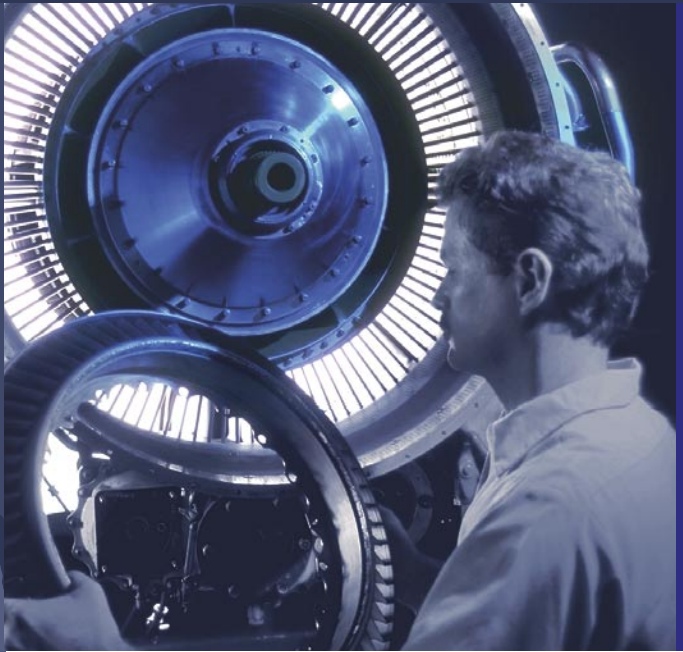


Realize the Benefits



Industrial Solutions and Services on Linux





Linux: a competitive advantage for industrial companies

Industrial companies are among the most competitive in the world—driven by global supply and demand, intensifying competition, regulatory restrictions, market consolidation and volatile and unpredictable prices. To gain competitive advantage, companies are reducing time to market, lowering costs, developing greater flexibility to respond quickly to changing business conditions and leveraging the power of the Internet.

The key is having an IT infrastructure that supports these initiatives. That is why electronics, aerospace and defense, chemical and petroleum, and automotive companies as well as other industrial companies are rapidly adopting the Linux® operating system as the foundation for their IT infrastructures. With its high performance, reliability and flexibility, Linux running on IBM @server™ systems can improve your ability to respond to the challenges of a dynamic marketplace.

Since it was introduced in 1991, no other operating system in history has spread as quickly across such a broad range of systems as Linux. According to studies by market research firm IDC, Linux is currently the fastest growing server operating system, with shipments expected to grow by more than 34 percent per year over the next four years.¹

Because Linux is open source, it allows freedom of choice—freedom to choose the best software, systems and solutions to meet your business needs. As a result, companies are not locked into a particular approach or vendor. IT departments can harness this flexibility to adopt new approaches that enhance the competitiveness of your business. Most importantly, Linux is comparatively “future-proof.” Because of its broad support

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Linux is comparatively “future-proof.” Because of its broad support over a wide variety of the most common hardware platforms today, and the likelihood that it will be supported on the hardware platforms of the future, Linux is a safe bet for developing applications.



¹ IDC Server Market Forecaster, December 2002.

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IBM is playing a key role in encouraging Linux application development. IBM moved its middle-ware to Linux early on; our Business Partners have been developing and porting applica-tions to Linux for years. IBM's Global Solutions Directory has more than 4,000 applications that run on Linux. This large selection of commercial software enables companies to leverage the value of Linux through innovative new applica-tions as well as through the proven applications that are widely used today.

Lower cost is often of greatest interest to industrial companies. By harnessing increasingly powerful Intel® processor-based servers, Linux is helping industrial companies use commodity hardware to perform business-critical functions. It is the total costs that can be lower with Linux. According to a senior analyst for the TowerGroup, "Linux is proving to have an advantage over alternative operating platforms with a lower TCO (total cost of ownership), both in terms of lower hardware and software expense and ongoing maintenance and support."² In addition, recent research from the TowerGroup³ also found that compared to UNIX® and Microsoft® Windows NT® platforms, Linux has the lowest license, installation, administrative and support costs for certain business functions.

Reliability also is acknowledged as a key strength of Linux—companies are using Linux for their most critical applications. For example, IBM itself is using more than 300 Linux-based servers to control manufacturing processes in a new state-of-the-art IBM semiconductor fabrica-tion (chip) plant.

Linux benefits four key areas

• **High-performance computing:** IBM Intel processor-based servers, workstations and Linux clusters provide scalable configurations of computing and storage hardware and cluster management infrastructure—providing you with superior scalability and low-cost modular growth that is easy to deploy and manage. Compute-intensive workloads such as seismic analysis, reservoir modeling and data mining in the petroleum industry, computer-aided engineering (CAE) in the automotive and aerospace industries and electronic design automation (EDA) in the electronics industry are more affordable on Linux clusters than on RISC-based UNIX platforms.

