Builder is an intuitive, graphical user interface (GUI)-based tool for packaging software into SD-UX packages so that they can be installed and managed in the same way as HP's system software.

GlancePlus Pak

HP OpenView GlancePlus Pak provides a single product for managing a system's availability and performance. It is an integrated product that includes:

HP OpenView GlancePlus - GlancePlus provides immediate performance information about a system. It lets a customer easily examine system activities, identify and resolve performance bottlenecks, and tune the system for more efficient operation.

HP OpenView Performance Agent - The HP OpenView Performance Agent is the logging, alarming, and collection component of HP OpenView GlancePlus Pak. It keeps a history of the system's performance and sends alarms of impending performance problems.

As an integrated product, the GlancePlus Pak includes the real-time diagnostic capabilities of GlancePlus and the historical data collection capabilities of the Performance Agent. The performance agent is used with

other availability and performance management products, thus providing an integrated real-time and historical performance management solution.

With GlancePlus Pak, a wide range of system performance and availability problems can be handled to get the best from the system and the applications running on it.

HP OpenView Storage Data Protector

The HP OpenView Storage Data Protector software is enterprise data protection and disaster recovery, ensuring recovery from any disruption. Data Protector integrates a variety of techniques to eliminate backup and recovery windows. The capabilities to eliminate planned downtime range from online backup and backup of open files to zero-downtime, zero-impact backup. The software provides industry-leading instant recovery as well as several disaster recovery alternatives to eliminate unplanned downtime, allowing recovery of entire data centers in minutes.

HP Integrity Essentials Virtualization Manager

HP Virtualization Manager provides a central point of control for managing all the resources in your Virtual Server Environment. It's a powerful way to connect IT resources to real business needs. HP Virtualization Manager includes an easy-to-use interface that lets you build a picture of your available virtual resources in seconds rather than taking hours or days to "manually" construct a picture of your virtual environment. It lets you see how virtual resources are being used, and how they relate to your physical infrastructure in real time. Virtual Manager can also be used to seamlessly configure new virtualization resources—and reconfigure existing ones—for high efficiency.

HP Integrity Essentials Capacity Advisor

HP Capacity Advisor is an easy-to-use tool that captures server utilization data and virtualization configuration scenarios so you can perform ongoing capacity planning. It allows you to view historical resource usage data through an intuitive graphical interface and use that data to pre-test different scenarios before you make changes to your critical applications. By running multiple scenarios before updating your system, you can make better decisions, match workloads to servers more precisely, and get more from your existing server resources.

HP-UX Workload Manager/HP Integrity Essentials Global Workload Manager

HP Integrity Essentials Global Workload Manager (gWLM) and HP-UX Workload Manager (WLM) provide the intelligent control for the HP Virtual Server Environment. They enable automated, dynamic allocation of server resources among applications according to predefined policies—so that resource utilization improves and service levels are maintained. While gWLM and WLM are each best suited for a different type of Virtual Server Environment deployment, they both provide the following capabilities:

- Managing the real-time resource allocation of many soft partitions (vPars, HP Integrity VMs or Secure Resource Partitions)
- Shifting Instant Capacity licenses between nPars or servers based on business priorities, or resizing servers based on demand by activating or deactivating Temporary Instant Capacity
- Synchronizing resource management policies to re-allocate server resources in the case of a failover

HP-UX Workload Manager (WLM) is designed to manage workloads on a single system or high availability cluster. WLM is a suitable solution for a line-of-business (LOB) consolidation in which the LOB owns its servers but relies on an IT team to manage them. HP-UX WLM also gives you the ability to fine-tune policies to support specialized resource management needs.

HP gWLM is ideal for a large-scale deployment with multiple servers. A typical example is a centralized-IT deployment, where a single IT department manages servers for multiple business units, and many applications run on a large number of servers — each with several partitions. HP gWLM's ease of use features include centralized policy administration, pre-defined policies and reporting features to enable IT to easily set-up, manage and track resource usage. These benefits also make gWLM a suitable solution for many common types of IT environments, where fine-tuned policies and specialized resource management are not applicable.

Process Resource Manager

HP Process Resource Manager (HP PRM) is a resource management tool used to control the amount of resources that processes use during peak system load.

HP PRM can manage allocation of the following resources:

CPU: Ensures a minimum allocation, but (optionally) no more than its capped amount of CPU.

Memory: Ensures a minimum allocation, and (optionally) a soft upper bound can be defined of real memory.

Disk bandwidth: Ensures a minimum allocation of disk bandwidth.

Web-Based Enterprise Management (WBEM)

WBEM (Web-Based Enterprise Management) is a DMTF (Distributed Management Task Force) standard based on the CIM (Common Information Management) model.

WBEM allows customers to manage their systems consistently across multiple platforms and operating systems, providing integrated solutions that optimize their infrastructure for greater operational efficiency.

WBEM enables management applications to retrieve system information and request system operations wherever and whenever required.

Event Monitoring Services (EMS)

HP's Event Monitoring Service (EMS) is a system monitoring application designed to facilitate real-time monitoring and error detection for HP products in the enterprise environment. This framework provides centralized management of hardware devices and system resources and provides immediate notification of hardware failures and system status.

HP EMS reports information that helps to detect loss of redundant resources, thus exposing single points of failure and eliminating the threat to data and application availability. HP EMS capabilities cover the entire system: system components, storage, and network interfaces.

Partition Manager

Partition Manager (parmgr) allows system administrators to configure Superdome and other systems that support hardware partitions through an easy to use, familiar graphical user interface. Partition Manager is available as a free web download.

HP Serviceguard Manager

Serviceguard Manager provides a configuration, monitoring, and administration tool to display and manage Serviceguard, Serviceguard Extension for RAC, Serviceguard Extension for SAP, Metrocluster and Continentalclusters, maintaining high availability.

Using Serviceguard Manager, administrators and operators see color-coded, graphically intuitive icons to get the big-picture view of multiple clusters so that they can proactively manage the clusters, nodes, and applications.

Hyper-Threading for HP-UX 11i v3

The new generation of the dual-core Intel® Itanium® 2 processor incorporates two cores per socket; each core offers 2-way hardware threads. HP-UX 11i v3 fully supports this new Hyper-Threading (HT) technology. Each hardware thread appears as a complete processor to the operating system. Logical Processors (LCPUs) provide control for hardware threads in HP-UX 11i v3.

On HP-UX 11i v3, the HT technology is enabled at different levels. The Intel® Hyper-Threading feature is enabled or disabled at system boot time through the firmware setting. When the HT Feature is enabled, the LCPU feature can be dynamically enabled so that kernel threads are scheduled on each hardware thread. All interfaces available for general use by applications that deal with CPU IDs will expose LCPUs as processor core objects. Therefore, there is no impact to applications from a programming perspective. LCPUs are integrated with HP-UX Processor Sets (PSETs), as a way to offer simultaneous availability of processor cores and LCPUs in a single OS instance.

LCPUs are dynamically enabled or disabled for all cores within a PSET on an HT capable system. HP-UX 11i v3 customers may tailor each system specifically to the needs of the applications being run on that system. Applications that benefit from Hyper-Threading can run in PSETs with LCPUs enabled. For those applications that do not benefit from Hyper-Threading, PSETs may be configured to allow the application to run on cores without LCPUs enabled. This new use of PSETs allows for finer granularity control of HT through the use of an existing and well-tested mechanism. Furthermore, this use provides control for HT manipulation without requiring programming changes for applications. This approach is fully dynamic and allows all customer applications to co-exist within a single OS instance regardless of the use of HT.

File system and storage

HP Serviceguard Storage Management Suite

The HP Serviceguard Storage Management Suite (SMS) is the latest addition to the HP-UX 11i high availability portfolio. This suite of products combines the power of HP Serviceguard with the VeritasStorage Foundation offerings by Symantec to produce a comprehensive solution that offers proven availability, performance and manageability.

Seven product bundles are included in the Serviceguard Storage Management Suite - each to address different customer mission critical requirements. Some products are specific for Oracle database environments and others provide cluster file system manageability.

Additionally, the Veritas File System and Volume Manager 4.1 capabilities described in the Data Management section of this QuickSpec are also included in Serviceguard Storage Management Suite. Value-added utilities such as the Oracle Disk Manager provide improved performance within file-system based environments; and for better availability, the Dynamic Multi-pathing capability reduces downtime by enabling automatic I/O path failover.

Initially available with HP-UX 11i v2, version 5.0 of the Storage Management Suite contains a number of new features. CFS enjoys performance and scaling enhancements such as multiple Cluster File System

transaction servers and faster & more reliable failover. Dynamic Multi-Pathing has multi-threaded error handling. Applications will be able to query the File Change Log thus allowing backup utilities, auditing, system management, and compliance applications to check for what has changed and thus operate more efficiently. There are also more policies for Tiered Storage support.

The value of HP-UX 11i extends beyond the benefits gained through the Serviceguard Storage Management Suite. Customers will be able to take advantage of these high availability-based solutions integrated with the HP Virtual Server Environment to maximize resource utilization and improve ROI. Also, pre-integration with the HP-UX 11i Mission Critical Operating Environment provides a quick-to-deploy solution.

