**Software Announcement**
**September 13, 1999**

# AIX 4.3.3 UNIX Operating System with Powerful Scalability and e-business Support — the Right Choice for e-business and Enterprise Servers

## Overview

AIX® is an integrated UNIX® operating environment for RS/6000™ workstations, symmetric multiprocessor, and scalable parallel computing systems. This environment enables the development and execution of computing applications on those systems.

AIX Version 4.3.3 builds on the industry leading strength and stability of AIX 4.3. It provides a highly scalable environment for the full range of RS/6000 systems.

The combination of AIX 4.3 concurrent 32/64-bit functionality, binary compatibility across all AIX Version 4 releases, TCP/IP optimization, strong manageability, and high reliability make AIX 4.3 the best choice for applications in the most demanding market segments, including:

- e-business
- Business Intelligence (BI)
- Enterprise Resource Planning (ERP)
- Online Transaction Processing (OLTP)
- Network Computing
- Mechanical Computer-Aided Design (MCAD)

AIX Version 4.3.3 is Year 2000 ready, EuroReady, and Tivoli™ Ready.

AIX 4.3.3 is the cornerstone of Project Monterey. For more information, visit:

**http://www.ibm.com/servers/monterey**

## Key Prerequisites

- IBM Power systems
- POWER2 systems
- Personal Computer Power Series 830 and 850 desktop systems
- PowerPC systems
- POWER3 systems

Exceptions are listed in the **Hardware Requirements** section.

***Planned Availability Date***

September 17, 1999

## At a Glance

AIX Version 4.3.3 with enhanced 64-bit scalability and functionality provides:

- Significant AIX scalability enhancements for 24-way SMP systems
- AIX Workload Management system with a policy-based method for managing system workload and system resources
- AIX exploitation of SecureWay™ Directory for users and groups
- Increased network performance and scalability for e-business
- Improved system availability with support for online Journal File System (JFS) backup and concurrent Mirroring and Striping
- Enhanced RAS and improved serviceability features
- A port of the Sun Solaris 2.5 NIS+ network information management system
- Enhanced file and print capability
- AIX Developer Kit, Java™ Technology Edition, Version 1.1.8
- Enhanced ease-of-use capabilities, including additional Web-based System Manager TaskGuides and SMIT support
- X11R6.3, the “Broadway release,” OpenGL, and graPHIGS enhancements

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## Description

### *New RS/6000 Hardware Support*

- RS/6000 Enterprise Server Model S80 with up to 24-way processors and 64 GB real memory
- RS/6000 Enterprise Server 7046 Model B50
- New Token-Ring PCI adapter
- POWER GXT130P Graphics Adapter that can be attached to the RS/6000 PowerPC systems
- PCI Dual Channel Ultra2 SCSI adapter capable of running at 80 MB per second when attaching appropriate Low Voltage Differential (LVD) devices
- Enablement of standalone boot support for IBM Advanced SerialRAID adapter
- IBM Expandable Storage Plus —LVD SCSI drawer and tower: 10-bay LVD Ultra 2 capable SCSI Just a Bunch Of Disks (JBOD)
- LVD enablement of PCI 3-Channel Ultra2 SCSI RAID Adapter and PCI Dual Channel Ultra2 SCSI adapter when attaching to LVD SCSI drawer and tower

### *Scalability and Capacity*

- Significant AIX software scalability features and an outstanding, balanced system design deliver the achievement of nearly tripling online transaction performance with true SMP scalability while only doubling the number of processors and the amount of memory (12-way/32 GB Model S70 Advanced to the 24-way/64 GB Model S80)
- AIX Workload Management system provides a policy-based method for managing system workload and system resources

### *AIX System and Network Security*

- System Security
  - AIX Version 4.3.3 reduces administration of AIX users and groups for a collection of systems by optionally storing, replicating, and retrieving user and group information in the SecureWay Directory.
  - RS/6000, a member of the SecureWay software enabled server group platforms, has the components users need to locate, connect, and secure their e-business. These components feature the:
    - SecureWay Directory to give customers, business partners, and other users the ability to locate and access crucial enterprise networks
    - SecureWay Communications Server for AIX to connect customers, partners, and employees nearby or around the world to these resources across multiple systems and to secure communications, data, and transactions from unauthorized access or intrusion through the firewall and use of Virtual Private Network (VPN) Technology.
  - Sendmail is upgraded to Version 8.9.3 with anti-spamming feature.
  - AIX treats system console messages as critical system information, logging them to a file with timestamps.
  - AIX Version 4.3.3 includes a port of the Sun Solaris Version 2.5 NIS+ implementation. This function is provided in addition to the NIS support which remains unchanged and is still available. This new naming service provides enhanced capabilities for security management in a distributed system environment.
- Network Security

  IP Security enhancements include:
  - Improvements to serviceability
  - On-demand tunneling
  - Web-based System Manager to configure filters
  - Filters based on IP address ranges
  - Certificate-based use of Digital Signature for IKE Authentication. Support for this function is planned to be available November 5, 1999 for new orders and via APAR IY02769 for existing orders.

  AIX SOCKS API allows generic TCP/IP applications to connect to hosts through a generic TCP/IP proxy using SOCKS protocol Version 5.
- Java Security
  - AIX Developer Kit, Java Technology Edition, Version 1.1.8 with security enhancement

***Networking Performance and Scalability:*** AIX Version 4.3.3 increases the capacity and capability of our e-business support with the following functions:

- Quality of Service (QoS) administration and support manages a system's bandwidth under policy-based control, such as enforcing bandwidth restrictions among different application flows.
- New kernel extension HTTP GET Engine increases the performance of Web serving by serving Web pages from the AIX Network File Cache.
- AIX Version 4.3.3 implements Cisco System's Network Bandwidth Aggregation and Load Balancing technology called EtherChannel. Cisco's EtherChannel technology builds upon standard and 802.3 Fast Ethernet allowing increased bandwidth with load balancing by aggregating network interfaces. Use of multiple network interfaces in a channel provides intrinsic interface failover for improved availability over conventional Ethernet alternatives.

### *AIX Communication Enhancements*

- Gratuitous Address Resolution Protocol capability propagates hardware address changes during network interface bringup and lets AIX manage duplicate IP address assignment.
- Dynamic Host Configuration Protocol (DHCP) is enhanced with a programming interface to the DHCP server for user extension or third-party software integration.
- New Dynamic Load Name Resolver APIs allow users to define their own name resolver modules.
- TCP Checksum Offload for PCI Gigabit Ethernet adapter, along with network file cache capability, increases benefits for applications that transmit large blocks of data.

- Multiple-protocol over ATM (MPOA) provides improved management and performance of an ATM LAN Emulation network with standard Ethernet and 802.3 Ethernet by combining multiple-edge routers into a single router image.

### *TCP/IP Performance Enhancements*

- TCP/IP network interfaces support the thread mode on SMP systems, which:
  - Allows IP incoming packets to be queued and picked up by threads, thus shortening interrupt time
  - When turned on, allows the processing of incoming IP packets to be shared among multiple processors
  - Works best with high bandwidth adapters, such as 1 Gbps Ethernet or ATM 155 Mbps
  - In streaming scenarios, can help increase the throughput of high-speed network interfaces on the receiving machine
- TCP has been changed to inherit TCP/IP socket options on new connections between TCP/IP clients and servers. This enhancement allows server programs to set the TCP/IP level socket options once on the listening socket and avoid setting options on the sockets associated with new connections, thus reducing path length (instruction) overhead
- Path Maximum Transmission Unit (PMTU) discovery is now the default. This feature helps AIX systems determine the best way to deliver maximum packet without fragmentation. As a result, it helps optimize throughput and increase network performance across any internet affected by the packet size used.
- TCP Selective Acknowledgements (SACK) helps TCP recover from multiple packet losses within the TCP window.
  - When SACK is enabled, TCP attaches SACK options to TCP acknowledgements, informing the sender that data has been received, but cannot be acknowledged by TCP due to missing data.
  - The sending TCP can then retransmit only the missing data segments, thus reducing the number of packets transmitted and allowing TCP to recover more quickly than traditional retransmission methods.
  - With SACK, TCP can also avoid dropping back into slow start when packets are lost, allowing TCP to continue to send data at near network capacity.

### *Reliability, Accessibility, and Serviceability (RAS)/Storage*

- Support of concurrent striping and mirroring (RAID 0 + 1) provides a software solution to what used to require unique hardware support. This allows the performance advantages of striping to be combined with the reliability advantages of mirroring.
- Online JFS backup provides enhanced data availability for customers who need high file availability.
- The restriction that a dump device cannot be a mirrored logical volume has been removed by forcing the dump to be written to and read from the primary mirror of a mirrored logical volume.
- AIX treats system console messages as critical system information, logging them to a file with timestamps.
- AIX file system and system dump processing is enhanced to make it easier to diagnose problems when they occur.
- Enhancements to programming support include:
  - Replaceable Malloc
  - New Kernel Debugger (kdb)
  - Fast Single Instruction Patch
  - Pthread Debug Library
- Enhancements to performance analysis tools include support for workload management and upgrading Performance Toolbox agent (PTX) with the ability to process performance metrics by activity, rather than by a fixed name.

