

IBM i—Efficient, resilient business processing

The industry's leading integrated operating environment



IBM installs and integrates the SQL standards-based DB2® database for i with advanced database management utilities, plus additional middleware components such as multiple file system options, directory capability, an HTTP Web server powered by Apache, a Web application server and a Web services environment. IBM also makes available WebSphere® Application Server Express with i for Web-based J2EE™ application serving and Zend Server Community Edition for i for Web-based PHP application serving. Normally, companies purchase IBM i Standard Edition with the DB2 capability built-in, but IBM also offers an IBM i Express Edition option for those companies deploying workloads that do not use the DB2 database. IBM i Enterprise Edition includes DB2 and adds capabilities for 5250 transaction processing support.

IBM DB2 for i provides a scalable and easy-to-secure environment for the business data behind transaction processing and business intelligence applications. DB2 can be used to provide data to applications regardless of whether they are running on i, Windows, UNIX or Linux® operating systems with access via standards-based interfaces such as SQL, .NET, DRDA/CLI, ODBC and JDBC™. DB2 also supports XML, a popular method of exchanging information between companies. DB2 Web Query is available to help businesses analyze their data to understand and act on the key metrics that drive profitability.

DB2 for i offers a wide range of features to help improve performance and reliability of your business applications. For example, DB2 offers object relational technology that allows you to manage large, nonrelational objects within your database, such as images, audio or XML documents. It also provides extensive tools to manage queries based on the SQL industry standard. DB2 advanced parallel processing and query optimization techniques also support the exploitation of very large databases for analytical purposes.

The DB2 database for i is managed through the same easy-to-use, Web-based interfaces as other components of the operating system. Online database maintenance is designed to be performed while users are accessing and changing the database, which helps avoid scheduled outages by keeping applications available to users. Sophisticated database audit utilities also capture the information you need to conform to reporting and data compliance requirements.

In addition to handling data stored in the DB2 relational database, i also has an integrated file system that supports storage management of files in a similar way to Windows and UNIX operating systems. The integrated file system provides a hierarchical directory structure and management interface to 11 different file systems (including UNIX, Windows and NFS), each with its own set of logical structures and rules for interacting with information in storage. Compared to systems that focus only on their own native file system technology, the integrated file system gives companies much broader flexibility to integrate with a range of open applications from wide variety of operating environments.

Virtualized to manage multiple applications and processes

One of the key factors to the i operating environment's efficiency is the ability to run multiple business processes and applications reliably and securely together. In a study of large enterprises using multiple operating systems, IBM found utilization rates on i-based servers were over 10 times that compared to Intel® processor-based servers and over twice as high as UNIX and other midrange-based systems.¹ The high rate of utilization of Power Systems with i is achieved through the use of a variety of proven virtualization technologies, such as sub-systems (multiple workloads managed in a single operating system image) and IBM PowerVM™ logical partitions (multiple workloads managed in independent operating system images).

Subsystems are independent operating environments within an i instance, through which the system coordinates and automatically manages work flow and resource use for jobs, processes and applications. The system can contain many subsystems, each of which can be assigned defined system resources such as memory pools and processor priority. IBM i subsystems are routinely used to separate multiple Web, batch and transaction processing application components. Subsystems may be tuned manually for specific workloads including the ability to cap the number of processor cores used by the workloads, but most companies let i automatically handle routine subsystem prioritization and workload balancing.

IBM PowerVM provides virtualization technology that enables multiple images of IBM i, AIX® or Linux operating systems to be run on the same Power processor-based system with resources automatically balanced between partitions. Unlike most industry virtualization implementations on Intel processor-based systems, the Micro-Partitioning™ capability of PowerVM is directly based on the proven IBM mainframe hypervisor architecture. The PowerVM hypervisor ensures true separation of operating systems functionality from the performance-optimized firmware layer that handles management of system hardware resources. The PowerVM hypervisor ensures each operating system partition—either i, AIX or Linux—is completely independent and secure. Up to 10 micropartitions can be defined per processor, with dynamic or automatic balancing of processor resources between the micropartitions. PowerVM Active Memory™ Sharing provides advanced memory virtualization technology, which intelligently flows memory from one partition to another for increased utilization and flexibility of memory usage. PowerVM Virtual I/O Server (VIOS) can virtualize I/O resources to improve asset utilization and decrease system costs. Companies deploying i have routinely deployed their business applications using logical partitioning to optimize their IT operations over the past decade.