For additional information regarding the HP Serviceguard Storage Management Suite, go to www.hp.com/go/sms.

JFS, Online JFS, VxFS, Base VxFS

HP sells Symantec Veritas file system VxFS under the name of HP OnlineJFS. HP invests in integration, testing and quality assurance of OnlineJFS with the HP-UX 11i operating environment.

Designed to extend the functionality of Base VxFS, HP OnlineJFS is a set of features that adds higher levels of data management capability and substantially increases the availability by enabling online data management without interrupting user and application access to the data.

Base VxFS is the base file system included the base HP-UX 11i operating system. OnlineJFS is available as a stand-alone add-on HP-UX 11i software product, included in the Enterprise and Mission Critical Operating Environments, and as a product in the Serviceguard Storage Management Suites for HP-UX 11i.

HP OnlineJFS provides the online management of the journaled file system.

Supported on HP-UX 11iv2, VxFS3.5 supports file system size up to 32TB and file sizes to 2TB. Supported on both HP-UX 11i v2 and v3, VxFS 4.1 supports up to 256TB file system. Initially, 32TB file system size and 16TB file size will be qualified with HP-UX 11i v3; these are not architectural limits and we expect these sizes to increase over time based on customer needs.

Licenses for both versions of OnlineJFS (3.5 and 4.1) are included in the purchase of the Enterprise and Mission Critical OE. At installation time, the user has the option to install either version.

Some of the features in VxFS 4.1 include:

Multi-volume file system (MVS)

MVS allows a file system to exist in multiple volumes. It provides flexibility to the customer to customize the mapping between their data requirements and the most appropriate choice of performance, availability, and cost available from their storage configurations.

Dynamic Storage Tiers, Quality of Storage Service (QoSS)

With MVS you can control where storage is allocated for a given file, directory, or checkpoint. However, the value of that data can change over time. With Dynamic Storage Tiers and QoSS built on top of MVS, you can further configure relocation policies to ensure these files are stored on the storage most appropriate to matching their characteristics at a given time, thus reducing storage costs.

Cross-platform Data Sharing (CDS)

CDS provides a means for the serial sharing of a VxFS file system across heterogeneous platforms that have direct access to the physical devices that contain the data. This may be useful for migrating from one platform to another (e.g., Solaris or AIX to HP-UX) or for the serial processing of data across multiple platforms (e.g., HP-UX and Linux).

Disk Layout

VxFS4.1 supports disk layouts 4, 5, and 6 (new and default). Disk layout 3 is no longer supported. Many of the new VxFS4.1 features and future scalability beyond a 32TB file system size require disk layout 6. With disk layout 6, any application that uses the statvfsdev(3C) family of interfaces (statvfsdev, fstatvfsdev, statvfsdev64, fstatvfsdev64, statfsdev, fstatfsdev) must relink with these routines.

Cluster File System

Through use of the cluster file system, you can concurrently share file systems and files between nodes in the cluster. CFS is only available as part of Serviceguard Storage Management Suite with CFS.

For HP-UX 11i v2:

Online JFS 5.0 is available for HP-UX 11i V2 and deploys a new method of indexing file directories that provides improved performance for directories containing large numbers of entries.

HP Logical Volume Manager and Mirrordisk/UX

The HP Logical Volume Manager (LVM) is included with HP-UX 11i and provides basic volume manager functions and features needed for most configurations. New enhancements to LVM include:

- Dynamic LUN expansion for improved manageability and to minimize downtime
- Support for Online disk replacement (OLR)
- Improved ability to change existing volume group configuration (vgmodify)
- Increased maximum logical volume size, from 2TB to 16TB
- Performance improvements (scan time, activation time, etc.)
- Support for storage array snapshots and clones
- LVM command line interface parse-ability with HP-UX 11i v3
- Full support of native multi-pathing on HP-UX 11i v3

Mirrordisk/UX software (product number B2491BA) prevents data loss due to disk failures by maintaining up to three copies of data on separate disks. Applications can continue to access data even after a single disk failure. In addition, on-line backups can be performed to avoid user and application disruption.

To prevent the failure of a single I/O interface from causing a system failure, HP recommends that mirrored disks be connected to separate interface cards.

Features and Benefits

- Striped mirrors (RAID 0+1) and Mirrored stripes (RAID 1+0) for improved performance and availability
- No single point of failure - separate controllers/power supplies
- Up to 3-way disk mirroring (RAID 1)
- On-line backup while maintaining mirroring
- Application transparency
- Dynamic mirror configuration

- Selective mirror of data
- Fast data synchronization
- Menu-driven administration tools

Veritas Volume Manager (VxVM), Base VxVM

The Veritas Volume Manager for HP-UX is an alternative to the HP Logical Volume Manager and HP Mirrordisk/UX products.

Base VxVM 4.1 (included in HP-UX 11i Foundation OE at no additional cost) provides many volume manager features and benefits such as:

- Root disk mirroring
- Rootability support for improved manageability of the root disk
- Dynamic LUN expansion for improved manageability and to minimize downtime
- Split brain avoidance for high availability
- Java-based administrative GUI
- Heterogeneous platform support

In addition to the above features offered in Base VxVM 4.1, the full VxVM 4.1 product (product number B9116BA) can be purchased separately to obtain many more features and benefits including:

- Full mirroring capability (RAID1) up to 32 copies
- Striping (RAID 0) to distribute data across storage devices for improved performance
- Striped mirrors (RAID 0+1) and Mirrored stripes (RAID 1+0) for improved performance and availability
- Active load balancing or Dynamic Multi Pathing
- Online relayout provides uninterrupted data access during maintenance
- Online volume reconfiguration balances performance and minimize downtime
- Hot relocation restores data after disk failure

For HP-UX 11i v2:

VxVM 5.0 is available for HP-UX 11i v2. The faster startup time for the VxVM configuration daemon provides significantly faster discovery of new devices, initialization of dynamic multipathing, and the importing of disk groups. Enhancements to the Dynamic Multipathing (DMP) feature include more tunable parameters, faster detection of failures, and a tunable parameter to control the duration of retries for Persistent Group Reservations. Easier management of disks cloned via hardware replication is among many other new features such as enhancements to volume tags, disk tags, and the data migration commands.

The HP CIFS Product Suite

Hewlett Packard's HP CIFS Suite consists of HP CIFS Server and HP CIFS Client.

HP CIFS for HP-UX 11i unites UNIX with Microsoft Windows environments by providing remote file sharing, printer access and authentication services between HP-UX and Windows systems. HP CIFS includes both client and server functionality for HP-UX. The HP CIFS Client allows HP-UX systems to mount file systems on Windows NT, Windows 2000, HP CIFS and ASU/9000 servers and access them locally, in a manner similar to NFS, but with greater security. The HP CIFS Server allows Windows and HP CIFS clients to access the HP-UX file system; Windows clients can also access the HP CIFS Server's printers.

The HP CIFS products include CIFS UNIX Extensions, which allow connections between HP CIFS Clients and Servers to utilize UNIX file system attributes within the CIFS protocol. The HP CIFS Client also includes a Pluggable Authentication Module (PAM) which allows HP-UX logins to be authenticated by Windows NT domain controllers.

The HP CIFS products use Microsoft's Common Internet File System protocol (CIFS), the standard networking protocol in Microsoft Windows operating systems.

HP CIFS Server features and benefits:

- Based on the open source server software Samba
- Support for CIFS Unix Extensions
- Support for administration of HP-UX POSIX Access Control Lists (ACL) from Windows clients
- Integrated with core HP-UX directory and file access control subsystems; thus, compatible with standard HP-UX file backup tools such as OmniBack and Legato. (All data and security information resides in the HP-UX file system.)
- Web-based configuration and management using the Samba Web Administration Tool (SWAT)
- High Availability (HA) CIFS server solutions available when used with HP-UX Serviceguard. Templates and documentation are included to assist in the configuration of Serviceguard packages.
- Industry-leading HP service and support

Availability:

HP CIFS product suite is provided free with HP-UX 11i Application Releases. It is automatically ignited with HP-UX 11i, and is a standard component of HP-UX 11i Operating Environments. Both CIFS Server and CIFS Client products are included.

Network File System

The Network File System (NFS) allows a client node to perform transparent file access over the network. By using NFS, a client node operates on files residing on a variety of servers and server architectures, and across a variety of operating systems. File access calls on the client (such as read requests) are converted to NFS protocol requests and sent to the server system over the network. The server receives the request, performs the actual file system operation, and sends a response back to the client.

NFS operates in a stateless manner using remote procedure calls (RPC) built on top of an external data representation (XDR) protocol. The RPC protocol enables version and authentication parameters to be exchanged for security over the network. Customers can feel safe when sharing files over UNIX networks, whether across the room or across the building.

For HP-UX 11i v3:

HP-UX 11i v3 supports NFSv4, the latest version of NFS. NFSv4 adds significant new functionality such as the introduction of state into the NFS protocol and folds ancillary mechanisms such as Access Control Lists (ACLs), locking, and mounting into the protocol. In addition, NFSv4 improves Microsoft® Windows interoperability with an enhanced attributes mechanism, share locks and ACL support.