### *System Management*

- Support of AIX system backup (mksysb) onto recordable CDs includes a TaskGuide to simplify using this functionality.
- Network Installation Manager (NIM) adds scalability features, such as replication of resources and improved NIM master process handling
- A documentation library service provides support for reading, navigating, and searching HTML documentation. Both AIX and customer-written HTML documentation can be registered and used with the documentation library service.
- Enhancements to National Language support includes IBM Internationalized Classes for Unicode and support for ISO8895-15.
- Perl 5, a popular free scripting language, is included with AIX. Perl is often used in system management tasks and for Web development.
- Enhanced ease-of-use capability provides SMIT and Web-based System Manager interface support for:
  - NIS+
  - SecureWay Directory (directory exploitation — users and group information)
  - Logical Volumes (RAID 0 + 1)
  - AIX Workload Management
  - Web Quality of Service (Differential services and RSVP)
  - New TaskGuides including Base Operating System install, software update, and system backup on CD-ROM
  - New Documentation Library GUI supporting the reading, navigating, and searching of HTML documentation

### *Interoperability*

AIX Version 4.3.3 offers AIX Fast Connect Release 2.1.1 for Windows™ and OS/2®, one of the fastest AIX file and print server applications. This orderable priced feature enhances security and usability and integrated Distributed Computing Environment (DCE) and Distributed File System (DFS) support.

#### *Base and Standards*

- AIX Developer Kit, Java Technology Edition, Version 1.1.8
- Additional printer support

***AIX Graphics Enhancements***

- X11R6.3 (also known as the Broadway release from the X Consortium) includes four new functions:

  1. Remote/desktop agents
  2. Security extension
  3. Application group extension
  4. Low bandwidth X

- GLX support of Version 1.3, the latest level approved by the OpenGL Architectural Review Board (ARB), is available on the GXT2000 and GXT3000 graphics adapters. New functionality includes:

  - Rendering access to offscreen adapter memory (pbuffers) (only available on the GXT2000)
  - Enhanced X visual and resource selection and management

- OpenGL performance enhancements:

  - Improved positional lighting
  - Additional extensions

    -- Vertex Array List
    -- Multi-Mode Vertex Arrays
    -- Clip Volume Hint

- OpenGL Applications Thread Enablement allows the development of multithreaded OpenGL applications to use direct rendering context where any thread can call OpenGL functions.
- graPHIGS enhancements:

  - Improved CPU utilization during swaps
  - Faster clipping
  - Increased large program support
  - Full input and output support of the Japanese IBM 943 encoding

### *Tivoli-Ready*

In support of developing systems management standards, an optional preload of Tivoli Management Agent can make AIX Tivoli-ready. The agent is also included in the AIX 4.3 Bonus Pack.

### *Year 2000*

This product is Year 2000 ready. When used in accordance with its associated documentation, it is capable of correctly processing, providing, and/or receiving date data within and between the twentieth and twenty-first centuries, provided that all products (for example, hardware, software, and firmware) used with the product properly exchange accurate date data with it.

The service end date for this Year-2000-ready product is December 31, 2003.

### *Euro Currency*

This program is EuroReady.

For more information on the implications of the euro, visit the IBM euro Web site at:

**http://www.ibm.com/euro**

***EuroReady Products:*** IBM considers an IBM product to be EuroReady if the product, when used in accordance with its associated documentation, is capable of correctly processing monetary data in the euro denomination and of respecting the euro currency formatting conventions (including the euro sign). This assumes that all other products (that is, hardware, software, firmware etc.) that are used with this product are also EuroReady. IBM hardware products that are EuroReady may or may not have an engraved euro sign key on their keyboards.

Currently, EuroReady status applies primarily to IBM products specific to the EMU countries. Products that are not specific to these countries are deemed to be "not ready" for euro unless otherwise stated in the product's country-specific specifications.

***IBM Hardware Ready:*** IBM supplies certain IBM products which include third party software (pre-loaded or not) and/or third party attached hardware. In these instances IBM is not in a position to assert that these third party products are, in themselves, EuroReady.

Therefore such IBM products will be designated as Hardware Ready.

***EuroReady Solutions:*** IBM considers a solution to be EuroReady when the solution providers have:

- Analyzed the euro requirements, including the need to comply with relevant EC rules
- Built in appropriate function

Solution providers can clearly demonstrate this by:

- Detailing euro-related requirements
- Describing how these will be implemented in the solution
- Declaring when the implementation will be generally available

The euro capabilities of a EuroReady solution will be clearly identified as features of the Solution specification as described in the contracts document.

## Reference Information

Refer to Hardware Announcement 199-225, dated September 13, 1999, for RS/6000 7017-S80 Enterprise Server.

Refer to Hardware Announcement 199-226, dated September 13, 1999, for RS/6000 7046 Model B50.

Refer to Software Announcement 299-256, dated September 13, 1999, for AIX Version 4.2 and 4.3 Bonus Packs Enhancements.

***Trademarks***

# IBM US Announcement Supplemental Information

September 13, 1999

### *System Support*

AIX® Version 4.3.3 supports:

- RS/6000™ Enterprise Server Model S80 with up to 64 GB of real memory
- RS/6000 Enterprise Server 7046 Model B50

AIX Configuration Manager now allows multiple device configuration methods to run in parallel during reboot. This option may produce a faster reboot when multiple devices such as SCSI disks, TTYs, and multiport asynchronous adapters are connected to an AIX system; however, a serialization mechanism will be used when the configuration manager recognizes that new devices are added to the system, and will sequentially configure these new devices.

With the enhanced AIX Diagnostic package, system administrators can keep track of diagnostic activity on the systems by using the new Diagnostic Event Log. This log can be viewed by using the Display Previous Diagnostic Results task under Diagnostics. Tasks and service aids under diagnostics have been ordered alphabetically for improved ease-of-use.

A diagnostic exerciser has been added for processors to enhance problem determination. It provides a means to verify both memory and processor repairs previously detected by error log analysis.

### *I/O Support*

AIX Version 4.3.3 now supports:

- Token-Ring PCI Adapter —A Token-Ring device driver, which provides network boot support and automatically senses network speeds, including 4 Mbps and 16 Mbps.
- IBM POWER GXT130P — A follow-on 2D graphics adapter to the GXT120P which provides faster 2D performance.
- PCI Dual Channel Ultra2 SCSI adapter — A new PCI two-port SCSI Low Voltage Differential (LVD) adapter, which runs at data rate 80 MBps when attached to appropriate LVD devices. This adapter supports boot capability.
- Enablement of stand-alone boot support for 40 MBps, 8-way Advanced SerialRAID Adapter.
- IBM Expandable Storage Plus —LVD SCSI drawer and tower —10-bay LVD Ultra2 capable SCSI Just a Bunch Of Disks (JBOD).
- LVD enablement of PCI 3-Channel Ultra2 SCSI RAID Adapter and PCI Dual Channel Ultra2 SCSI Adapter when attaching to LVD SCSI drawer and tower.

### *Scalability and Capacity*

***24-Way SMP Scalability:*** AIX 4.3.3 boasts superior kernel scalability enhancements. These enhancements nearly triple online transaction processing throughput while only requiring a doubling of the number of CPUs (12 to 24), memory (32 GB to 64 GB), and increasing processor speed. This increased throughput is especially meaningful in Enterprise Resource Planning (ERP) and OnLine Transaction Processing (OLTP) applications. Individual results may vary due to different applications and workload combinations.

Memory management has been improved in AIX 4.3.3 to allow higher concurrence with multiple frame lists and multiple page replacement daemons. This reduces contention in the serialization mechanisms and allows processes with lower latencies to service the memory requests.

AIX 4.3.3 organizes the runnable threads into per-cpu local run queues. This simplifies the process of determining which thread to run next, and eliminates the costly logic, which was necessary to promote good cache affinity when scheduling from a single global run queue. It also virtually eliminates locking contention in this performance-critical subsystem.

With local run queues, the dispatchers′ affinity algorithms have been strengthened, resulting in greatly improved throughput on busy SMP systems. User mode threads generate less cache interference as a result of their increased affinity. These reductions in system overhead translate directly into increased application throughput.

***AIX Workload Management:*** The AIX Workload Management system introduced with AIX 4.3.3 provides a policy-based method for managing system workload and system resources. AIX Workload Management includes the following capabilities:

- Defines system resource allocations that can be applied towards specific jobs or job classes

  The operating system allocates CPU and memory resources to jobs or job classes in accordance with the defined resource allocation policies.
- Helps ensure that critical applications are not impacted by less important jobs in the system during peak demand
- Allows logical job separation on the server
- Permits applications to remain in memory for more predictable performance
- Helps provide greater convenience and control by using both resource targets and resource limits
- Allows policies to be set by the system administrator once, with no further interaction required

  The system will automatically apply the specified policies and adjust for changing conditions.

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- Permits creation and management of 29 classes of jobs, each with different resource policies and system administrator specified names
- Allows creation of automatic classification rules to assign processes to classes
- Permits usage of nine tiers of jobs, with each tier's resource needs being satisfied before resources are provided to jobs in the next tier
- Provides control options that include minimum and maximum percentage limits, shares, or a combination of both

These capabilities can be easily managed through Web-based System Manager (WebSM), SMIT, shell scripts, or command line interfaces. WebSM enables management of AIX systems on the Internet from "anywhere" via an intuitive, object-oriented, easy-to-use GUI. WebSM will automatically show the current resource utilization by class whenever the top level of WLM management is shown in WebSM.