Optimized for exceptional business resilience

For many companies, business process resilience and the ability to meet and exceed demanding service levels of multiple business units are top priorities. Over many years and in many businesses, i has established the reputation as one of the top operating environments in the industry for resilient application deployment. Companies routinely trust the i operating environment to deploy their most critical business applications.

To handle the most challenging resiliency requirements, IBM i features a clustering architecture with multiple deployment options to provide continuous availability for application processing. For example, it includes options for remote database journaling and cross-site mirroring capability to cluster between systems at both transaction and disk levels. For disk level clustering, IBM offers PowerHA™ for i, for transaction clustering, IBM offers iCluster®. These solutions can be deployed in high availability and disaster recovery environments. IBM i resiliency features have been extended and enhanced by a broad range of business resiliency solutions available from specialist resiliency ISVs that have exploited the i cluster architecture and implemented additional cluster management tools.

Trusted security with auditing and compliance tools

For companies running Windows and UNIX operating system-based servers, security and virus management are major challenges in terms of time and money. According to secunia.com, IBM i has a long-term track record of significantly fewer security advisories than Microsoft® Windows Server® and UNIX operating environments.

The simple-to-deploy, object-based security model of the i operating environment provides comprehensive capabilities for deploying and managing a highly secure system environment. Its object-based architectural design provides virus resistance by protecting the operating system code from modification (via hardware storage protection) and by preventing

the running of executable instructions stored in a file, a common source of viruses. i also helps safeguard data against hackers with built-in intrusion detection and prevention and has an audit journal to track security changes and breaches to help with compliance and auditing. Of course, i supports options for encrypting data on disk as well as backups, encrypting selected database information, and common network networking standards, including SSL and VPN.

IBM i also supports multiple additional tools from IBM and ISV tools providers that help create, deploy and comply with business security policies.

Designed for open application design choices

IBM i offers an integrated language environment that supports a broad range of open application options, with best-of-breed IBM Rational® development tools as well as a wide range of options from IBM tools partners. ISV solutions written for i are routinely deployed with a combination of development languages optimized for transaction processing such as C, RPG, COBOL and C++, as well as environments optimized for Web-based and open source applications such as Java™, EGL, and PHP.

The integrated language environment for i enables companies to exploit existing application assets, while taking advantage of new business opportunities with a range of open technologies. A variety of technologies can be used to implement a Service-oriented Architecture (SOA), integrating traditional transaction processing language environments with today's open source technologies. Traditional language applications can also be made available as a Web service or easily connected to Web services running on other systems. Java and PHP offer powerful and open Web application environments on i with thousands of applications and components. With its easy-to-use development approach, PHP is a natural fit for companies that have invested in i, offering rapid deployment and simple

integration with existing business applications. Zend Server Community Edition for i includes a PHP runtime environment and a toolkit that provides easy access to IBM i data and applications. With support for the Apache Web server, MySQL database, and PHP, companies can easily deploy open source applications written to the popular AMP stack on IBM i.

IBM i also includes a runtime for AIX applications—the Portable Application Solutions Environment—enabling UNIX applications more simply to be ported to the system. The PASE runtime environment enables running selected UNIX applications without the complexity of managing a full UNIX system. It is shipped with industry-standard and de facto-standard shells and utilities that provide powerful scripting tools.

IBM i is also shipped with a powerful Command Language (CL) that is commonly used for automating complex operations, such as for deploying batch processing and job scheduling.

Simplified operations and storage management

IBM i is renowned for its ease-of-use and powerful systems management features. Typically, companies require fewer administrators to manage the i operating environment compared to their UNIX and Windows systems. Systems Director Navigator for i is a browser-based graphical interface that enables the system to be managed with minimal skills and resources. Additionally, IBM Systems Director is available to help with management of heterogeneous systems.

Storage management software is also a key element of i providing fundamental operating advantages compared to UNIX and Windows operating system-based systems. Unlike on UNIX and Windows, applications running in i do not directly access disk drives. Instead, i automatically manages and balances the storage of data across multiple disk drives.

The automated storage balancing both optimizes performance and helps companies avoid reorganizing disk units and defragmenting disks to reclaim unused space. Of course, i also enables protection of disk storage through various resiliency options, including RAID-6, mirroring, as well as IBM System Storage™ solutions.

With recent enhancements, Solid-state Drives (SSD) can be utilized to help improve the performance of long running queries or batch jobs. With hierarchal storage management provided by IBM i, the most active data can be automatically placed on SSDs making it easier to get the benefit from SSD's fast I/O response times.