Next generation mass storage stack (HP-UX 11i v3 only)

The next generation mass storage stack meets the greater challenges of today and also establishes a solid foundation for future development. It delivers improved performance and scalability, higher levels of availability and simplified management of mass storage devices. Some of the new features and benefits include:

- SAN (Storage Area Network) Agility – agile addressing of devices. A new, single persistent device special file (DSF) per logical unit (LUN) which will not change with reconfiguration of the SAN infrastructure
- Immense scalability – architected to support up to 16 million devices (LUNs), up to 16 million I/O controllers, over 4 billion I/O paths and disk sizes up to 8 zettabytes
- Built-in native multi-pathing and load balancing fully integrated with HP-UX 11i v3 – no more need for additional investment in add-on multi-pathing products
- Automatic detection and auto configuration of new mass storage devices, device configuration and SAN changes
- All paths to a device are automatically configured for multi-pathing and load balancing
- Resilience to link failures with persistent DSFs and native multi-pathing. Faster and pro-active path failover of impacted I/O paths by utilizing SAN infrastructure notifications.
- Increased performance through use of parallelism and concurrency of I/O operations which can also result in significantly faster ioscan time
- Architected to exploit OS and platform hardware features such as Cell Local Memory, Processor Allegiance, etc. for maximum performance
- User settable tunables for further optimization of device access
- Integration with CIM/WBEM based system and storage management utilities such as HP's System Management Homepage (SMH), Systems Insight Manager (SIM) and Storage Essentials (SE).
- Enhanced performance metrics and improved performance tools, including port level metrics and separation of read and write operations within sar
- OLARD (online addition, replacement, deletion) of I/O interfaces while I/O activity continues

- Ability to quickly and easily detect missing SAN components and devices when SAN changes are made
- Compatible with HP-UX 11i v2 – no retraining of IT staff required in most update cases. Update to HP-UX 11i v3 and begin using without additional training requirements. Only need to adopt new features when ready to or when exceeding HP-UX 11i v2 limits.

Availability and clustering

HP Serviceguard ---

HP Serviceguard builds upon the concept of virtualization by grouping multiple servers or partitions into a cluster to provide highly available application services that ensure data integrity. Within the cluster, HP Serviceguard monitors the health and status of software and hardware components and uses enhanced cluster management tools to efficiently manage multiple systems. If a threshold is exceeded or a failure occurs, HP Serviceguard provides automatic failover and fast failback of the mission-critical applications.

While HP Serviceguard is effective in handling unplanned events, it can also be used for planned maintenance of your clustered environment. Applications can be moved among servers so that services can remain available to the end user while software or hardware upgrades are implemented.

HP Serviceguard is available as a stand-alone product, as part of the HP-UX 11i Mission Critical Operating Environment, and in the Serviceguard Storage Management Suites.

HP Serviceguard is available for environments with HP-UX 11i or Linux, enabling a consistent cluster strategy for both operating systems.

Extended Distance (Campus) Cluster ---

Key features

- This configuration implements a single Serviceguard cluster across two data centers, and uses either Mirrordisk/UX or VxVM mirroring for data replication. No cluster license beyond Serviceguard is required for this solution, making it the least expensive to implement.
- Customers may choose any storage supported by Serviceguard, and the storage can be a mix of any Serviceguard-supported storage.
- Writes are synchronous unless the link or disk is down, so data remains current between the primary disk and its replica.

Extended Distance Cluster is most appropriate when

- Distance is less than 100km. Extended Campus Cluster does not support asynchronous data replication. While data currency is maintained between the two data in normal operations, longer distances between the data centers increases the likelihood of performance impact.
- Data is less critical. Extended Campus Cluster provides no built-in mechanism for Serviceguard to determine the state of the data before starting up the application. Unlike Metrocluster or

Continentalclusters, An application package will start successfully if volume group activation is successful. For example, nothing prevents an application from starting if the Logical Volume Manager (LVM) mirrors are split. This scenario will increase the exposure to loss in the event of a site disaster.

Only a carefully designed architecture coupled with proper implementation (e.g. adding additional intelligence to package control scripts, selecting appropriate volume group activation options, incorporating monitoring tools like Event Monitoring Services, etc.) can help to avoid undesirable behavior or consequences.

Metrocluster

Metroclusters offer the most robust of HP-UX suite of geographically dispersed clusters that also includes Continentalcluster and Extended Distance Cluster.

Key features

- Automatic and bi-directional failover of mission critical data and applications so both data centers can be active, protected and capable of handling package failover to each other
- Cluster stretched up to 300km, support up to 16 HP Integrity and HP 9000 servers
- Robust, reliable fast fail-over and fail-back based on array-based data replication
- Optimized resource utilization and performance with HP-UX Workload Manager and On-Demand Solutions

Metrocluster can be used with HP Stagerworks continuous access XP, continuous access EVA or EMC's Symmetrix Remote Data Facility (SRDF) when

- The integration with storage is used to mirror data between sites
- Application performance is of critical importance
- Fast fail-over and fail-back are required

Continentalclusters

Continentalclusters are the most flexible of HP-UX suite of geographically dispersed clusters that also includes Extended Distance Cluster and Metrocluster.

Key Features:

- Local and remote failover capability
- Support up to 32 HP Integrity or HP 9000 nodes per
- Allow any data replication. HP offers integrated solutions with leading data replications such as HP Continuous Access, EMC SRDF, and Oracle Standby Database
- Optimized resource utilization and performance with HP-UX Workload Manager and On-Demand Solutions

Continentalclusters is most appropriate when

- Data centers are located at any distance from each other
- Full control of the failover (operator initiated) is required in case of a major outage
- Multiple clusters need to be managed and protected

- Application requires that one site is totally down before the other comes online.

HP Serviceguard Extension for SAP

HP Serviceguard Extension for SAP expands Serviceguard's powerful failover capabilities to SAP environments. It continuously monitors the health of each SAP node and automatically responds to failures or threshold violations. As an added bonus, it can minimize planned downtime when performing SAP upgrades.

HP Serviceguard Extension for RAC

HP Serviceguard Extension for RAC allows multiple servers to be configured as a highly available enterprise cluster that supports Oracle 9i and 10g Real Application Clusters.

These two products work together to provide the best aspects of HP's enterprise clusters and the Real Application Clusters: high availability, data integrity, scalability, and reduced database administration costs.

Please note: Serviceguard and Serviceguard Extension for RAC are required components for Oracle9i Real Application Clusters on HP-UX servers.

HP Serviceguard Extension for Faster Failover

HP Serviceguard Extension for Faster Failover decreases recovery time to provide even greater levels of protection for mission-critical needs. The application is designed to significantly reduce failover time of Serviceguard and Serviceguard Extension for RAC environments while continuing to support all of their functionalities and components without compromise.

Security

The most basic goal of operating system security is to preserve the integrity of the system in the face of attack. The HP-UX 11i operating system includes a number of features that assist the administrator in locking down the platform:

- HP-UX Bastille provides a graphical interface that guides an administrator in tasks to harden the system against attack, including locking down system ports, files, and other components.
- Host IDS uses kernel-level system audit information to continuously monitor many systems for attacks, generating alerts and, as an option, also responding in real time.
- IPFilter provides system firewall capabilities, including stateful connection filtering to limit the "attack surface" of the platform, and connection throttling to limit the effectiveness of denial-of-service attacks.
- Install-Time Security eases default lockdowns by offering a menu of security profiles that may be applied as part of the operating-system installation process.

- Security Patch Check helps ensure security patch currency by periodically connecting to HP and recommending the latest security-relevant patches.
- Execute-Protected Stack prevents common types of buffer overflow attacks, which are a leading contributor to platform compromise.

Security containment

HP Security Containment for HP-UX 11i is a suite of security technologies designed to dramatically reduce the likelihood of system compromise. HP incorporates these enhanced security features into the mainstream HP-UX 11i operating environment to help businesses combat increasingly complex threats. Without requiring modification to applications, HP Security Containment isolates compromised applications, which are denied unauthorized access to other applications or files on the system.

HP-UX 11i Security Containment comprises three core technologies that together provide a highly secure operating environment:

- Compartments provide isolation and restrict access to application and system resources outside of the compartment to prevent catastrophic damage should a compartment be penetrated. HP-UX Security Containment accomplishes this by controlling the flow of information between processes in different compartments. For example, outside compartments can accept and process customer-facing data and then transfer it securely, by rule, to inside compartments for non-public access and processing.
- Fine-Grained Privileges grant only the privileges needed for a task and, optionally, only for the time needed to perform the task. Applications that are “privilege-aware” are able to elevate their privilege level during the operation and lower it after completion of the operation.
- Role-Based Access Control provides a mechanism to allow non-root users to perform administrative tasks, effectively splitting the power of root into a manageable set of roles. An out-of-the-box configuration supports many common HP-UX 11i commands and, when combined with HP OpenView Select Access, also supports multi-system access management.