## *AIX System and Network Security*

### *System Security*

*Directory Exploitation — User/Group Info:* AIX 4.3.3 offers new directory exploitation of AIX users and groups. It provides a facility, which allows AIX users and group information to be optionally stored, replicated, and retrieved in an SecureWay™ Directory for fast access (local or remote), expandability, and reliability. When an AIX system is configured, user and group-related queries are sent to and responses are received from the SecureWay Directory. All AIX user data is securely stored, replicated, and managed by the SecureWay Directory server. For a collection of AIX systems that need to share a common view of user security information, this function can significantly reduce the number of administrative operations.

*SecureWay Directory Version 3.1.1:* SecureWay Directory is an open, cross-platform server optimized to support Lightweight Directory Access Protocol (LDAP)-enabled applications that integrate enterprise systems. Providing a unified architecture that allows users to share data with people, applications and network resources, SecureWay Directory helps improve communication, speed development, and deployment of Web applications and increase the security of the network. Utilizing the power of DB2® Universal Database (UDB) and its transactional data store, the directory extends the performance and availability of DB2 to an enterprise directory service.

**Note:** You may only use the DB2 UDB component in association with your licensed use of the SecureWay Directory.

The SecureWay Directory, previously announced as eNetwork™ LDAP Directory, has been rebranded and renamed under the SecureWay brand to more closely align with the IBM eBusiness portfolio for SecureWay Software. These products provide an integrated solution and a secure network platform for our customers to implement an e-business.

The new version of the SecureWay Directory steps up to the Internet Engineering Task Force (IETF) LDAP V3 support based on RFC 2251, 2252, 2253, 2254, and 2256. Many new features are provided over the eNetwork LDAP Directory, which was based on LDAP V2. LDAP V3 provides enhancements to both the LDAP protocol and the supported schema.

The new LDAP V3 protocol features include:

- Referrals — A list of server URL addresses are returned to a client whose request cannot be serviced. The client can use the server locations returned to continue the operation.
- Controls — Extension information can be added to a request for an LDAP operation.
- Extended operation plugin support — Additional operations can be defined for services not available elsewhere in the V3 protocol. Clients can request and receive responses with predefined syntaxes and semantics.

The SecureWay Directory server uses attribute-type definitions, object-class definitions, and other information called schema to determine how to match a filter or attribute value against an attribute of a directory entry. The schema matching also determines whether or not add or modify operations are permitted. The breadth of supported schema definitions has grown to support, not only the schema defined by LDAP V3, but also encompasses IBM common schema and Directory-Enabled Networks (DEN) schema.

Subclassing enables new object classes to be defined that inherit the object class definitions and attributes of its parent class. The new object may be defined with additional or changed attributes. Schema update operations are checked against the schema class hierarchy for consistency before being processed. Additionally, the Directory permits authorized users to dynamically define new attributes and object classes to enhance the pre-defined directory schema.

SecureWay Directory has provided a migration utility to convert your eNetwork LDAP Directory V2.1 schema definitions to LDAP V3 format. No migration is required of the directory data. eNetwork LDAP Directory V2.1 data will work with the SecureWay Directory V3.1.1 server.

Server-specific information, Directory System Agent (DSA)-Specific Entry (DSE), is contained in a read-only repository, RootDSE, that contains the following information:

- Suffixes supported by the local directory server
- Distinguished Name (DN) of the subschema entries known by the server
- List of alternative (replica) servers
- LDAP version implemented by the server
- List of supported extended operations
- List of supported controls
- List of supported Simple Authentication and Security Layer (SASL) security features
- Server configuration information

SASL, defined in RPC 2222, is a framework for adding pluggable authentication support for connection-based protocols. The directory server invokes the SASL plugin functions to perform authentication following a bind request from a client and returns the results to the client. Two methods of authentication are supported:

- Challenge/Response Authentication Mechanism — Message Digest 5 (CRAM-MD5)
- Secure Socket Layer (SSL)

Several new features have been added to address security:

- In addition to certificate authentication for the server, which was available with Version 2.1, the Directory now supports SSL client certificate authentication based on public keys, which provides the means for setting up a protected communication channel between the client and server. A user with a public key certificate signed by a Certificate Authority can use the certificate to authenticate to the directory server.
- Full SSL Java™ Naming and Directory Interface (JNDI) support.
- Encryption of passwords in the Directory prevents passwords from being compromised via database queries or file lookup.

The SecureWay Directory allows users to write server and client plugins, which contain additional functions that the user would like the server or client to perform. A plugin is a dynamic link library (DLL), which can be dynamically linked with the server. The directory plugin APIs are compatible with the Netscape Directory Server (NDS) published APIs.

Directory clients can locate Directory servers via the domain name. SecureWay Directory server addresses are published through Service Resource Records in the Domain Name Service (DNS) manually. A list of servers will be returned to the client from the DNS.

A Change Log has been included in this release, which logs add, delete, and modify operations to the directory server and changes to the change log itself. A client can access the Change Log and update its own replicated copy of the directory data by applying the changes.

Greater performance and data availability is achieved though client-side caching and server ACL Caching.

Data can be stored, retrieved, and managed in the Directory using a native language code page for either single-byte or double-byte languages. Data is converted to the Universal Code Set (UCS) Transformation Format (UTF-8) character strings before being sent to and from the server. The data can be stored as either UTF-8 or as local codepage strings depending on the database configuration. This version has translated messages for Group 1 languages and Czech, Polish, Hungarian, Russian, Catalan, and Slovakian.

SecureWay Directory can be administered and configured from a Web browser-based GUI. The administrator can:

- Perform initial setup of the Directory
- Change configuration options
- Manage the daily operations of the Directory

User access control is provided for information stored in the Directory and can be defined by an administrator. From a Web browser, users can search for or add to information in the Directory. In addition, the Java-based Directory Management Tool is provided to allow a user to perform these tasks:

- Connect to one or many directory servers via secure or unsecure network connects
- Browse the directory tree or directory schema
- Add, Edit, Modify, and Delete objects, object classes, and attributes in the Directory

Client access to the SecureWay Directory is supported using LDAP or HTTP protocols. AIX client applications can be developed using the enhanced elements provided for supporting LDAP V3 protocols and APIs. These elements are provided by the SecureWay Client SDK, which consists of:

- Client libraries that provide a set of C-language APIs
- C header files
- Documentation (in the form of HTML files)
- Sample programs
- Executable versions of the sample programs

Additionally, the following components are provided for developing Java applications that use Sun's JNDI. This permits Java applications to access LDAP-compliant directory servers:

- JNDI class files
- A set of class files for the LDAP service provider
- Documentation

The LDAP libraries and utilities provided with the SDK utilize the SSL libraries, if present. The SSL libraries are provided as part of the IBM Global Security Kit (GSKit). When GSKit is installed, the LDAP library will dynamically load the SSL libraries and use them to enable support of SSL. The LDAP library is fully functional regardless of the presence of SSL. GSKit Version 3.0.1 is available on the AIX Bonus Pack 4.3.

The U.S. government's regulations regarding the export of SDKs, which provide support for strong encryption, continue to evolve. This has resulted in changes in the way IBM packages the SecureWay Directory Client SDK and the manner in which LDAP applications gain access to the strongest SSL encryption algorithms (which include 128-bit and triple DES encryption). The point of control, with respect to available levels of encryption, is now the application.

Any LDAP application that uses the SecureWay Directory Client SDK Version 3.1.1 with the required level of GSKit 3.0.1.84 (or higher) has default access to 56-bit DES encryption (over SSL). This is the case for LDAP applications (new and existing) that use either the domestic or general export versions of SecureWay Client SDK Version 3.1.1.

For an LDAP application to access the stronger SSL cryptographic encryption algorithms, the application must use a new function that sets the cipher support to 128-bit/triple-DES and registers the application for the stronger cryptographic encryption algorithms. Without this function, LDAP applications have default access to a maximum of 56-bit DES encryption for SSL connections. To invoke the new function, your application must be linked with the appropriate static library that exports it. These static libraries are distributed via the IBM SecureWay Directory Security Enabler V3.1.1 package (5648-D14). For users within the U.S. and Canada, this package can be download from URL:

**http://www.software.ibm.com/network/directory**

These static libraries, which provide unrestricted cipher support and applications developed with these libraries, may be exported outside the U.S. and Canada **only** with the appropriate export license, as provided by the U.S. government.

The SecureWay Directory is Tivoli-ready.

***AIX Console Logging:*** AIX now treats system console messages as critical system information. Previously, these messages were simply displayed on the current console device. If that screen or window was in use, the messages could be lost. Now, in addition to displaying them on the console, these messages are also logged to a file, along with the originating user and the time of day when the message was written. Now, customers can easily retrieve these messages, improving their ability to diagnose problems and monitor system status.

In addition, AIX has numerous new and improved serviceability features. The file system and system dump processor have been enhanced to make it easier to diagnose problems when they occur.

