Taking UNIX to the next level

AIX 5L

Highlights

Helps ensure that critical applications remain responsive even during periods of peak system demand

Protects and leverages current investments as new technologies and applications are integrated

Uses advanced tools to help remove cost and complexity from systems management

Provides affinity with LINUX® applications

Expands on AIX® Version 4, recognized as the leading commercial, industrial-strength UNIX® operating system[1]

Extending your reach

When managing a business, every detail is important. That's why businesses invest in information technology to help gather details about companies customers and competitors. But in today's ever-changing, accelerating marketplace, businesses need more. For many companies, UNIX – with its superior scalability, reliability and manageability – is the best choice for building such a strategic solution. Only one system leverages IBM experience in building the solutions that run businesses worldwide, while becoming the industry's most open enterprise-class UNIX operating system. Only one UNIX leads the industry in delivering an operating system for POWER and IA-64-based platforms with an affinity for Linux. That UNIX is AIX 5L.

e-business

Feature	*Benefit*
Binary Compatibility	
Application binary compatibility with previous releases of AIX Version 4; 64-bit applications require special attention	• Helps assure continuing application availability across AIX Version 4 moving to Version 5
System Scalability	
JFS2 with theoretical 4 Petabyte capacity (1TB tested)[2]	• Extends maximum file size (Technology Preview in V5.0)
Data Management API (DMAPI) in JFS (32-bit Power kernel only)	• Enables support of 3rd party Hierarchic Storage Management (HSM)
Very large program support with dynamic data heap segment creation	• Allows programs to reserve all available segments for the data heap and still have access to them
Selectable Logical Track Group (LTG) transfer size within LVM	• Enables tuning of disk I/O and optimization of RAID storage
Concurrent execution of 32- and 64-bit applications on 64-bit processors	• Helps preserve application investments and enables the transition to 64-bit applications
Performance-enhanced TCP/IP stack, directory services and I/O subsystem	• Provide strong performance with high throughput and additional capability to keep traffic moving over alternate paths
HTTP Get Engine	• Helps increase Web-serving performance by serving Web pages from the AIX Network File Cache
Improved cache affinity and reduced lock contention	• Reduces processing overhead
Zero-Copy File System-to-Network I/O system call for developers	• Helps reduce CPU cycles and increase server capacity
128 disks per volume group and 512 logical volumes per volume group	• Supports very large storage requirements
32,768 threads/process and 32,768 open files per process	• Provides robust UNIX scalability
LP64 (32-bit integers, 64-bit long and pointer types)	• Offers industry-standard implementation
e-business and Network Performance	
System VIPA (Virtual IP Address) assignment	• Uses single-system IP address rather than many; and if a network interface goes down, the address used by the application is unaffected
IP Multipath Routing	• Enables multiple routes to a destination for bandwidth aggregation or high-availability configurations
Multiple default gateways	• Keep traffic moving by detecting dead gateways

[2] JFS is default, JFS2 option in POWER version and default for IA-64

Feature	*Benefit*
e-business and Network Performance (continued)	
Extended memory allocator (malloc)	• Performance enhancement for applications issuing large numbers of small allocation requests
Ability to tune TCP connections on a "per interface" basis	• Improves TCP/IP performance
Automatic selection of TCP MTU to avoid packet fragmentation	• Improves TCP/IP performance
TCP Selective Acknowledgments (SACK) for efficient recovery of lost packets	• Improves TCP/IP performance
Internet Advanced Network Services features Quality of Service based on IETF, IntServ and DiffServ standards	• Allows the management of a system's network bandwidth under policy-based control
Implementation of CISCO's EtherChannel™ for AIX	• Builds upon standard and 802.3 Fast Ethernet, allowing increased bandwidth with network load balancing and intrinsic interface failover
AIX SOCKS 5 API	• Allows generic TCP/IP applications to connect to hosts through a generic TCP/IP proxy
Gratuitous ARP (Address Resolution Protocol)	• Facilitates fast propagation of hardware address change
Perl 5, a popular scripting language (English only)	• Is included for convenience in system management and for Web development
AutoFS	• Provides network file system mounts automatically, saving administration
CacheFS	• Offers faster access when using network file system mounts
Internet Protocol	
IPv6[3]	• Increases IP addressability, security and integrity through redundant routing, dynamic rerouting, on-demand tunneling and gateway support
IPv6 gateway capabilities	• Perform routing and packet forwarding for both IPv4 and IPv6
IPv4 support including DHCP performance and functional updates	• Provide concurrency, scalability, CIDR networks and Virtual Subnets
IPv4 secure TCP/IP commands (rsh, rcp, rlogin, telnet, ftp)	• Enhance password protection under IPv4
Internet Key Exchange (IKE) for IPv4 and IPv6	• Enhances the IP Security function in AIX for Virtual Private Networking
Merit GateD V6.0, supported in both IPv4 and IPv6	• Manages the routing table to enhance firewall integration into existing routing infrastructures