Identity management and accountability

- Standard Mode Security Enhancements offer granular account and password policies on a system-wide or per-user basis, including the ability to generate detailed system audits for user accountability.
- HP-UX LDAP-UX client services simplify identity management by allowing system authentication and naming services to leverage a new or existing LDAP directory.
- Kerberos server and clients offer enterprise-class Single-Sign-On (SSO) services as well as enhanced interoperability with Windows® ADS.
- HP-UX AAA server (RADIUS) authenticates network devices and controls access.
- Red Hat Directory Server for HP-UX provides an industry-standard, centralized directory service to store digital identity information.

Common Criteria certification

The HP-UX 11i v2 operating system running on HP Integrity or HP 9000 platforms has been successfully evaluated against the requirements for the EAL4 Common Criteria (ISO 15408) Assurance Level, augmented by ALC_FLR.3 (flaw remediation), using the Controlled Access (CAPP) and Role-Based Access Control (RBAC) Protection Profiles. EAL4+ is sometimes used as the abbreviated form for additional assurances. Details of the evaluation and evaluated configuration are available at

www.commoncriteriaportal.org/public/files/epfiles/CRP225.pdf and
www.commoncriteriaportal.org/public/files/epfiles/hp-ux11iv2.pdf.

For HP-UX 11i v3:

- HP-UX Identity Management Integration for Select Access, an HP OpenView Select tool included at no charge with the HP-UX operating system, simplifies user management with improved provisioning and manageability. Instead of accessing each machine individually to update security policies, it is now possible to manage HP-UX 11i servers on a one-to-many basis; and add policies and rules that define user privileges and manage access rights. With this tool, it takes just a single click to define and apply high-level security policies that accompany a specific role within an organization. For example, the tool automatically assigns system backup and restore rights when an employee joins the operations team, and withdraws these privileges when the employee leaves the team.
- Encrypted Volume and File System transparently protects “data-at-rest” against unauthorized disclosure if the data is lost or stolen, and may also provide “safe harbor,” avoiding the need for breach disclosure required by some state laws.
- Trusted Computing Services provides software support for embedded security hardware that is available on selected HP Integrity servers for enhanced key protection and EVFS auto-boot support.
- HP Protected Systems offers an automated mechanism to configure and deploy more secure systems by leveraging the built-in protection of HP-UX 11i servers, reducing the time and level of security knowledge required by IT personnel when configuring such mechanisms as Security Containment, which isolates processes and resources.
- HP-UX Bastille with drift reporting checks the consistency of a system’s hardening configuration with previously applied hardening policy to avoid risk of system changes. This data reduces system exposure to malware, simplifies compliance maintenance, and provides visibility into undone hardening to allow planned response without risk of unexpected system breakage.
- HP-UX AAA Server offers more flexible integration with enterprise databases in combination with centralized, RADIUS-based user authentication and network access logging to simplify auditing and compliance.

Directory-enabled computing

HP provides added security protection through directory-enabled computing. HP includes Netscape Directory Server for HP-UX 11i with the HP-UX 11i v2 operating environment.

In addition, LDAP Services are integrated through LDAP UX integration. LDAP is integrated with:

- Local OS login authorization as pam_authz
- Cluster management
- With sendmail
- With BIND 9.3.2
- With NIS
- With Network Quality of Service (QoS) management
- With Virtual Private Network (VPN) management
- AAA (RADIUS) Server

For HP-UX 11i v2:

NIS+ Server is available as a directory server.

For HP-UX 11i v3:

NIS+ Server is no longer available.

Netscape Directory Server V6.2 for HP-UX 11i v2

Netscape Directory Server for HP-UX 11i is an LDAP server that centralizes application settings, user profiles, group data, policies, and access control information into a network-based registry. Directory Server simplifies user management by eliminating data redundancy and automating data maintenance. It also improves security enabling administrators to store policies and access control information in the directory for a single authentication source across enterprise or extranet applications. The server is available on HP-UX 11i v2 and operates on both HP9000 and Integrity hardware platforms.

Red Hat Directory Server v7 for HP-UX 11i

Red Hat Directory Server for HP-UX provides an industry standard centralized directory service to build your intranet or extranet on. Your Red Hat servers and other directory-enabled applications use the directory service as a common, network-accessible location for storing shared data such as user and group identification, server identification, and access control information.

Novell eDirectory for HP-UX 11i

Novell® eDirectory™ is the foundation for the world's largest identity management deployments-allowing businesses to manage identities and control access for employees, customers and partners. With Novell eDirectory, the industry's first and most advanced full-service directory, businesses lay the groundwork for complete secure identity management solutions and multi-platform network services. Now HP-UX 11i customers can implement this popular directory on systems running the HP-UX 11i operating system.

LDAP-UX integration

LDAP-UX Integration for HP-UX is a free downloadable bundle consisting of two products, which provide access to the directory services of an LDAP directory server.

The NIS/LDAP Gateway acts as an NIS server storing data in an LDAP directory server rather than in NIS maps. The NIS/LDAP Gateway provides Simple Access to LDAP Directory Server allowing current NIS

clients to use the LDAP directory server with few or no changes. In addition, the gateway server converts NIS rpc requests into LDAP operations, and then converts answers back into NIS replies.

The LDAP-UX Client Services provides tools for managing the data in the LDAP directory server and a second set of tools that provide native access to the directory server, bypassing NIS.

HP-UX Identity Management Integration

Hewlett Packard provides the first identity management and single sign-on capability from a single vendor that utilizes the HP-UX 11i operating system to enforce critical system access and authorizations. In addition to integrated enforcement, customers benefit from single vendor support for this mission critical capability.

The Identity Management Integration feature of HP-UX 11i provides authentication and enforcement of user rights within the operating system. By using the Red Hat Directory Server for HP-UX, with HP OpenView Select Access Identity Management System features are seamlessly managed. The HP-UX AAA Radius Server can be added to enforce network access, authentication and accounting useful to many service providers

Partitioning

HP nPartitions

Hewlett-Packard's nPartition system capabilities enable a customer to configure a single server complex as one large system or as multiple smaller systems. These hard partitions are designed to provide for complete electrical and software isolation. For organization where high availability is critical, this ensures that any fault within one partition cannot impact any other partition. Applications running within hard partitions are not subject to hardware or software events in other partitions.

Each nPartition has one or more cells (containing processors and memory) that are assigned to the partition for its exclusive use. Any I/O chassis that is attached to a cell belonging to a partition also is assigned to the partition. (Each chassis has PCI card slots plus any I/O cards and attached devices, and may also have core I/O.) Since each nPartition has its own CPU, memory and I/O resources consisting of the resources of the cells allocated to the nPartition, resources may be removed from one nPartition and added to another without having to physically remove and add hardware. Additionally, dynamic creation and modification of nPartitions is supported.

These partitions operate in such a manner that they can be totally isolated from other hard partitions. Each nPartition executes a single OS image, thus providing software isolation. Alternate nPartitions may, therefore, be executing different versions of the OS. With the addition of IA-64 processors, HP-UX 11i, Linux, and Microsoft Windows will be supported simultaneously in different nPartitions within a single Superdome, making the Superdome the only high-end server in the industry that includes both full IA-64 compatibility and binary application support.

HP Virtual Partitions

The vPars (Virtual Partitions) product is one of the soft partitioning options in the integrated HP Virtual Server Environment. vPars is available on cell-based mid-range and high-end HP Integrity and HP 9000 servers or nPartitions.

The vPars technology enables you to increase server utilization by creating multiple vPars simultaneously on a single server or nPartition. Each virtual partition: runs a separate instance of HP-UX, is assigned its own subset of CPU, memory and I/O resources, and hosts its own set of applications. HP-UX Virtual Partitions provide application and OS (operating system) fault isolation. Dynamic CPU migration is available between the vPars.

HP-UX 11i v3 Virtual Partitions also support: dynamic memory migration between vPars, and mixed HP-UX 11i v2 and v3 version support within the same nPartition.

vPars provide processor core granularity. Because the vPars technology parses resources, and gets “out of the way” during normal processing, there is typically little overhead associated with vPars.

HP offers Virtualization Licensing for the HP-UX 11i software running in the vPars. Software running within vPars are capped, for licensing, at the maximum number of processor cores assigned to the total number of vPars.

HP Integrity Virtual Machines

HP Integrity Virtual Machines is one of the soft partitioning options in the integrated HP Virtual Server Environment.

HP Integrity Virtual Machines (VM) is a software virtualization technology that allows you to create multiple virtual machines simultaneously on any single HP Integrity server, or nPartition. Each virtual machine has its own separate “guest” operating system instance with different: operating systems and versions, applications, and users. Each virtual machine hosts its own applications in an environment that provides full software fault and security isolation.

Integrity VM provides shared processor and shared I/O, and automatic, dynamic resource allocation that is built in. The physical resources of the HP Integrity server are shared amongst any of the virtual machines it hosts, based on demand and entitlement.

HP offers Virtualization Licensing for the HP-UX 11i software running in the guests. Software running within Integrity VMs are capped, for licensing, at the maximum number of processor cores assigned to the total number of virtual machines.