***NIS+:*** AIX Version 4.3.3 includes a port of the Sun Solaris Version 2.5 NIS+ implementation. This function is provided in addition to the current NIS support, which remains unchanged. This new naming service provides enhanced capabilities for security management in a distributed system environment. Security can be managed for a set of systems using a single management point. NIS+ was designed to meet the demanding requirements of networks, which typically range from 100 to 10,000 multivendor clients supported by 10 to 100 specialized servers located at various sites. 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. Information is incrementally updated and propagated immediately, allowing information to be changed rapidly. The NIS+ namespace was designed with hierarchical domains to accommodate more distributed networks requiring scalability and decentralized administration. The NIS+ implementation is optimized to support up to 10 replicas per domain. Such a domain may typically have 10,000 table entries. Scalability beyond 1000 NIS+ clients is best achieved by dividing NIS+ name spaces into different domains to create a hierarchy.

Differences between NIS and NIS+:

| NIS | NIS+ |
|---|---|
| Flat domains: no hierarchy<br>– Slave servers on each subnet | Hierarchical layout: data stored in different levels in the name spaces.<br>– Support up to 10 replicas per domain. No special requirements for broadcast subnets.<br>– A domain may typically have 10,000 table entries |
| Data stored in two column maps tables | Data stored in multicolumn tables |
| No authentication | Data Encryption Standards (DES) authentication<br>Fine grain access control.<br>Access controlled by authentication and authorization. |
| Updates delayed for batch propagation | Incremental updates propagated immediately |

***Sendmail Functional Upgrade:*** Sendmail has been upgraded to Version 8.9.3, which features anti-spamming among other capabilities. AIX will include the necessary files to generate custom configuration files for the anti-spamming feature. The default /etc/sendmail.cf does not include anti-spamming configuration; however, the /usr/samples directory contains custom anti-spamming configuration files to illustrate how to configure the anti-spamming feature.

## *Network Security*

### *IP Security Enhancements*

- **Improvements to serviceability:** Logic has been added to allow better tracing of the IP Security and IKE messages. The output of logging is now formatted in readable format and AIX auditing has been implemented. Users can now pinpoint configuration failures and view audit logs to determine security attacks.
- **On-Demand tunneling:** Dynamic tunnels only need to be defined one time, then will be activated only when traffic matching the criteria set out in the policy was sent or received. This feature is beneficial to users because the functions for negotiating, computing, and refreshing session keys will only be performed when necessary.
- **Filtering based on IP address ranges:** IKE Tunnels can be created that specify a range of IP addresses (starting and ending IP address range endpoints) that allow tunneling over multiple IP addresses. It allows users to easily define tunnels for ranges of addresses.
- **Web-based System Manager interface for filters:** A GUI-based tool can now be used to configure and manage manual tunnels, static and dynamic filter rules, and importing and exporting tunnel definitions. The tool is now consistent across IP Security and is NLS-enabled; however, SMIT is not available for this option.
- **Certificate-based Use of Digital Signatures for IKE Authentication:** IKE tunnels (dynamically negotiated secure tunnels) have been enhanced to use digital certificates for authentication. Authentication is accomplished by signing IKE messages using X.509 certificates. Certificates may be stored locally. This enhancement enables the deployment of Virtual Private networks with a large number of endpoints. Such network configurations may present a savings in cost and administration of typical leased line installations. Support for certificate-based use of digital signatures for IKE Authentications is planned to be available November 5, 1999, for new orders and via APAR IY02769 for existing customers.

***TCP/IP Socks Library:*** The AIX SOCKS API allows generic TCP/IP applications to connect to hosts through a generic TCP/IP proxy using version 5 of the SOCKS protocol. Any application that only makes outgoing TCP connections can take advantage of this API without any code modification because the library will automatically handle the tunnel creation with a configured SOCKS5 server. Furthermore, the network administrators can configure the API to accept and route certain types of clients' requests to different servers, balancing the workload across multiple SOCKS5 servers. This library enables network administrators to allow limited access to external sites, while maintaining network boundary controls.

## *Java Security*

AIX Developer Kit, Java Technology Edition, Version 1.1.8 delivered on AIX Version 4.3.3 provides the following security enhancement:

- Java Security Migration Aid — The Security Migration Aid provides the more robust policy-based security model of the Java 2 platform in the Java 1 platform environment. The Security Migration Aid is intended to help users migrate from the relatively simple

Java 1 platform security mode to the finer grained Java 2 platform model. The Security Migration Aid supports the use of security policies, permissions, tools, and Java runtime security managers as defined in the Java 2 platform security model.

### *Network Performance and Scalability*

***Quality of Service:*** Advanced Internet services are based on Quality of Service (QoS) and policy-based networking. QoS embodies the idea of preferential treatment for certain traffic flows and enables Service Providers to implement and effectively manage Service Level Agreements. The AIX QoS implementation is based on the Internet Engineering Task Force (IETF) standards, Integrated Services (IntServ) and Differentiated Services (DiffServ). IntServ utilizes the Resource ReSerVation Protocol (RSVP) available to applications via the RSVP API (RAPI). DiffServ support includes IP packet marking for IP packets selected via filtering. The AIX QoS also offers bandwidth management functions such as Traffic Shaping and Policing. Policy-based networking is an industry effort to define and standardize various network configuration parameters needed for effective network management. The AIX QoS scope covers both QoS and policy-based networking. This enhancement to AIX provides System Administrators with the benefits of both QoS support and policy-based networking in meeting the challenges of QoS offerings across complex networks.

***HTTP GET Engine:*** The new kernel extension HTTP Get Engine helps to increase the performance of Web serving by serving Web pages from AIX Network File Cache. Web pages are cached in Network File Cache. Using Power and PowerPC private segment, this cache can be extremely large, constrained by the physical memory in a system. The AIX HTTP Get Kernel extension intercepts incoming HTTP Get requests from the network, and serves Web pages if found in the Network Cache, without the overhead of Get requests sent to user space Web server. If Web pages are not found in AIX Network File Cache, the HTTP Get request is queued to user space Web server. Furthermore, the Network File Cache Web page data is transmitted by reference without requiring any data copies. This function, in conjunction with TCP/IP Checksum Offload capability in ATM 155 Mbps adapter and 1 GB Ethernet adapter, makes up the Non Data Touching (by CPU) architecture. The kernel HTTP Get Engine, along with Network File Cache, helps reduce the number of instructions needed to process a Get request dramatically, increasing server throughput. This capability is used by HTTP Server (powered by Apache) Web server software Version 1.3.6.

***EtherChannel:*** Cisco System′s Network Bandwidth Aggregation and Load Balancing technology, called EtherChannel, builds upon standard and 802.3 Fast Ethernet and provides the functionality to aggregate a bandwidth of multiple Ethernet interfaces. IBM′s implementation for AIX of Cisco′s EtherChannel defines a logical interface or channel, which can consist of 2 to 4 physical interfaces (or adapters). This logical interface or channel looks like an Ethernet interface to the upper layers. Any upper layer (IP, SNA, DLPI, etc.) which can connect to an Ethernet adapter through AIX Common Data Link Interface (CDLI) network services is designed to work over an EtherChannel without any code change. AIX′s EtherChannel implementation is designed to work with Ethernet Switches that are compatible with Cisco′s EtherChannel technology. Traffic sent to the channel is sent on the network over one of the devices that is part of the channel. For IP traffic, the outgoing device is selected by hashing the destination IP addresses. For all other upper layer traffic, the outgoing device is selected by hashing the destination MAC addresses. Hashing of addresses helps ensure that traffic between a particular source and destination uses the same physical interface or adapter. This is to avoid packets reaching the destination out of order as some higher layer protocols have problems handling out of order packets. Packets received from any of the interfaces are sent to the higher layers for processing, regardless which device they are received on.

***TCP/IP Gratuitous Address Resolution Protocol (ARP):*** Gratuitous ARP provides two features:

- When the network adapter hardware address for an IP host changes, then all other hosts on the same physical network that have an ARP entry with the old hardware address update their entry with the new hardware address. The address update will take place during a non-intensive performance period such as network interface bringup; therefore, it helps reduce the waiting time when data is ready to transfer through a TCP/IP connection.
- When assigning an IP address to an interface, AIX will detect whether another host is already configured with the same IP address by sending an ARP request for the desired address. If the desired address is discovered to be already in use, the system will log this error to notify the system administrator.

***DHCP Functional Upgrade:*** The Dynamic Host Configuration Protocol (DHCP) product has been enhanced with a programming interface to the DHCP server for user extension or third-party software integration. Performance enhancements were made to nsupdate4.

***TCP/IP Resolver Enhancements:*** New Dynamic Load Name Resolver APIs included in AIX Version 4.3.3 allow users to define their own Name Resolver module in addition to the existing Name Resolver methods such as local, DNS/Bind, NIS, and NIS+. Users can create a module, which may have one or all the following five map types: services, protocols, hosts, networks, and netgroup.

***TCP Checksum Offload for Gigabit Ethernet:*** In the new gigabit Ethernet device driver, the workload of TCP checksum processing is offloaded from the AIX TCP/IP protocol stack to the adapter. This reduces the amount of CPU time spent computing checksums in the main CPU, allowing more packets to be processed. Along with the network buffer cache, this feature allows sending data with Non Data Touching, helping to increase performance. This function benefits applications that transmit large blocks.