[3] Not available on IBM RS/6000 SP™ or IBM RS/6000 S70/S70 Advanced/S80 attached to SP system or IBM @server pSeries 680 attached to SP system

Feature	*Benefit*
Security	
Native Kerberos V5 Network Authentication Service (NAS)	• Provides authentication interoperability with other Kerberos 5 systems
User/password management, authorization controls, extensible security auditing, resource limits, network security, integrity checking and IP security filtering rules	• Offer extensive base security capability
On-demand tunneling	• Helps reduce function overhead for negotiating, computing and refreshing session keys
Sendmail 8.9.3 anti-spamming capability	• Improves the assurance of availability
System Manager tool	• Simplifies the management of filtering
Traceability of IP Security and IKE messages	• Help security management
Cryptography support (varying by geography and component) includes Triple DES, 128-bit, 56-bit and 40-bit options	• Meets the requirements of worldwide support
Dynamic secure tunnel authentication (IKE using X.509)	• Enhances the IP Security function in AIX for Virtual Private Networking
AIX 4.3.0 certified at the E3/F-C2 security level according to European Information Technology Security Evaluation Criteria (ITSEC); an operational subset of AIX 4.3.1 is certified at C2 security level according to U.S. Trusted Computer Security Evaluation Criteria (TCSEC); AIX 4.3.1 received International Computer Security Association (ICSA) Virtual Private Network (VPN) certification; AIX 4.3.1 with B1/EST-X V2.0.1 from Groupe Bull evaluated at EAL4/F-B1 security level (Common Criteria V2.0)	• Meets highest levels of U.S. and European security standards
Systems and Workload Management	
Logical Partitioning (LPAR) enablement for POWER4 system planned 4Q2001	• Provides multiple AIX instances on single POWER4 SMP system, full isolation protection
/proc filesystem makes total process visible in a directory tree	• Improves ease of use in reviewing system workload
Proactive systems management	• Allows trigger of automated responses (Example: file system is 90 percent, automatically increase its size)
UNIX System V SVR4 Printing Subsystem (optional on POWER)	• Is an additional popular spooling subsystem familiar to users of Intel-based systems

Feature	*Benefit*
System and Workload Management (continued)	
Fully dynamic AIX Workload Manager (WLM) capability governing resource entitlement to CPU cycles, real memory and disk I/O	• Helps solve the problems of mixed workload management by providing resource availability to critical applications
Web-based System Management	• Enables the convenience of management of AIX from any Java 1.1 or greater enabled browser
TaskGuides	• Simplify complex and infrequently performed tasks
NIS+	• Enables system administrators to store information about client addresses, security information, mail information, network interfaces and network services in central locations where all clients on a network can access it
Documentation Library Service for both AIX and customer HTML documentation	• Offers an open, Web-based feature that integrates the navigation, reading and search of online documentation with the ability to print whole books
X11R6.3 (also known as Broadway release from the X Consortium)	• Allows a Web server to run X Windows® System client applications on a remote host
Reliability, Availability, Serviceability (RAS)	
Optional Passive LVM Mirror write consistency	• Improves random write performance on mirrored logical drives
Optional hot spare disk support in volume group	• Improves availability of mirrored data
Hot spot management in LVM for high-traffic disk partitions	• Provides new tools that simplify hot spot detection and migration
Automated System Hang Recovery	• Detects system hands and initiates configured action
Consecutive duplicate errors are counted instead of repetitively logged	• Avoids Error Log capacity overload
Ability to deactivate active paging space	• Provides enhanced flexibility without rebooting
Automatic dump analysis	• Accelerates customer support and saves full dump transmission
Dump reliability improved with compression and capacity warning	• Helps avoid a situation where dump exceeds system recording capacity
Multipath I/O manages multiple I/O paths to same storage media	• Improves internal reliability and defers maintenance
“Pax” compatible archive format compatible with IEEE POSIX 1003.2b standard	• Offers 64-bit ready support for files larger than 2GB
Striped and mirrored (RAID 0 + 1) logical volumes	• Improve system availability