Integrity Virtual Machines 2.0 not only supports HP-UX 11i v2, but also Windows Server 2003 guests, and HP-UX 11i v3 guests (with some limitations that will be lifted in the next Integrity VM release). Download the Integrity VM Manager GUI for free at our Integrity Essentials download page.

HP Secure Resource Partitions

HP Secure Resource Partitions (SRPs) are a soft partitioning and virtualization technology available on HP-UX 11i. Secure Resource Partitions allow stacking of multiple applications within a single HP-UX 11i operating system image, allowing for the most dynamic and most granular allocation of resources. Increased security is achieved through the assurance that a process running in one secure resource partition cannot communicate with processes in another resource partition. HP Secure Resource Partitions offer the most granular resource controls, permitting applications to run in as little as one percent of a processor core. SRPs also support controls for real memory and disk I/O bandwidth, offering a high degree of dynamic control and flexibility. SRPs can be implemented by using the HP Process Resource Manager together with the Security Containment features of HP-UX 11i. Security Containment is included with the HP-

UX 11i Foundation Operating Environment. The HP Process Resource Manager is included with the HP-UX 11i Enterprise Operating Environment.

Internet and networking

IPv6

HP-UX 11i IPv6 is a fully supported version of IPv6 and downloadable at no extra charge.

HP-UX 11i IPv6 supports dual stacks to facilitate IPv6 deployment. This allows existing applications to coexist on both IPv4 and IPv6 networks. Application modification is required only when the application needs to take advantage of the new IPv6 features. Some benefits of IPv6 are:

Plug-and-Play address auto-configuration to allow immediate communication with directly connected hosts, printers, or other devices.

IP security extensions for authentication, data integrity, and data confidentiality

Built in controls that allow network traffic to be prioritized and reserved.

Mobility support through auto-configuration, routing headers, destination options, anycast address, encapsulation, security, and flow label management all contribute to IPv6's natural mobility support.

IPv6 features available with Transport Optional Upgrade Release (TOUR)

Multicast Listener Discovery (MLD): MLD (specified in RFC 2710) is a sub-protocol of ICMPv6. MLD is automatically enabled when an IPv6 interface is initialized. This RFC specifies a protocol that an IPv6 router uses to detect multicast listeners (nodes interested in receiving multicast packets) on its directly attached links. The Management Information Base (MIB) for MLD (defined in RFC 3019) is also supported.

Transport Optional Upgrade Release (TOUR) 3.1 delivers Transport and STREAMS functionality on the web and independently from major HP-UX releases. TOUR 3.1 is a Transport Web upgrade supported on the HP-UX 11i v1 and HP-UX 11i v2 September 2004 operating systems.

Features Available since TOUR 2.0 /TOUR 3.1

- IPv6 Transition Mechanism (Tunneling) Enhancements
- Host and router support for configured tunnels and "6to4"
- Support for Tunnel Types: IP-in-IPv6, IPv6-in-IPv6
- IP over InfiniBand (IPoIB) Link Support (HP-UX 11i v2 only).
- TCP Segmentation Offload (TSO) transport support for TSO-enhanced cards and drivers. For more information on TSO-enhanced cards and drivers, refer to "GigEtherEnh-01: Enhancement Software for GigEther-01" by searching the keyword "GigEtherEnh" at <http://www.software.hp.com>.
- IPv6 Link Support: Ethernet, FDDI and PPP links.

- Serviceguard Enablement for IPv6 support.
- IPv6 Transition Mechanisms - Dual Stack, IP6-in-IP tunneling.
- IPv6 Stateless Address Autoconfiguration.
- IPv6 Neighbor Discovery.
- TCP/UDP over IPv6, PMTUv6, ICMPv6, IPv6 MIBs and Socket APIs.
- Network Configuration and Troubleshooting Utilities for IPv4 and IPv6: ifconfig, netstat, ping, route, ndd, ndp (neighbor-discovery utility for IPv6 only), traceroute, nettl and netfmt.
- Router Advertisement: Router functionality, implemented with a new daemon, rtradvd, and an accompanying configuration file, /etc/rtradvd.conf.
- Host (listener) Multicast Listener Discovery (MLD) support. The Management Information Base for MLD is also supported.
- Limited Transmit: a TCP loss recovery enhancement.

HP-UX Mobile IPv6 A.01.00

IPv6 addresses are topologically correct, meaning IPv6 nodes attached to the same physical network or LAN segment must have the same IPv6 network address prefix. Mobile IPv6 allows Mobile Nodes, such as laptops and PDAs, to change network attachment points, remaining reachable at all times and with no disruption in network connectivity using a single, fixed IPv6 address for extended periods of time. Without Mobile IPv6, Mobile Nodes cannot use a single, fixed IPv6 address while they roam. Instead, each time a Mobile Node moves and changes network attachment points, it must manually re-configure a new IP address and default router based on its current location—temporarily losing its network connections and ability to communicate in the process. The first release of the HP-UX Mobile IPv6 software was delivered in TOUR 2.0.

HP-UX Quality of Service

With the rapid growth in networking traffic and the utilization of server resources near their capacity, Enterprise IT departments and ISPs are confronted with a dilemma in providing applications and users the guaranteed bandwidth to meet the service levels that they have signed up for. To address this business need, HP-UX IPQoS provides IETF DiffServ-compliant network quality of service controls for IP-based network communications.

Multimedia Protocols

HP-UX provides a multimedia infrastructure to be used for multimedia applications. The following lists the protocols that Multimedia Streaming Protocols (MSP) includes.

RTP

Real Time Transfer Protocol (RTP) is a transport protocol that provides end-to-end network transport functions for applications transmitting data with real-time properties, such as interactive audio and video. RTP consists of Real-Time Control Protocol (RTCP), a closely linked protocol, which provides a mechanism for reporting feedback on the transmitted real-time data.

RTSP

Real Time Streaming Protocol (RTSP) controls the transfer of real-time media data and serves as a network-remote-control for multimedia sessions.

SDP

Session Description Protocol (SDP) describes the general real-time multimedia sessions

BIND 9.3.2

BIND, a Berkeley implementation of the Domain Name System (DNS), is a distributed network service that maps host names to Internet addresses and Internet addresses to host names, and facilitates Internet mail routing. BIND 9.3.2 version provides better security and manageability in the networking communications, and offers new features such as 'DNSSEC Implementation Based on RFC 4033, 4034, and 4035,' 'New Resource Records,' 'Transition Support for IPv4 and IPv6.'

Sockets

BSD Sockets is a set of programming development tools for inter-process communication. HP's implementation of BSD Sockets is a full set of sockets from the networking services originally developed by the University of California at Berkeley (UCB).

STREAMS

STREAMS/UX for the HP 9000 is Hewlett Packard's implementation of the AT&T de facto standard environment for communications protocols.

STREAMS/UX consists of the STREAMS environment, Transport Layer Interface (TLI), and XTI. TLI is an industry de facto standard application program interface for implementing transport-level communications by means of STREAMS-based network protocol stacks. HP also provides a Data Link Provider Interface (DLPI) adapter with the core operating system. DLPI is one industry standard definition for message communications to STREAMS-based network interface drivers.

Network tuning and performance (HP-UX 11i v3)

HP-UX 11i v3 includes many tuning and performance updates:

Tuning

- Improved throughput with mobile clients by avoiding unnecessary TCP retransmissions due to varying response times
- Improved throughput over congested networks by making the estimate of the network path's capacity more accurate.

Performance

Improved scalability and CPU utilization for high end systems involved significant reduction of spinlock usage and time spent within a spinlock (contention avoidance)

Improved bandwidth with high speed network interfaces involved implementing NOSYNC capabilities in the STREAMS framework and the IP Lower STREAMS module.

Improved CPU utilization on cell-based systems involved several different methods to reduce cache misses and the associated latency of retrieving memory across cross-bars.

Methods include rearrangement of key data structures in networking data stack, pre-fetching throughout the networking stack and eliminating static false sharing.

Dynamic Host Configuration Protocol (DHCP)

HP-UX 11i DHCP Server contains all the benefits inherent in DHCP, plus a number of advantages that are unique to HP's version. DHCP is available for IPv4 and IPv6 networks. The most recent versions of DHCP, DHCPv6, are available on www.software.hp.com. This version is for IPv6 networks and can coexist with DHCPv4 on the same host.

HP-UX Web Server Suite

HP-UX 11i provides the industry leading, Apache Web Server as a total solution for web server deployment. The version of Apache featured on HP-UX 11i is based on the Open Source Apache Web Server 2.0 software developed by the Apache Software Foundation (Apache HTTP Server Project described at <http://httpd.apache.org>).

Apache 2.0 is a significant enhancement over the Apache 1.3.x line from the Apache Server Foundation with many architectural improvements that increase Apache's power and flexibility while retaining its legendary stability as the world's most popular web server. In addition to the base HTTP server, HP has combined numerous popular modules from other Open Source projects as well as provided HP value-added features just for the HP-UX platform.