***MPOA on ATM Enhancement:*** AIX 4.3.3 includes enhancements for Multiple-protocol over ATM (MPOA) which provides improved management and performance of an ATM LAN Emulation network by combining multiple edge routers into a single router image. Device specific configurations are minimized with auto-discovery and device discovery protocol, while data paths are reduced from many hops between routers to a single hop between end clients. MPOA supports both standard Ethernet and 802.3 Ethernet in AIX 4.3.3.

### *Reliability, Availability, and Serviceability (RAS)/Storage*

***Striping and Mirroring:*** The Logical Volume Manager (LVM) combines RAID 1 (mirror) data availability with RAID 0 (striped) performance by supporting (entirely in software) a striped logical volume with mirrors. This feature further enhances data availability in high performance striped logical volumes by tolerating disk failures. The remaining disks in the striped mirror copy continue to service striped units contained on these disks. The replacement of a disk where only the partitions on the new disk are synchronized is provided through the migratepv or replacepv command.

In addition, all logical volumes now can utilize a new partition allocation policy called Super Strict. This Super Strict policy does not allow partitions from one mirror to share a disk with partitions from a second or third mirror, helping to further reduce the probability of data loss with a disk failure.

These new functionalities are not backward compatible; therefore, new volume groups supporting these features can not be used with previous versions of AIX.

***Online JFS Backup:*** JFS is enhanced to support file system online backup. The capability allows a mirrored copy of a file system to be used for backup purposes. A mirror copy of the file system is split off, mounted read-only, and available for backup. This enables end users to backup a consistent copy of the file system while another copy is still mounted and in use. After the backup is complete, the user can reintegrate the backup mirror copy and resynchronize it with the other mirror copies.

***Support Mirroring for System Dump:*** The restriction that a dump device can not be a mirrored logical volume has been removed by forcing the dump to be written to and read from the primary mirror of a mirrored logical volume. Previously, if a customer wished to mirror their root volume group, they had to specifically avoid mirroring their dump logical volume. Now, customers can use mirrored paging devices as dump devices. Dump data itself is not mirrored, but the AIX dump management utilities have been enhanced to properly obtain the dump data regardless of the mirroring state.

***Replaceable Malloc:*** AIX now allows the use of alternative memory allocation (malloc) routines via an environment variable. This provides the ability to fully replace the system malloc routine, including the one used within libc itself, without any relinking required. Previously, a malloc replacement would only be used for application calls directly linked with a new malloc but would not be utilized by shared libc routines, possibly resulting in undetectable memory references. This enhancement helps make memory references more visible, enabling the third-party memory access products performing functions including garbage collection, memory usage analysis, and high speed memory allocation.

***AIX Support for Kernel Debugger:*** The Kernel Debugger (kdb) is a tool being added to the AIX system to provide a symbolic debugger for the AIX kernel, kernel extensions, and device drivers. kdb is also a command to allow examination of system crash dumps. kdb is an alternative to the current kernel debugger and crash command.

***Fast Single Instruction Patch:*** The new Fast Trap signal generates a trap (branch) that will bypass the debugger, permitting users to insert patch or instrumentation code with a single instruction replacement. This results in roughly an order of magnitude improved performance over the current mechanism of using the current trap signal through elimination of notification to the debugger, for example, no context switch required.

***Pthread Debug Library:*** AIX 4.3.3 facilitates third-party development of user-level, thread-capable debuggers by providing a pthread debug library. This library provides the APIs for the development of debuggers and/or applications, which require information about both user level threads (pthreads) and kernel threads. Furthermore, the pthread debug library provides the building blocks needed in the development of an application designed to gather information about mutex (lock) and condition variable usage over the lifetime of the application.

***Performance Analysis Tools Enhancements:*** Performance Analysis Tools in AIX Version 4.3.3 add the following improvements:

- fdpr — The usability and reliability of this tool has been improved by adding automatic selection of options based on the type of execution used.
- gennames — This tool is used in conjunction with the new offline mode capability found in tprof. It consolidates and simplifies the information needed by tprof to process symbol, loader and extension information.
- svmon — This tool has been enhanced with usability, scalability and speed improvements on RS/6000 Enterprise Server Systems. In addition, it supports the new Workload Management function offered in AIX Version 4.3.3.
- tprof — This tool has been enhanced to produce separate statistics per processor when running off-line and in conjunction with a new trace option to produce one trace log file per processor.

In addition, the Performance Analysis Tools adds the following new tools:

- ipfilter — This tool sorts the information provided by the ipreport command and presents it in table format. The ipfilter allows the user to select which operation headers (NFS, UDP, IPX, and ICMP) to view.
- pprof — A lightweight, trace-based tool, which collects a system′s process and thread information. Reports are generated in several formats, including a family view. The family view displays all parent-child relationships for all processes and threads. This tool is especially helpful in pinpointing system degradation when caused by multiple processes.
- topas — This tool utilizes the Performance Toolbox System Performance Measurement Interface to sample and report a wide variety of local system statistics, which include event, file, disk, memory, network, paging, process, and queue information. This tool provides an easy-to-use snapshot of overall system activity.

The Performance Toolbox Agent (PTX) has been upgraded with the ability to process performance metrics by activity, rather than by a fixed name. This capability allows system metrics to be logged only when customers′ specified thresholds are exceeded. Another improvement to PTX is the ability to create a file, which contains shell commands to be executed when recording files are

deleted. This feature allows users to merge, rename or move recording files automatically. Finally, the PTX agent has been modified to process a larger number of local processes on each monitored system.

***sar Command with New Flag:*** AIX 4.3.3 includes an additional option with the sar command: the -d option provides useful statistics such as throughput and average queue depth. Many of these statistics were previously provided with the AIX "iostat" command. The new -d option is added to AIX for compatibility with other UNIX® systems.

### *System Management*

***mksysb on CD-ROM:*** AIX 4.3.3 provides a new capability to generate an AIX system backup (mksysb) onto recordable CDs using third-party writers and third-party software. This function also allows system administrators and Independent Software Vendors to produce customized AIX system installation media on CDs as an alternative to the AIX Network Installation Manager (NIM). To make this new function easy to use, a TaskGuide is provided to walk the user through the steps needed to create a system backup on CD-ROM. Refer to the Install Guide for more details on tested configurations of third-party hardware and software.

***Converged Install and NIM Scalability:*** AIX Version 4.3.3 provides some building blocks to begin to unite the install solutions across the RS/6000 family. Improvements are being put in place in the network installation manager (NIM) by adding scalability features such as replication of resources and improved NIM master process handling. Base operating system installation (for both standalone and NIM installations) has been made more usable via TaskGuides in the Web-based System Manager Tool. Updating standalone AIX systems or SP™ is easier with the introduction of the Software Maintenance TaskGuide, which analyzes and applies updates to your system.

***Unified Documentation Library Services:*** Beginning in AIX Version 4.3.3 the Documentation Library Service is extended to integrate the navigation, reading, and searching of online documents. To use these functions, a new Documentation Library GUI is available. The new documentation Library GUI offers easier access to online documentation with a single integrated GUI that allows users to read, navigate, and search online HTML documentation. The AIX Operating System documentation can be accessed through this library service. Additionally, system administrators can register locally written HTML documents into the library so that users can go to a single library GUI to access a wide range of documents. For example, non-AIX documents could include online documentation for customer applications and also company policies and procedures. The library services can be made available locally, or through use of a Web server, and the documents can be used remotely by AIX or PC Computer clients.

***Internationalized Classes for Unicode:*** AIX Version 4.3.3 provides IBM Internationalized Classes for Unicode (ICU), a series of programming libraries that will allow application developers to develop C or C++ applications that handle all of the various languages contained within the Unicode standard in a consistent fashion. Furthermore, it enables application developers to write Unicode-enabled applications that will be portable across all IBM operating systems.

***ISO Standard ISO8859-15:*** Support for the ISO standard ISO8859-15 is added to AIX Version 4.3.3. This support provides the ability to process data in the ISO8859-15 codeset, which replaces eight characters from ISO8859-1 with eight new characters, including one Euro symbol, three characters in support of French, and four characters in support of Finnish. All languages that currently use ISO8859-1 will now have the option to use ISO8859-15 instead.

***Taiwanese Input Method Enhancements:*** The Taiwanese Input Method has been significantly enhanced for Traditional and Simplified Chinese Unicode locales. These enhancements have been made to the following input methods for greater similarity to the local Chinese/Taiwanese character inputting methods:

1. Intelligent ABC (based on phonetic representation of Chinese characters)
2. Biao Xing Ma (in which a Chinese character is divided into several components according to its writing orders)
3. Zheng Ma (based on the grapheme representation of a Chinese word)
4. Wu Bi (Five Strike — classifies a Chinese character into three categories: Stroke, radical, and single-character)
5. Pin Yin (based on the phonetic representation of Chinese characters)

Furthermore, users will have the ability to switch from one input method to another or between the Chinese input method and the English input method.

***Korean Input Method Enhancements:*** In AIX Version 4.3.3, Korean Input Method expands to support all Korean characters defined in KSC 5700. As a result, users can input not only 11,172 HANGEUL characters and 7,744 HANJA characters but also JAMO (Korean consonants and vowels).