Feature	*Benefit*
Reliability, Availability, Serviceability (RAS) (continued)	
Online backup of mirrored Journal File System (JFS) while still in use	• Improves system availability
Mirrored paging devices can be used as dump devices	• Remove the restriction that a dump device cannot be a mirrored logical volume
Recordable CD Support	• Makes it possible to generate an AIX system backup (mksysb) on recordable CDs
Programming support includes Replaceable Malloc, enhanced Kernel Debugger, Fast Single Instruction Patch and Pthread Debug Library	• Enhances tool capability
Performance analysis tools include support for Workload Manager	• Deliver broader analysis capability
Java	
Common code reengineered by IBM	• Enhances performance, scalability and stability
Cooperative interface between the AIX kernel and Java (IBM AIX Developer Kit, Java 2 Technology Edition, Version 1.3.0)	• Improves Java application scalability and performance over the range of Web server products, better enabling AIX for Java runtime and Java application deployment
Concurrent support of multiple Java versions	• Enhances flexibility in developing and executing Java applications
Java Security Migration Aid	• Allows exploitation of security enhancements in Java 2 platforms, including security policies, permissions, tools and Java runtime security managers.

Feature	*Benefit*
Directory Integration	
AIX LDAP server (IBM SecureWay® Directory V3.2 utilizing DB2® Universal Database™ technology)	• Significantly reduces administrative effort for a collection of AIX systems
Graphics (3D graphics are on Power Only)	
OpenGL GLX 1.3 and pbuffer support, enhanced local lighting, application-specific performance	• Improves application performance
graPHIGS enhancements include improved CPU utilization during swaps, faster clipping, increased large program support, and full input and output support of Japanese IBM 943 encoding	• Allow the user to display and interact with larger models • Improve application performance
AIX Virtual Frame Buffer (VFB)	• Supports developing Web-based applications that render 3D graphics without the need for a 3D graphics adapter
Multilingual Support	
Hindi enablement and locale support	• Allows Hindi characters to be entered, viewed and printed from an AIX workstation
Unicode support	• Meets worldwide language requirements, including Euro currency support
Codepage 943	• Supports interoperability with Microsoft Windows® clients in Japan
Double Byte Character Set (DBCS) search capability	• Supports documentation searches in Japanese, Korean, Chinese and Traditional Chinese
Standards Leadership	
UNIX 98 and X/Open XPG4 branded	• Increases availability of applications, tools and middleware from developers supporting open standards
Implements IEEE POSIX 1003.1-1996 (1003.1c)	• Improves scalability, performance and the assurance of application support threads including M:N thread support

AIX is the cornerstone for AIX 5L. It operates on a range of IBM UNIX systems from workstations to supercomputers. In addition, AIX provides the reliability, availability, performance and security required for e-business. It integrates key Internet technologies, such as Java,™ and includes enhancements to the operating system that facilitate increased capacity and the ability to handle unexpected peaks in demand. For example, the Quality of Service (QoS) administration and support function of AIX provides a high level of reliability, availability and serviceability that keeps traffic moving. And AIX offers the seamless system, network and transaction security required for mission-critical e-business and e-commerce. In fact, AIX Version 4 was the first operating system to receive Virtual Private Network certification from the International Computer Security Association.

Stay in control

AIX 5L can help ensure that critical applications meet user expectations even during periods of peak system demand. The enhanced AIX Workload Manager allows businesses to divide processor cycles, real memory and disk I/O between jobs. Business needs are translated into a policy that automatically determines job scheduler dynamics. And the Workload Manager is easily accessed through both the Web-based AIX System Manager, an intuitive, graphical interface and the System Management Interface Tool (SMIT) as well as AIX commands.

In real-world terms, servers running AIX Workload Manager, using a customer-defined resource allocation policy, dynamically address application requirements. This type of scheduler is valuable in critical business solution areas such as e-business, Business Intelligence, server consolidation and Enterprise Resource Planning.

Linux affinity

IBM is working to provide strong Linux affinity with AIX 5L. This will enable faster and less costly deployment of multi-platform, integrated solutions across AIX and Linux platforms. Many applications developed on and for Linux will run on AIX 5L with a simple recompilation of the source code. Thus, customers could combine Linux applications with the advanced scalability and availability features of AIX. This Linux affinity in AIX will enhance a customer's ability to adapt to changes in business and technology.

New Expansion Pack for AIX 5L

AIX 5L Expansion Packs complement the operating system by providing encryption support, a browser to view on-line HTML publications and an HTTP server to serve online publication pages and support Web-based System Manager. Software products are packaged in AIX Expansion Packs for convenience to customers at no extra charge.

For more Information

For information on AIX releases and upgrade benefits, contact your IBM representative, IBM Business Partner or visit the following Web sites:

- **ibm.com**/servers/aix/products/aixos/
- **ibm.com**/servers/aix/products/aixos/compatibility/
- **ibm.com**/ibmlink

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[1] *1999-2000 Operating System Function Review*, D.H. Brown Associates, Inc., March 2000.

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