Internet Express

HP-UX 11i Internet Express is a collection of the most popular and up-to-date set of Internet and security services and tools, combined with a graphical administration utility for ease of management and easy installation of services and configuration. Included with every HP-UX 11i OE Media Kit, the Open Source software is fully tested and qualified for HP-UX 11i supported HP Integrity and HP 9000 systems.

The HP-UX 11i Internet Express software package consists of the most recognized security products, mail servers, news and chat servers, and a variety of tools for providing dynamic Web content. In addition, the Industry-leading HP-UX 11i Web Server Suite is also provided.

All the Open Source Internet components and administration software included with the product are configured and available for use when the installation is complete. HP-UX 11i Internet Express can be installed using a command-line script or using a graphical user interface. The HP-UX 11i Internet Express Open source components are configured through the HP-UX 11i Webmin-based administration utility. These components are grouped as HP-UX 11i OE components and non-OE components. The OE components are part of every HP-UX 11i OE media and are fully supported under HP-UX 11i support contracts. The non-OE components, on the HP-UX 11i Internet Express media, are part of every OE media kit and are open source community supported products.

HP-UX 11i Internet Express is available on both HP Integrity and HP 9000 platforms.

HP-UX supports Fast Ethernet (IEEE 802.3 100Base-TX) in full and half duplex.

HP Auto-Port Aggregation (HP APA)

HP APA, HP's link aggregation or trunking product, provides the ability to logically group two or more physical network ports into single "Fat Pipes", often called "trunks". Network traffic is load balanced across

all of the links in the aggregation, which allows a customer to build large bandwidth logical links into the server that are highly available and completely transparent to the client and server applications. HP APA is available for HP-UX 11i v2.

The LAN Monitor mode of HP APA provides a failover group capability with Serviceguard-like configuration tools. LAN Monitor does not support Serviceguard. In the event of link failure, LAN Monitor will automatically migrate the data flow from the primary link to one of the standby links in the failover group.

HP has tested switches from the following vendors to work with HP APA:

- 3Com
- Cisco
- HP
- Foundry
- Alteon
- Nortel
- Extreme

Developers tools

HP Fortran

HP Fortran is a modern, powerful mathematical and scientific language that supports array-handling, data abstraction, and data hiding. HP Fortran is available on both HP Integrity and HP 9000 servers, and includes the following features:

- Full Fortran 95 compiler, based on International ANSI/ISO standards
- Full OpenMP v2.0
- Object-oriented Fortran feature optimizations
- Math intrinsic inlining support
- Standard Fortran library
- Native and cross compilers for HP Integrity and HP 9000 systems
- HP WDB debugger support
- HP Caliper

HP Fortran products are increasingly the language of choice for software engineers writing scientific applications and who demand superior run-time performance, code portability, and programmer productivity.

HP aC++

The HP aC++ compiler is HP's implementation of the ISO/IEC 14882 Standard for the C++ Programming Language (the international standard for C++) and largely conforms to this standard.

Major features and benefits include:

- Precompiled Header Files — quicker compiles
- Standard Template Library — off-the-shelf software reduces the amount of code to be written
- Faster Template Instantiation — promotes software reuse
- Optimized Exception Handling — convenient mechanism for handling error conditions

HP C/ANSI C Developer's Bundle

HP C/ANSI C Developer's Bundle is HP's well-rounded compiler toolkit for HP-UX 11.0, 11.i, 11i version 1.5, and 11i version 1.6, based on the ANSI/ISO Standard. The bundle supports code generation for both PA-RISC and Itanium®-based processors.

The HP C Developer's Bundle includes:

- Standard C library
- C developer's tools
- C analysis tools
- Support of N-Class and V2600 servers
- Y2K compliance for HP-UX 10.20 and HP-UX 11.x

HP C is one of the most commonly used products by software engineers writing commercial or technical applications.

HP Code Advisor

HP is happy to announce the availability of HP Code Advisor (cadvice) version C.01.00. This new tool is a static analysis tool. It finds coding errors in C and C++ programs. Beyond finding coding errors, this tool also enables programmers to identify porting issues, and security vulnerabilities.

HP WDB Debugger

The HP WDB debugger is an HP-supported implementation of the GDB debugger. It supports source-level debugging of object files written in HP C, HP aC++, Fortran 90, and FORTRAN77 on HP-UX Release 11.0 and later.

HPWDB 4.5 is the recommended debugger for Integrity systems running HP-UX 11i v2. Other debuggers, such as xdb and HP DDE, are no longer supported.

PERL

PERL has been updated to include hash code re-factored for source code duplication reduction, to add hv_clear_placeholders as part of the PERL API. .

Java™ 2 platform Standard Edition™ (J2SE) for HP-UX 11i

The HP-UX SDK, for the Java platform (product T1456AA) provides the Java 2 programming tools and runtime environment which allows a customer to deploy version 1.4 technology with the best performance on HP-UX 11i for HP Integrity and HP 9000 systems.

The redistributable version of the 1.4 runtime environment is HP-UX Runtime Environment for the Java platform (product T1457AA).

The J2SE features include:

- 64-bit interpreter and compiler
- Standard Java™ 2 SDK tools
- Core API support
- Hotspot 1.4 VM
- HP enhancements to enable great performance
- HP-UX 11i HP Integrity and HP 9000 support

In addition, additional downloadable tools are available for use with J2SE:

HPjtune is a Java Garbage Collection (GC) visualization tool for analyzing garbage collection activity in a Java program. The analysis is carried out off-line or on-line, based on the output of the JVM via the -Xloggc or -Xverbosegc output file.

HPjmeter is the 100% Pure Java tool for analyzing profiling information generated by the Java Virtual Machine in Java 2 (1.2, 1.3 and 1.4). Measure, view, and improve Java™ application performance with HPjmeter.

HPjconfig is a Java configuration tool for tuning HP-UX 11i HP Integrity and HP 9000 system kernel parameters to match the characteristics of the application. HPjconfig provides kernel parameter recommendations tailored to a customer's Java enterprise services (Web server, Application Server, etc.) and HP-UX hardware platform. It offers save and restore functions for easy distribution of tailored recommendations across multiple users.

Java Out-of-Box is a stand-alone bundle that upon installation will install startup (RC) scripts, modify kernel parameters, rebuild the kernel, and reboot the system. During startup the startup scripts will modify system tunables, thus providing better "out of the box" behavior for Java.

Aries Technology for HP 9000 to HP Integrity transition

ARIES is a binary translator that automatically executes PA-RISC applications on Integrity servers running HP-UX 11i. The ARIES technology does not require recompilation of the code. To learn more about it, read the following white papers:

[Transparent execution, no recompilation](#) (PDF, 140 KB)

[Compatibility mode on Itanium-based HP-UX](#)

Note:

On Integrity servers, HP 9000 and HP integrity applications and libraries cannot be mixed. To port or simply qualify an application on Integrity servers, make sure that the libraries for this platform are available.

HP Integrity and HP 9000 binaries cannot be mixed in any one executable.

Visual Threads

Visual Threads is the diagnostic tool needed to analyze and refine multithreaded applications. It can be used to debug potential thread-related logic problems, even those hard-to-find problems that only occur due to slight timing differences. Visual Threads can also be used to pinpoint bottlenecks and performance problems by using its rule-based analysis and statistics capabilities and visualization techniques.

Visual Threads can be used with any application that uses a POSIX threads library (including Java applications).

Parallelized Scientific Subroutine Lib (MLIB)

HP MLIB is a package of high-performance mathematical software in the form of subroutine libraries. The MLIB product is designed for use by software engineers who develop, port, or optimize engineering or scientific programs. These programs rely heavily on computational kernels such as the Basic Linear Algebra Subprograms, linear algebra computations (solving linear equations or eigenvalue problems), discrete Fourier transforms, or convolutions. Using MLIB will save you the effort of developing, testing, or optimizing these algorithms.

Included in this bundle are subprogram libraries containing software for:

- dense vector operations, including the Basic Linear Algebra Subprograms (BLAS)
- sparse vector and matrix operations, including the Sparse BLAS
- matrix operations, including the Level 2 and Level 3 BLAS
- linear equation solution, including LAPACK
- eigensystem solution, including LAPACK
- parallel linear equation solution using MPI, including ScaLAPACK
- parallel eigensystem solution using MPI, including ScaLAPACK
- parallel sparse nonsymmetric linear systems solution using MPI, including SuperLU_DIST
- sparse symmetric and structurally-symmetric linear equation solutions
- full METIS functionality
- sparse symmetric ordinary and generalized eigensystem solutions
- discrete Fourier transforms
- convolution and correlation
- miscellaneous tasks, such as sorting and generating random numbers

HP STK for platform transitions

The HP Software Transition Kit contains tools and documentation to help transition applications from older to newer versions of HP-UX, from Tru64 Unix to HP-UX and from Linux to HP-UX. More specifically HP-UX STK supports application transition from older version to newer versions of HP-UX. STKT supports

application transition from Tru64 UNIX to HP-UX transition. STKL supports Linux to HP-UX application transition. The HP STK assists with topics such as:

New features in the latest HP-UX release and how to take advantage of them:

- Deciding on 32-bit or 64-bit version of applications.
- Qualifying software (for example, run a 10.x executable on HP-UX 11.x) versus porting (create a new HP-UX executable on the destination platform).
- Transitioning software to Integrity processors.