The Korean Input Method features the following characteristics:

- Compound consonants and compound vowels can be input as one character.
- Half-width and full-width character input supports ASCII characters in both single-byte and multibyte modes.
- Special characters can be input by conversion from JAMO or code input function.
- An over-the-spot pre-editing drawing area allows intermediate characters in the reverse video area that temporarily covers the text line. The complete character is sent by pressing the conversion key.

***New Locales:*** AIX Version 4.3.3 expands the number of locales supported by four. The newly supported locales are:

- Italian — Switzerland (it_CH or IT_CH)
- English — Australia (en_AU or EN_AU)
- English — Belgium (en_BE or EN_BE)
- English — South Africa (en_ZA or EN_ZA)

These locales support new keyboard maps such as Low Function Terminal and language conventions, including collation, case conversion, character classification, message catalogs, date-and-time representation, monetary system, and numeric representation. The added locales support will be in both UCS2.0 and

ISO8859-15 encodings. Direct translation will not be provided for these languages; however, users and applications can utilize the existing customary directories to store translated messages, which could be displayed by the new locales.

***Japan Kit Fixed Fonts and Printers Support Integration:*** AIX Version 4.3.3 integrates various Japanese fixed fonts and Japanese printer support previously provided by separate LPP, Japan Kit V2 (5607-E30), which is available for Japan only. AIX now supports six Japanese font sizes from 6 points to 23 points. Italic and Bold deform fonts are also available for larger font sizes (12, 17, and 23 points).

The Japan Kit V2.1.1 continues to provide the above support for AIX Version 4.2.1. Other components of Japan Kit V2.1.1, for example, Wnn6, advanced Japanese Input Method, and Japanese True Type fonts, are supported by Japan Kit V2 only. Price quotation (PRPQ) will be acceptable upon request to deliver Japan Kit V2.1.1 for countries other than Japan.

***Ease-of-Use:*** Enhanced ease-of-use capability provides SMIT and Web-based System Manager interface support for:

- NIS+
- SecureWay (directory exploitation — users and group information)
- Logical Volumes (RAID 0 + 1)
- AIX Workload Management
- Quality of Service (Differentiated Quality of Services and RSVP)
- TaskGuides including:
  - Base operating system install
  - Software update
  - System backup on CD-ROM

New Documentation Library GUI offers easier access to online documentation with a single integrated GUI that allows users to read, navigate, and search online HTML documentation.

## *Interoperability*

### *AIX Fast Connect Enhancements*

- AIX Fast Connect Release 2.1.1 for Windows™ and OS/2® includes integration with DCE/DFS. This feature allows user authentication with the DCE security server. DFS directories can be shared with (exported to) PC clients. PC client access is controlled by the login context acquired as a result of DCE authentication. Fast Connect offers DCE authentication and DFS access without requiring DCE/DFS client software to be installed on each of the PC clients requiring DCE/DFS access. This allows centralized user/resource management for PC clients using DCE/DFS, avoiding cost, complexity, and extensive management overhead associated with installing DCE/DFS client on every desktop.
- AIX Fast Connect supports Windows 95/98 logon. Windows NT® clients are supported using Network Client for Windows NT. This feature of AIX Fast Connect allows support of home directories, startup scripts, and roaming user profiles for PC clients without requiring Windows NT domain controllers. Windows NT client support requires use of encrypted passwords and AIX Fast Connect logon server located in the same IP subnet as clients. IBM Network client software for Windows NT and Windows 95 is available for download at the following IBM Web sites:

  **http://service.boulder.ibm.com/asd-bin/doc/en_us/winntcl2/f-feat.htm**

  **http://service.boulder.ibm.com/asd-bin/doc/en_us/win95cl/f-feat.htm**
- AIX Fast Connect Release 2.1.1 supports AIX Access Controlled Lists (ACLs), including per-share default ACLs. This feature provides enhanced access control for PC clients.
- AIX Fast Connect Release 2.1.1 is shipped as an AIX feature.

## *Base/Standards*

- AIX 4.3.3 continues its conformance to the Open Group UNIX98 Specification.
- AIX 4.3.3 continues application Binary Compatibility with previous releases of AIX Version 4.

  When the AIX Version 4 binary compatibility rules are followed, applications that are developed and compiled using either AIX Version 4.1 or 4.2 will execute properly on AIX Version 4.3.

For more information, read "AIX Version 4 Binary Compatibility" at:

**http://www.ibm.com/servers/aix/products/aixos/compatibility**

***Java:*** AIX Developer Kit, Java Technology Edition, Version 1.1.8 delivered on AIX Version 4.3.3 provides the following features:

- **Java Remote Method Invocation — Internet Inter-ORB Protocol (RMI-IIOP)** — A new version of RMI that runs over IIOP and interoperates with Common Object Request Broker Architecture (CORBA) Object Request Broker (ORB) and CORBA objects programmed in other languages. This new feature combines the simplicity of Java RMI programming and the heterogeneous interoperability of CORBA. The RMI-IIOP toolkit includes code generators that work directly with Java RMI class files used by applications on the client side and code that wraps object implementations on the server side. In this way, the developer can work in 100% Pure Java on both sides and does not have to know the CORBA IDL (Interface Definition Language). This enables Java client applications to access other server objects besides those written in Java.
- **Java Database Connectivities (JDBC) — Object Database Connectivities (ODBC) Bridge** — The Bridge enhances the capability of enterprise customers to communicate with databases via Java. The Bridge provides JDBC access to databases with ODBC drivers.
- **Swing 1.1.0** — This version is part of the Java Foundation Classes (JFC) that implements a new set of GUI components with a pluggable look and feel. Swing is implemented in 100% Pure Java and is based on the Java 1 platform Lightweight UI Framework. The pluggable look and feel lets you design a single set of GUI components that can automatically have the look and feel of any OS platform (Windows, Solaris, Macintosh). Swing components include both 100% Pure Java versions of the existing AWT component set (button, scrollbar, and label), plus a rich set of

higher-level components (such as tree view, list box, and tabbed panes).

- **Big Decimal** — IBM has enhanced Java's Big Decimal math class by adding support for floating point arithmetic. The IBM Big Decimal class implements the decimal arithmetic defined in the ANSI standard X3.274-1996. The advantages are:
  - A full-function decimal floating point arithmetic. For example, mantissa length information is not lost, so trailing zeros can be preserved (for example, 1.2 x 2 = 2.40, not 2.4)
  - Exact results (for example, 0.9/10 = .09, not .089999996).
  - The precision of the arithmetic is freely selectable by the programmer, not limited to a choice from one or two alternatives.
  - Robust arithmetic operations — There is no wrap of integers at certain sizes. Ill-defined or out-of-range results throw exceptions.
  - A single class can be used for all decimal numbers. There is no arbitrary distinction between integers and floating point numbers.
  - Both scientific (where one digit is shown before the decimal point) and engineering (where the exponent is a multiple of three) exponential notations are supported.
  - Exponents in the range E-999999999 through E+999999999 are supported.

***Additional Printer Support:*** AIX Version 4.3.3 adds support for the following printers:

- Lexmark Optra W810 laser printer
- Lexmark Optra T laser printer family
- Lexmark Optra S plus laser printer family
- Lexmark Optra M410 laser printer
- Lexmark Optra E310 laser printer
- InfoPrint™ 40
- Hewlett-Packard 2500C Professional Series Color Printer
- Hewlett-Packard D640 Printer
- Hewlett-Packard 8100 Printer
- Hewlett-Packard Color LaserJet 4500 Printer

AIX also has additional standard parallel printer support for CANON LIPS4 and EPSON ESC/P Japanese printer data stream.

### *Graphics Enhancements*

***X11R6.3:*** 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. With this function, system administrators can create simple Web-based menus of applications to run on the server, and users can point and click to run them. For example, sites that have many X Terminals and Network Computers can use this functionality to provide a single Web-based point of contact for running their enterprise applications.

X11R6.3 includes four new functions:

- *Remote/Desktop Agents* — two types of agents used to facilitate remote execution of X-client applications.
  - Netscape plug-ins
  - Standalone helper applications for the rx mime type to be used with older Netscape versions and other Web browsers
- *Security Extension* — introduces the concept of trusted and untrusted applications in the X Windows System. Untrusted applications are not allowed to do illegal things such as intercepting keystrokes.
- *Application Group Extension* — allows an application to perform some of the functions that a Window Manager normally does, such as, putting resize handles on top level windows. This allows an X application to be embedded in a browser.
- *Low Bandwidth X (LBX)* — employs techniques to minimize bandwidth, including protocol compressing, reencoding, short circuiting, and caching to reduce network traffic on slow connections. LBX Proxy allows applications to use LBX without recompiling by acting as a pseudo-server. This means that it is located between the applications and the X Server and passes information between the applications and the X Server.

***OpenGL:*** GLX support of Version 1.3, the latest level approved by the OpenGL Architectural Review Board (ARB), is available on the GXT2000 and GXT3000 adapters. New functionality includes rendering access to offscreen adapter memory (pbuffers) (only available on the GXT2000) and enhanced X visual and resource selection and management.