The value of IBM i advanced storage management capabilities can also be extended to other operating environments by hosting storage for i, AIX and Linux logical partitions or Windows and VMware-based IBM System x® servers and IBM BladeCenter® blade servers. IBM i is also supported in PowerVM VIOS environments with VIOS virtualizing I/O resources for i, AIX, and Linux partitions. With this virtual storage technology, Power servers have the flexibility to easily support the testing of new operating system releases and applications.

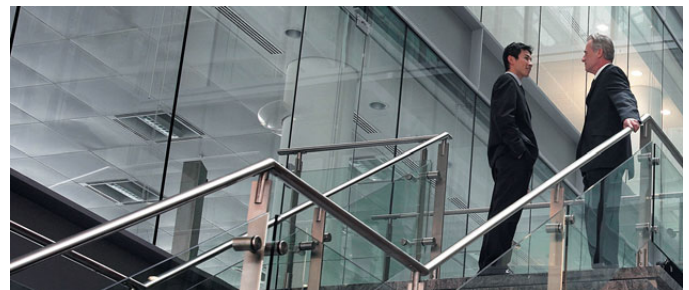
Scalable to enable nondisruptive business growth

IBM i offers a variety of expansion options to help a company maximize return on its IT investments. With support for the wide breadth of IBM Power Systems servers as well as POWER® processor-based blades, IBM i can support the computing requirements of small and mid-sized businesses to large enterprises. With support for IBM BladeCenter

solutions, i can be consolidated with x86 environments into a single platform infrastructure, helping to reduce complexity and costs.

Most important to nondisruptive growth is the Technology Independent Machine Interface (TIMI) that provides a protective layer between applications and hardware devices, such as processors and disks. Proven over many years and technology generations, the TIMI has protected applications from changing hardware devices and processor technologies, enabling applications to be upgraded without recompilation. IBM i also directly supports software upgrades from the previous two releases, with the system automatically changing system data structures and other object characteristics to new operating levels.

Capacity on Demand is an additional aid to nondisruptive business growth, enabling additional built-in processors to be activated without disrupting business operations. When using Capacity on Demand with i, neither the operating environment, nor the database or applications need to be restarted to take advantage of the additional performance.



| Feature | Benefits |
|--|---|
| Integrated middleware for efficient business processing | <ul style="list-style-type: none"> • Standards-based DB2 database • HTTP Server Powered by Apache • Integrated Web application server • Java and J2EE Web services environment • IBM WebSphere Application Server Express • Zend Server Community Edition providing PHP runtime environment • Integration with SQL, .NET, DRDA/CLI, ODBC, JDBC • Support for TCP/IPV6 • Multiple file systems (Windows, UNIX, NFS) • Support for MySQL database |
| Virtualized to manage multiple applications and processes | <ul style="list-style-type: none"> • Subsystem workload manager • PowerVM technology providing Micro-Partitioning and shared processor pools • Automatic balancing of processor and memory resources |
| Optimized for exceptional business resilience | <ul style="list-style-type: none"> • Highly resilient with built-in cluster architecture • Transaction-based journaling leveraged by IBM iCluster and complementary ISV high availability solutions • IBM PowerHA for i disk-based clustering • IBM Storage System resiliency solutions |
| Trusted security with auditing and compliance tools | <ul style="list-style-type: none"> • Simple-to-deploy, object-based security model • Virus resistance object architecture • Intrusion detection, prevention, and audit journal • Encryption of data on disk and backups • Secure networking with SSL and VPN |
| Designed for open application design choices | <ul style="list-style-type: none"> • IBM Rational development tools • C, RPG, COBOL, C++, Java, EGL, PHP, CL • Supports open source applications built to Apache, MySQL, and PHP stack • Services-oriented Architecture • UNIX application runtime |
| Simplified operations and storage management | <ul style="list-style-type: none"> • Web-based systems management • IBM Systems Director • Integrated storage management • Hierarchical storage management for Solid State Drives • Support for integrated and IBM System Storage • Hosts managed storage for i, AIX, Linux, Windows, VMware • Supported by Power VIOS virtualization |
| Scalable to handle nondisruptive business growth | <ul style="list-style-type: none"> • Support for IBM POWER processor-based systems and blades • Technology independent machine interface • Automatic software upgrades from previous releases • Capacity on Demand (processor & memory) |

For more information

To learn more about IBM i and the supported IBM server platforms, please contact your IBM marketing representative or IBM Business Partner or visit the following Web sites:

ibm.com/systems/power/

ibm.com/power/i/



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