An STK consists of:

- a set of file scanning tools with associated database and information, which checks source files, makefiles, and scripts for identifiers which may indicate transition problems
- a library of useful documents
- A search engine which searches the man pages, impacts and documents
- HTML formatted man pages or links to HTML formatted man pages on docs.hp.com

Cell Local Memory Support

Memory can be configured into “interleaved” and “cell local” memory. Interleaved memory is a hardware-provided feature that mixes memory from different cells with a very fine granularity. This has the effect of spreading out memory accesses and eliminating “hot spots.” Cell local memory provides faster access to processes running on the same cell as the memory, but slower access to processes running on any other cell.

The system administrator has the ability to configure how much memory will be interleaved and how much will be cell local via the command line (parcreate or parmodify) or Partition Manager GUI (parmgr).

Applications can control which locality they execute in using the locality binding and launch policy features.

Shells

HP-UX systems support the Bourne Shell, the C Shell, the POSIX Shell, and the Korn Shell command interpreters.

Dynamic Loader

HP-UX 11i uses an SVR4-compatible loader to dynamically load shared libraries. This loader provides SVR4 symbol resolution semantics, including symbol preemption.

The COFF object file format is supported for all forms of object files.

Data Link Provider Interface (DLPI)

HP-UX 11i provides a Data Link Provider Interface to allow applications to directly use the data link layer services in order to interact directly with the network device drivers.

Dynamically Loadable Kernel Modules

Dynamically Loadable Kernel Module (DLKM) provides the means to add a device driver to a running UNIX system without rebooting the system or rebuilding the kernel. This feature also makes it possible to dynamically remove a device driver from the UNIX system when the driver is no longer needed, thereby freeing system resources for other use.

The DLKM feature not only provides the infrastructure to load drivers into a running kernel, but it also allows a driver to be statically linked into the kernel-the way all drivers were included in the kernel prior to HP-UX 11.0. Simply setting a flag in one of the driver's configuration files determines whether a driver is to be configured as dynamically loadable or statically linked.

Standards

The Single UNIX Specification is an industry standard promulgated by the Open Group¹. The Open Group has released three versions of this specification starting with UNIX 95 in 1994. The UNIX 98 version was released in the first half of 1998. The UNIX 2003 version was released in 2002.

Since 1996, HP-UX has been branded with the UNIX 95 profile. The HP-UX 10.10, 10.20, 11.0 and 11i releases of HP-UX are all branded to this specification.

POSIX.1 and FIPS 151-2

HP-UX 11i conforms to the IEEE Standard 1003.1- 1990, POSIX Part 1: System Application Program Interface (API) [C Language] also referred to internationally as ISO/IEC 9945-1:1990, and to the Federal Information Processing Standard, FIPS 151-2.

IEEE Standard 1003.1-1996

Information Technology-Portable Operating System Interface (POSIX®)-Part 1: System Application: Program Interface (API) [C Language] This edition incorporates extensions for realtime applications (1003.1b-1993, 1003.1i-1995) and threads (1003.1c-1995).

POSIX_ASYNCHRONOUS_IO	POSIX_SYNCHRONIZED_IO
POSIX_CHOWN_RESTRICTED	POSIX_SYNC_IO
POSIX_FSYNC	POSIX_THREADS
POSIX_JOB_CONTROL	POSIX_THREAD_ATTR_STACKADDR
POSIX_MEMLOCK	POSIX_THREAD_ATTR_STACKSIZE
POSIX_MEMLOCK_RANGE	POSIX_THREAD_PRIORITY_SCHEDULING
POSIX_MESSAGE_PASSING	POSIX_THREAD_PRIO_INHERIT
POSIX_NO_TRUNC	POSIX_THREAD_PRIO_PROTECT
POSIX_PRIORITY_SCHEDULING	POSIX_THREAD_PROCESS_SHARED
POSIX_REALTIME_SIGNALS	POSIX_THREAD_SAFE_FUNCTIONS
POSIX_SAVED_IDS	POSIX_TIMERS
POSIX_SEMAPHORES	POSIX_VDISABLE
POSIX_SHARED_MEMORY_OBJECTS	

Open Group Standard XNS 5.2 Networking Standard (Sockets)

HP-UX 11i includes support for the Open Group Std XNS 5.2 Networking Standard (Sockets).

IEEE Standard 1003.2-1992

¹ www.opengroup.org

HP-UX 11i conforms to the IEEE Std 1003.2 1992 - Shell and Utilities, referred to internationally as ISO/IEC 9945-2, and provides the following implementation options:

[POSIX2_C_BIND]

[POSIX2_C_DEV]

[POSIX2_CHAR_TERM]

[POSIX2_LOCALEDEF]

[POSIX2_SW_DEV]

[POSIX2_UPE]

SVID

HP-UX 11i is based on the UNIX System V Release 3.2 operating system and includes important features from the Fourth Berkeley Software Distribution.

Real-Time

HP-UX 11i provides a realtime user and programming environment that complies with the POSIX 1003.1-1996 standard. Support is provided for:

- Real-time clocks and timers
- Real-time queued signals
- Fixed-priority scheduling policies
- Real-time scheduler priorities
- Counting semaphores
- Shared memory
- Process memory locking
- Asynchronous I/O
- Synchronized I/O
- Process communications facilities
- Thread-safe implementation of real-time libraries

HP Message Passing Interface (MPI)

HP MPI is an implementation of the MPI standard for HP systems. Engineers from the High Performance Technical Computing Lab of Hewlett-Packard have developed a high-performance, robust, high-quality, native implementation of MPI for HP servers and workstations.

HP MPI uses OS-specific enhancements to provide low latency and high bandwidth point-to-point and collective communication routines. It supports multi-protocol execution of MPI applications on clusters of shared-memory servers. HP MPI supports 32- and 64-bit applications, single- and multi-threaded, and provides tools to debug and instrument MPI execution.

Symmetric Multiprocessing (SMP)

HP-UX 11i supports symmetric multiprocessing (SMP), which enables systems with two or more processors to execute the same copy of the operating system, access common memory, and execute instructions simultaneously. SMP functionality fully exploits the additional compute capabilities of multiple processors.

Threads

HP-UX 11i provides software developers the ability to write multithreaded programs that take full advantage of SMP using POSIX Threads. POSIX Threads provide a pthreads interface that complies with the POSIX 1003.1c semantics. The POSIX Threads implementation provides user space threads that are supported by and cooperate with the threaded kernel of HP-UX 11i in a comprehensive two-level scheduling model that transparently maintains full concurrency when a thread blocks. In addition, for building libraries whose routines can be called in either a single-threaded or multi-threaded context, POSIX Threads provide a thread-independent services (TIS) interface.

Shared Libraries

HP-UX 11i provides a full complement of dynamic shared libraries based on System V semantics, which increase system performance, reduce minimum hardware requirements, and ease system management. HP-UX 11i also provides static versions of most of these libraries.

Internationalization

The HP-UX 11i internationalization environment, tools, and localization features enable the development and execution of internationalized software without re-engineering the user application. Supported character sets, Unicode support, Euro support, a complete listing of I18N features, as well as memory and disk space requirements by language variant, can be found at the following URL:

<http://docs.hp.com/en/5991-1194/index.html>

Unicode Support

HP-UX 11i v2 includes Unicode 3.0 support, which is an extension to the previously supported Unicode 2.1 standard. Unicode 3.0 is aligned with the revised ISO 10646-1:2000 standard and includes an additional 10,194 characters from the previous version of the standard. Most notable of these additional characters are 6,582 new CJK characters (Han Extension A) for use in various Asian countries.

Euro Currency Support

HP-UX 11i supports the processing of the new euro currency symbol through the use of the ISO 8859-15 character set, and Unicode V3.0. ISO 8859-15 is a newly ratified character set that differs from ISO 8859-1 by supporting eight new characters. Specific enhancements are provided to allow Euro display, input, and processing capabilities.

Chinese Character Set Standard GB18030

HP-UX 11i conforms to the People's Republic of China National Standard GB18030-2000. This is a mandatory standard and supports the Chinese Character Set Standard for Information Interchange.

Hardware Requirements

QuickSpecs for HP Integrity servers and for HP 9000 systems describe how to configure and order the systems that run HP-UX 11i.

The HP-UX 11i Operating System can execute on supported HP Integrity and HP 9000 systems and must include the following minimum system configuration:

Minimum main memory - 512 MB for HP-UX 11i v2, 2 GB for HP-UX 11i v3

Minimum swap space on disk - 1 GB

The minimum disk space requirement for installing the HP-UX 11i Operating System is 1 GB to accommodate the EFI Boot Disk and the HP Service Partition.