OpenGL performance enhancements include improved positional lighting and the following new extensions:

- Vertex Array List — an IBM extension that allows a list of vertex attribute arrays to be provided with a single OpenGL function call. This helps reduce performance overhead of multiple function calls.
- Multi-Mode Vertex Arrays — an IBM extension that allows multiple vertex arrays for different primitive types to be provided using a single OpenGL function call. Like the Vertex Array List, this enhancement helps reduce performance overhead of multiple function calls.
- Clip Volume Hint — an extension that allows applications to notify the IBM OpenGL implementation whenever view frustum clipping is not required. This is designed to help reduce rendering computations.

OpenGL Applications Thread Enablement allows the development of multithreaded OpenGL applications to use direct rendering context where any thread can call OpenGL functions. This is a performance improvement for multithreaded applications since direct rendering contexts have higher performance than indirect contexts.

***graPHIGS:*** graPHIGS performance enhancements:

- Improved CPU utilization during swaps

  The default swapping method of the GXT2000P and GXT3000P graphics accelerators has been changed to minimize the "idle time" in the graPHIGS API software. The previous implementation required the device-specific software to be put to sleep while waiting for the vertical blank interrupt from the adapter indicating that the swap has completed. The updated software allows the application to begin working on the next frame before the vertical blank interrupt occurs.

- Improved clipping performance

  Models that are rendered to a view the same size as the graPHIGS workstation window can now use hardware clipping capabilities on the GXT2000P and GXT3000P graphics accelerators to improve clipping performance. Models that extend slightly beyond the window boundaries (up to 20%) will no longer be clipped using software. This has shown to significantly improve performance on some models.

- Improved large program support

  In AIX versions prior to AIX 4.3.3, the maximum data addressability for large graPHIGS programs was 1.25 GB (five segments). With changes in AIX 4.3.3, large graPHIGS programs can now access up to 2 GB (eight segments) of contiguous memory.

- Full input and output support of the Japanese IBM 943 encoding

  For implementation specifics, refer to the AIX 4.3.3 graPHIGS Technical Reference.

## Publications

The following additional hardcopy publications are shipped with AIX Version 4.3.3 or can be ordered from IBM after the planned availability date. To order, contact your IBM representative.

| Title | Order Number |
|---|---|
| AIX Version 4.3 Installation Guide | SC23-4112 |
| AIX Version 4.3 Network Installation Management Guide and Reference | SC23-4113 |

Publications can now be viewed using the new Documentation Library GUI, which offers easier access to online documentation with a single integrated GUI that allows users to read, navigate, and search online HTML documentation.

## Technical Information

### *Specified Operating Environment*

***Hardware Requirements:*** IBM Power, POWER2, Power Series 830 and 850 desktop systems, PowerPC systems, POWER3 systems, or RS/6000 SP and SP2® systems with the following exceptions:

- RS/6000 7016 POWERserver® Model 730
- RS/6000 7007 Notebook Workstation Model N40
- POWERnetwork Dataserver 7051
- RS/6000 7249 Models 851 and 860
- RS/6000 7247 Models 821, 822, and 823

AIX Version 4.3 supports systems with at least 32 MB of physical memory, 64 MB of initial disk paging space, and requires 315 MB disk storage for the operating system files for a total of 380 MB of disk storage. This configuration does not include online documentation. Application software may require additional storage.

Most applications will require additional disk storage space for application data, as well as the application program itself. Users should plan ahead for growth of user data and future application needs. As with any UNIX system, performance and capacity of the system will usually benefit from additional memory. The amount of benefit, if any, depends on the applications and system load. Increased memory sizes also imply that a larger amount of disk storage space be reserved for paging space. A typical recommendation is to reserve paging space two to three times the size of real memory. Different rules apply to larger memory systems (approaching 1 GB or more) where paging space may not be as important. Some applications may benefit from tuning the size of the paging space.

***OpenGL and GL 3.2 or PHIGS:*** OpenGL and GL 3.2 for AIX, Version 4.3 or PHIGS for AIX, Version 4.3 supports the following machines:

- RS/6000 7006, all models
- RS/6000 7009, all models
- RS/6000 7011, all 200 series models
- RS/6000 7012, all models
- RS/6000 7030, 3AT, 3BT, 3CT
- RS/6000 7013, all models
- RS/6000 7020, 40P
- RS/6000 7025, Model F40
- RS/6000 7043, all models
- RS/6000 7248 (Series 43P), all models
- RS/6000 Power Series 830 (PHIGS only)
- RS/6000 Power Series 850 (PHIGS only)

The machines listed above must be equipped with one of the following graphics adapters to utilize OpenGL and GL 3.2 for AIX or PHIGS for AIX functions. Those preceded by an asterisk also support GL 3.2. Those preceded by a + support “Easy MP” (the IBM internally multithreaded implementation of OpenGL) and standard OpenGL.

- POWER Gt3™
- POWER Gt3i™
- *POWER Gt4e™
- *POWER Gt4™
- *POWER Gt4i™
- *POWER Gt4x™
- *POWER Gt4xi™
- POWER GXT150
- POWER GXT150L™
- POWER GXT155L
- POWER GXT150M™
- POWER GXT150P
- POWER GXT250P
- POWER GXT255P
- *POWER GXT500
- *POWER GXT500D
- *+POWER GXT500P
- *+POWER GXT550P
- *+POWER GXT800P
- *+POWER GXT800P
- *+POWER GXT800PT
- *POWER GXT800M
- *POWER GXT1000™
- POWER GXT2000P
- POWER GXT3000P

Graphics displays supported by the above listed graphics adapters include:

- IBM 6091 machine type displays
- IBM POWER displays
- IBM G52, P50, P70, P200, and P201 color monitors

***Software Requirements:*** Clients and servers operating on AIX Version 4.3 are supported only when used within the system operating environments described in the appropriate hardware announcements and when used within the specified programming environment. When clients and servers operating on AIX Version 4.3 are used with other software or software in later announcements, other limitations may be included.

- *AIX*

  AIX Version 4.3 supports systems with at least 32 MB of physical memory, 64 MB of initial disk paging space, and requires 315 MB disk storage for the operating system files for a total of 380 MB of disk storage. This configuration does not include online documentation. AIX online documentation and any additional application software may require additional storage.

- *OpenGL and GL 3.2*

  OpenGL and GL 3.2 require a minimum of 32 MB of system memory and more than 3.2 MB of disk space for installation.

- *PHIGS*

  PHIGS for AIX Version 4.3 requires a minimum of 32 MB of system memory and disk space between 10 MB and 120 MB.

- *InfoExplorer*

  InfoExplorer requires a minimum of 10 MB of disk space.

- *AIX Fast Connect*

  AIX Fast Connect requires a minimum of 16 MB plus 1 MB per connected client of system memory and 50 MB of disk space.

*SecureWay Directory Version 3.1.1*

- SecureWay Directory Server
  - Operating System: AIX 4.3.1 with APARs IX72439, IX74821, IX75022 and PTF U457544, or AIX 4.3.2, or 4.3.3
  - Web Server: The directory server administration requires one of the following listed Web servers (or later version) installed on the system:
    - Apache 1.3.2, or later
    - Lotus® Domino™ Go Server 4.6.2, or later
    - Lotus Domino Server 5.0.1, or later
    - Netscape FastTrack Server 3.01, or later
    - Netscape Enterprise Server 3.5.1, or later
    - Microsoft™ Internet Information Server (IIS) 2.0
    - HTTP Server 1.3.3.1
  - Web Browser: A Web browser must be installed for use with the Web Administration features of the server. The browser must be frame-enabled and support AIX Developer Kit, Java Technology Edition, Version 1.1.7 features, including the IBM implementation for AIX of Sun's Java Version 1.1 AWT events and HTML V3.0. The following Web browser supports this specification:
    - Netscape Navigator/Communicator 4.06, or later, for AIX
  - A minimum of 64 MB RAM or more is recommended
  - Disk Space:
    - If you already have DB2 installed, approximately 25 MB is needed to install the product.
    - If you DO NOT have DB2 installed, approximately 70 MB is needed to install the product.
- SecureWay Directory Client
  - A minimum of 16 MB of memory

***Program Specifications:*** AIX Version 4 Release 3 is a UNIX-based operating environment, designed to handle the needs and requirements of a wide variety of systems and applications. It is designed for use in technical and commercial environments, and to be scalable on a wide variety of hardware platforms.