File Partition Disk Space Allocation by Operating Environment

Foundation OE	Enterprise OE	Mission-Critical OE
208 MB (78% used)	208 MB (81% used)	208 MB (81% used)
304 MB (21% used)	304 MB (21% used)	304 MB (21% used)
4.5 GB (2% used)	4.5 GB (2% used)	4.5 GB (2% used)
2.6 GB (76% used)	2.7 GB (75% used)	2.7 GB (75% used)
208 MB (4% used)	208 MB (4% used)	208 MB (4% used)
3.6 GB (52% used)	3.7 GB (53% used)	3.7 GB (53% used)
32 MB (26% used)	32 MB (26% used)	32 MB (26% used)
11.6 GB (37% used)	11.7 GB (37% used)	11.8 GB (36% used)

1. The results are from using the bdf (1M) command; the results may vary if the du (1) command is used.
2. Totals are not exact due to rounding.
3. Totals do not include disk space required for the EFI Boot Partition, HP Service Partition, or /swap.

Supported Hardware

Combinations of hardware options are subject to limitations, such as bandwidth, physical configuration constraints, and electrical load and power supply.

HP reserves the right to change the number and type of devices supported by HP-UX 11i. The minimum hardware requirements for future versions and updates of HP-UX 11i may be different from current requirements. Please check the platform specific requirements:

For HP Integrity server options: <http://h20341.www2.hp.com/integrity/cache/342360-0-0-0-121.html>

For HP 9000 server options: http://www.hp.com/products1/servers/HP9000_family_overview.html

HP-UX 11i v2

Supported HP Integrity server models

The current Integrity server family models supported by HP-UX 11i are listed below. Additional Integrity server models will be added to the supported models list as they are introduced.

- HP Integrity Superdome
- rx8620/ rx8640
- rx7620/ rx7640
- rx6600
- rx5670
- rx4640 / rx4610
- rx3600
- rx2660
- rx2620 / rx2600
- rx1620 / rx1600
- cx2600
- BL60p
- BL860c

Supported HP Integrity workstation models

- zx2000 (Itanium2)*
- zx6000 (Itanium2)*

* supported on HP-UX 11i 0505 and earlier

Supported HP 9000 server models

- Superdome
- rp8440² / rp8420 / rp8400
- rp7440³ / rp7420 / rp7410 / rp7405 / rp7400
- rp5470 / rp5450 / rp5430 / rp5405 / rp5400

² mid 2007

³ mid 2007

- rp4440 / rp4410
- rp3440 / rp3410
- rp2470 / rp2430 / rp2405

Note: HP 9000 Workstations are no longer supported.

HP-UX 11i v3

Supported HP Integrity server models

The current Integrity server family models supported by HP-UX 11i are listed below. Additional HP Integrity server models will be added to the supported models list as they are introduced.

- HP Integrity Superdome
- rx8620/rx8640
- rx7620/rx7640
- rx6600
- rx3600
- rx4640
- rx5670
- rx2660⁴
- rx2620/rx2600
- rx1620/rx1600
- cx2620/cx2600
- BL60p
- BI860c⁵

⁴ Supported initially with PCI-X option, full support planned in 2H 2007

⁵ 2H 2007

Supported HP 9000 server models

The current HP 9000 server family models supported by HP-UX 11i are listed below. Additional HP 9000 server models will be added to the supported models list as they are introduced.

- HP 9000 Superdome
- rp8440⁶ / rp8420/rp8400
- rp7440⁷ / rp7420 / rp7410 / rp7405
- rp4440
- rp3440 / rp3410

Retired hardware

The following hardware platforms are no longer supported:

HP Integrity Server platforms:

- Itanium-1 based servers (Merced):
- Rx4610, rx9610
- No HSC, EISA, HPPB

HP Integrity Workstation platforms:

- Itanium-1 based WS (Merced):
- I2000
- No HSC, EISA, HPPB

HP 9000 Server platforms:

- All 32-bit servers (incl. 32-bit A-class servers -- A180, A180C)
 - All D-class servers
 - All R-class servers
 - All E-class servers
 - All K-class servers
-

⁶ 2H 2007

⁷ 2H 2007

- All T-class servers
- All V-class servers
- No HSC, EISA, HPPB

HP 9000 workstations are no longer supported.

Optional Device Support

The HP-UX 11i Version 2 Release Notes (available at <http://docs.hp.com/hpux/os/11iv2/index.html>) provides a complete list of supported network and mass storage drivers, and SCSI devices.

Utility pricing and licensing

Instant Capacity On Demand for HP Integrity and HP 9000 Servers

Instant Capacity Hardware

The Instant Capacity program allows inactive processors, cell boards and memory modules to be installed in the server for a fraction of the price. When additional resources are required, the remainder of the purchase price for the hardware, plus any needed software licenses and/or support fees are paid, and the hardware can be instantly activated with minimal downtime. Instant Capacity provides a linear upgrade path and also allows resources to be load balanced between partitions within the server as needed. Systems can be more highly available with automatic activation of iCAP processors when processor failure is detected, and the upgrade path of servers is extended as resources are simply activated with a simple command as needed. The Instant Capacity Software manages the system locally and no communication to HP outside the data centre is required. Additionally, every Instant Capacity processor core includes five days of Instant Access Capacity (IAC), which provides 5 days of temporary capacity per core.

Temporary Instant Capacity for Processors (TiCAP)

Temporary Instant Capacity provides 30 processor core days of prepaid activation time for Instant Capacity processors. A processor core day equals 24 hours of activation for one processor core. With this option, processors may be activated and deactivated as needed without a need for a reboot. TiCAP also includes temporary licenses for HP-UX and OpenVMS Foundation, Enterprise and Mission Critical Operating Environments, the HP Virtual Server Environment Suite, and temporary hardware and software support. TiCAP is applied at the server level and can be used to temporarily activate any number of Instant Capacity processor cores in the complex.

Global Instant Capacity (GiCAP)

GiCAP is a unique HP differentiator that allows servers to loan resources to each other, optimizing resource utilization and reducing over-provisioning. Just as Instant Capacity can migrate resources between partitions within a server, GiCAP allows resources to be migrated between partitions on different servers, regardless of where those servers are located. In the event of a partition failure, the usage rights for the hardware

resources as well as the software licenses used by that partition can be moved to a failover partition in another server which is configured with idle Instant Capacity resources. GiCAP also facilitates load balancing across servers and even allows TiCAP to be shared with other servers in the group.

Platform availability

HP-UX 11i Instant Capacity is supported on all cellular HP Integrity and HP 9000 Servers, including:

Superdome

rp8420/rp7420

rx8620/rx7620

rx8640/rx7640

Pricing

There is no premium pricing for iCAP. At any given time, the Instant Capacity hardware purchase fee plus the Right to Use (which activates the iCAP hardware) is equal to the purchase price of the equivalent active hardware component.

Easy to implement, activate, and afford, iCAP supports both current and future customers, can be installed on existing servers, and will be available on all future Integrity platforms. It can be ordered pre-installed on new servers and thus can be delivered "ready to go."

The iCAP program is extremely flexible. A customer does not need to order a full complement of processors and cells, and can order any combination of traditional and iCAP components up to the full capacity of the system. This flexibility is vital for those who may be limited by environmental considerations such as power and cooling.

Upgrading existing HP servers to iCAP models

The iCAP solutions are available for all current or new HP customers who intend to install servers based on PA-8500, PA-8600, PA-8700 and PA-8700+ CPUs, as well as future PA-RISC and Itanium® processors.

Pay per use for HP Integrity and HP 9000 Servers

The unique HP Pay per use (PPU) solution is designed for businesses with widely varying or unpredictable demand for computing resources. With Pay per use, customers pay a variable monthly bill for HP Integrity servers running HP-UX, Microsoft® Windows® Server 2003, OpenVMS, or all three and HP 9000 servers running HP-UX based on core utilization. Two usage metrics are available to compute core utilization: Percent Core and Active Core (HP-UX and OpenVMS only). The following servers are currently available under Pay per use:

- HP 9000 Superdome
- HP 9000 rp8420-32 and rp7420-16 Servers
- HP Integrity Superdome
- HP Integrity rx8640 and rx7640 Servers

The automated metering technology is simple to use, meets customer needs for security, and has negligible impact on operations. Server agents periodically collect utilization data for individual cores and forward this data to a utility meter that securely sends it to HP over the Internet using encrypted messages via email or HTTPS.

Pricing

There is no premium required for Pay per use. The total payment guaranteed to be no more than a reference lease.

Software Licensing

The licenses for the HP-UX 11i Operating Environments provide the right to use the software as described in these QuickSpecs. Customers can update from previous versions of HP-UX 11i if they are on a software update contract. Customers with no support contract are required to purchase the license to update to later versions.

Software Product Services

A variety of service options are available from HP. For more information, please see the HP-UX 11i services page on hp.com or contact your local HP office.

For more information, please visit www.hp.com/go/hpux11i

© Copyright 2006 Hewlett-Packard Development Company, L.P.

Microsoft, Windows, and Windows NT are U.S. registered trademarks of Microsoft Corporation. Intel is a registered trademark of Intel Corporation and its subsidiaries in the U.S. and other countries. Java and SUN are U.S. trademarks of Sun Microsystems, Inc. UNIX is a registered trademark of the Open Group. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.