AIX Version 4.3 provides:

- Support for uniprocessors (UP) and symmetric multiprocessors (SMP)
- 32-bit and 64-bit application support
- GUI based on the Common Desktop Environment (CDE)
- X11R5 and X11R6 windowing system
- Motif 2.1
- Conforms to the following major industry standards:
  - IEEE POSIX
    - POSIX 1003.1-1996, includes support for threads option
    - POSIX 1003.2-1993
  - X/OPEN
    - UNIX98 Profile Brand
    - XPG4 Network File Systems (NFS)
    - XPG5 Transport Service (XTI) V2
    - XPG5 Sockets V2
- Journaled file system (JFS)
- Logical Volume Manager (LVM)
- Security and control facilities
- Network File Systems (NFS)
- License Use Manager (LUM)
- Network Computing System (NCS)
- System management facilities
- Performance tools
- Asynchronous I/O APIs
- Communications:
  - UUCP
  - Serial Line Internet Protocol (SLIP)
  - Point to Point Protocol (PPP)
  - Common Data Link Interface (CDLI)
  - Data Link Protocol Interface (DLPI)
  - Simple Network Management Protocol (SNMP) Agent
  - ATM LAN emulation
  - IPX/SPX protocols
- Transmission Control Protocol/Internet Protocol (TCP/IP)
- Java support
- International language support:
  - Unicode support
  - Single-Byte Character Set (SBCS) and Multi-Byte Character Set (MBCS) support
  - Euro currency symbol support
- InfoExplorer feature: separately chargeable option
- OpenGL and GL 3.2 for AIX 4.3

- PHIGS for AIX 4.3
- HTML-based documentation
- Xstation support
- Network Install Manager (NIM), which installs the operating system from a server onto clients on the network
- Support for diskless/dataless workstations
- Network Information Services Server Function (NIS)
- LDAP Directory
- Disk Quota Management
- AIX Fast Connect for Windows feature: separately chargeable option
- AIX Fast Connect for OS/2 feature: separately chargeable option
- Hardware power management

### *Planning Information*

***Packaging:*** AIX Version 4.3.3 is distributed in one package with the following:

- IBM International Program License Agreement in multi-language booklet and its License Information (LI)
- Proof of Entitlement (PoE)
- One CD-ROM

### *Security, Auditability, and Control*

The announced program uses the security and auditability features of AIX Version 4.3.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

## Ordering Information

An AIX Version 4, one- to two-user operating environment is included with every new RS/6000 system order as part of the base RS/6000 system price. When ordering most new RS/6000 systems, you can select which AIX Version 4 release you want to be licensed and shipped with your new system. AIX Version 4.3 is available on all new RS/6000 systems shipping today.

Optional features can be ordered for the base AIX Version 4, one- to two-user operating environment. While the base AIX operating environment is included at no charge with the base RS/6000 system, a separate AIX software order is required for registration purposes and to accommodate selectable options.

Orders for new licenses are accepted now. Shipments begin on the planned availability date.

Ordering for AIX Fast Connect for Windows and AIX Fast Connect for OS/2, which was announced prior to this release, will stay the same.

Refer to Software Announcement 299-069, dated March 16, 1999.

### *Current Licenses*

Current licenses of AIX Version 4.3 must order this update via MES.

Current license of AIX Version 4.1 (5765-393 or 5765-C34) or AIX Version 4.2 (5765-655 or 5765-C34) who want to obtain this current level of AIX Version 4.3 should refer to the Program Upgrades section of the AIX Version 4.3 announcement. Refer to Software Announcement 297-399, dated October 6, 1997.

Current licenses of AIX Version 4.3 who have not paid a media process charge are encouraged to call IBM Direct at 800-426-2255.

Current licenses of AIX Version 4.3 who have already paid a media charge are encouraged to order MES updates by calling 800-879-2755. IBM Software Delivery and Fulfillment (SDF) requires that all AIX licensed programs installed on any RS/6000 hardware be installed for the customer's appropriate hardware and software serial numbers on AAS. If these conditions are met, SDF will enter an order for an MES to ship the release and will process the installation of the MES. The hours of operation are Monday through Friday, 7:00 a.m. to 4:00 p.m. mountain time.

SDF will request the following information from the caller:

- Verification of customer name and number.
- Verification of ship-to address (for a permanent address change, the local IBM office must be contacted)
- Verification of media on which the update will be provided. If update is required on a different media than reflected in the profile and customer is going to a higher density media than the original media type, SDF will make a permanent change. Examples of changes that SDF will make are going from 4-mm to 8-mm to CD-ROM.
- Number of software shipments to be generated.
- RS/6000 hardware and software systems serial numbers.
- Expected shipment/receipt date.
- Expedited software delivery requests.

The following is done by the local IBM office:

- Permanent address change
- New chargeable software order requests
- Software discontinuance
- System Program Order (SPO) consolidations

If SDF is unable to fulfill the customer's request, SDF will refer you to an IBM representative.

To receive the updated AIX Version 4.3.3, place an MES 5692-AIX SPO order using the information from the table below.

AIX Version 4.3 (5765-C34) customers do the following:

| Program Number | Delete 5692-AIX Feature Number | Add 5692-AIX Feature Number |
|---|---|---|
| 5692-AIX | | |
| AIX Version 4.3 | 0857 | 0857 |
| AIX 4.3 Update CD | 0838 | 0838 |

When placing a MES order, a language feature number must be on the order. The default language feature is U.S. English.

In addition to the translated softcopy documentation already announced, the following is also available under 5692-AIX:

| Language | Translated Documentation Feature Number | PreInstall Feature Number |
|---|---|---|
| Slovakian | 2994 | 5994 |

### *New Licenses*

The ordering of the updated AIX Version 4.3.3 is unchanged by this announcement.

Refer to Software Announcement 297-399, dated October 6, 1997.

***AIX/UNIX Upgrade Protection Plan:*** The planned availability date for refresh of products under Upgrade Protection Plan (5692-ADV) is October 8, 1999.

**Note:** The current AIX Upgrade Protection Plan (5692-ADV) will continue to provide upgrades for customers with existing contracts. Effective September 13, 1999, this program will not be available for new customer enrollment.

A new enhanced program, Software Subscription for AIX (5692-SSO), is available for all new customers to more easily manage their program currency and upgrade budget. Effective September 13, 1999, all new contracts for this offering will be under the new Software Subscription for AIX (5692-SSO).

The new Software Subscription for AIX program is an enhanced program that includes Web support for e-mail notification and ordering in the United States.

Refer to Software Announcement 299-257, dated September 13, 1999, for details of this new offering and for ordering information.

***System Program Order (SPO) (5692-AIX):*** A 5692-AIX SPO is mandatory for shipments of program distribution and publications. The individual licensed program orders (for example, 5765-C34) are for registration and billing purposes only. No shipment occurs under these orders.

To receive shipment of machine-readable materials stacked on a single CD-ROM requires an SPO (5692-AIX). Billing for the media type selected is generated under the SPO. To prevent additional billing expenses, place only one SPO order per machine.

Select one of the following (5692-AIX) feature numbers for the licensed program hardcopy entitled publications, along with feature number 9001 for asset registration to be shipped on a given date.

| Program Name | Feature Number |
|---|---|
| ***Program Number 5692-AIX*** | |
| AIX Version 4.3.3 | 0857 |
| AIX Version 4.3 Update CD | 0838 |

Under SPO 5692-AIX, feature number 3470 can be used to suppress hardcopy documentation. To order entitled hardcopy documentation only, order feature number 3430.

## Terms and Conditions

***Licensing:*** IBM International Program License Agreement. PoEs are required for all authorized use.

***Limited Warranty Applies:*** Yes

***Program Services:*** Available until December 31, 2003

***Money-back Guarantee:*** Two-month, money-back guarantee

***Copy and Use on Home/Portable Computer:*** No

***Support Line:*** Yes

***Volume Orders:*** Yes, contact your IBM representative

***Passport Advantage Applies:*** No

***Passport Advantage Subscription Applies:*** No

***Upgrades:*** Customers can acquire upgrades up to the currently authorized level of use of the qualifying programs.

***AIX/UNIX Upgrade Protection Applies:*** Yes

***Entitled Upgrade for Current AIX/UNIX Upgrade Protection Licensees:*** Yes

***AS/400® Software Subscription Applies:*** No

***Variable Charges Apply:*** Yes

***Educational Allowance Available:*** Yes, to qualified educational institution customers.

## Charges

Charges are unchanged by this announcement.

***Variable Charges:*** The applicable processor-based one-time charge will be based on the group of the designated machine on which the program is licensed for use. If the program is designated to a processor in a group for which no charge is listed above, the charge of the next higher group listed applies. For movement to a machine in a higher group, an upgrade charge equal to the difference in the then current charges between the two groups will apply. For movement to a machine in a lower group, there will be no adjustment or refund of charges paid.

***Customer Financing:*** Global Financing offers attractive financing to credit-qualified commercial and government customers and Business Partners in more than 40 countries around the world. Global Financing is provided by the IBM Credit Corporation in the United States. Offerings, rates, terms, and availability may vary by country. Contact your local Global Financing organization. Country organizations are listed on the Web at:

**http://www.financing.ibm.com**

## Call Now to Order

Contact the IBM Americas Call Centers (to help IBM serve you, use the Reference Code):

Phone: 800-IBM-CALL
Fax: 800-2IBM-FAX
Internet: ibm_direct@vnet.ibm.com
Mail: IBM Americas Call Centers
Dept. RE001
P.O. Box 2690
Atlanta, GA 30301-2690
Reference Code: RE001

You can also contact your local IBM Business Partner or IBM representative. To identify them, call 800-IBM-4YOU.

**Note:** Shipments will begin after the planned availability date.

IBM Americas Call Centers, our national direct marketing organization, can add your name to the mailing list for catalogs of IBM products.

***Trademarks***



***Year 2000 Readiness Disclosure***

*Statements made in this announcement regarding Year 2000 are "Year 2000 Readiness Disclosures" under the Year 2000 Information and Readiness Disclosure Act of 1998, a U.S. statute enacted on October 19, 1998.*