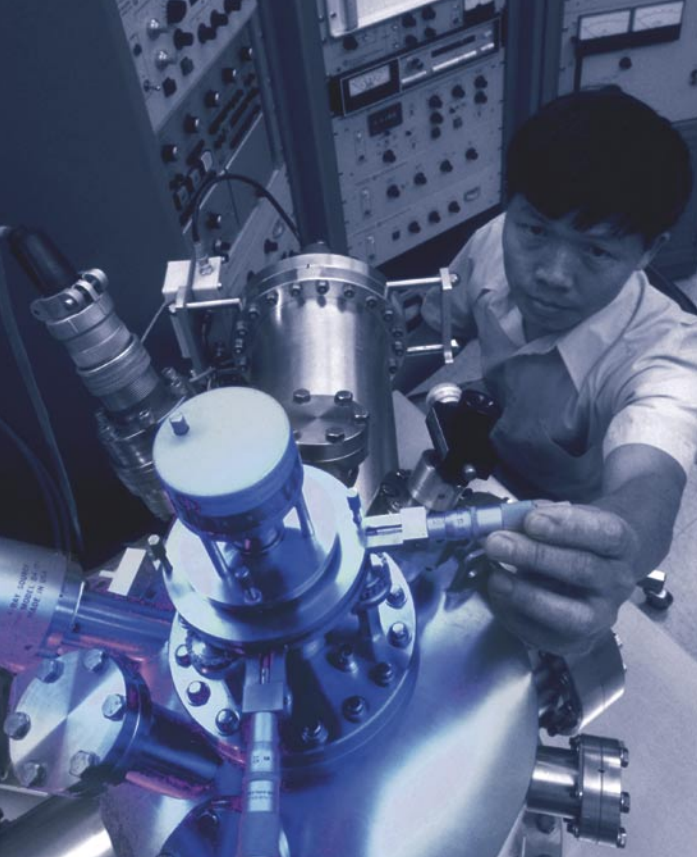
• **Workload consolidation:** By consolidating distributed workloads (such as Web serving) from competitors' systems onto IBM platforms, customers can realize reduced costs, efficient resource utilization and simplified management.

• **Infrastructure:** IBM Linux-based infrastruc-ture servers—for firewalls and for print, e-mail and Web servers—are Intel architecture-based platforms tailored and optimized to deliver to customers pretested products that are inexpen-sive and easy to use, install, set up and expand.

• **Embedded devices:** Linux is emerging as a key building block for embedded devices—because it is open and supports a wide range of processors. Linux is being deployed as the operating system for a variety of industrial appli-cations including consumer products (such as PDAs and set-top boxes), telematics, telecom servers and industrial automation.

^{2,3} Dushyant Shahrawat, "Wall Street Romances the Penguin: The Growing Popularity of Linux," TowerGroup report, September 2002.





Leveraging Linux for competitive advantage

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As a manufacturer itself, IBM understands that competition is intense for manufacturing companies. Market consolidation, coupled with an economic slowdown and surplus inventories, is leading to evaporating margins. And on top of that, it is a buyer's market and your customers know that—if you can't meet their demands, then your competitor will. Differentiating yourself from your competition in this kind of environment requires that you execute well on two fronts—meeting your customers' needs by being more responsive, and controlling costs by streamlining operations. Linux can play an important role in achieving both these objectives.

Use Linux to reduce time to market

Whether you work for a manufacturing company seeking to reduce its cycle time and speed up innovation or a petroleum company needing to reduce the time to find and develop oil and gas reserves, you have one challenge: the need to get your products into the hands of your customers faster. Time to market is a key differentiating

factor. IT can play an important role in the rapid and successful delivery of products—and Linux can help build such an infrastructure.

Built on open standards, Linux provides a flexible foundation that enables the rapid introduction of new applications in response to changing business demands. With Linux, developers can create applications on low-cost workstations and then quickly roll them out to a variety of servers.

For example, DuPont Photomasks, a microimaging company, leveraged Red Hat Linux and ten IBM *@server* xSeries® servers to reduce by 50 percent the processing time for its computer-aided transcription software. The company is designing photomasks faster, lowering development costs and experiencing shorter development cycles.

Use Linux to lower IT costs

With IT representing a bigger part of overall costs, streamlining IT itself can be a key objective. Thanks to the low TCO of Linux—including low equipment, software and administrative costs—IT initiatives are often more easily justifiable on Linux-based servers than on many other platforms. This can result in more compelling business cases for using IT to gain a competitive advantage.

Linux-based servers can deliver both capital and operating cost reductions. The operating system itself is very efficient, requiring less hardware resources than alternatives such as Microsoft Windows® and other competing operating systems.⁴ And because Linux is available on so many platforms, you can select the one that best fits the workload, thus helping optimize your use of capital. A greater use of Linux also can enable you to reduce the number of server operating systems needing support.

⁴ Dushyant Shahrawat, "Wall Street Romances the Penguin: The Growing Popularity of Linux," TowerGroup report, September 2002.



Use Linux for higher computing performance

A variety of industrial companies are running compute-intensive applications on clusters of low-cost Linux systems—reliable, Intel processor-based xSeries servers and IBM IntelliStation® Pro workstations—providing supercomputing performance at commodity prices.

There are numerous examples of how Linux is being used in compute-intensive environments. Chemical and petroleum companies use Linux clusters for exploration and production applications such as seismic data processing and analysis and reservoir modeling. Electronics companies are leveraging Linux for EDA applications. Automotive and aerospace companies are using Linux for CAE applications such as crash simulation; computational fluid dynamics; noise,

vibration and harshness simulation; and structural analysis.

Landmark Graphics is a leading independent software vendor (ISV) of decision-making software and services for the oil and gas industry. Landmark supplies a full suite of integrated technologies for exploration, drilling and production, and data management. This technological leader for the oil and gas industry recognized that many of its customers were taking advantage of the cost-effective reliability, scalability and performance gains of Linux. So Landmark went beyond just committing to offer all its technologies on the Linux platform—it also forged a strategic agreement with IBM to deliver the oil and gas technologies on high-performance IBM Linux clusters.

The value of Linux to industrial companies

- **Freedom to choose**—With Linux, there are no dead-end application migration or integration scenarios. Linux eliminates the vendor lock-in that can interfere with execution and business goals.
- **On demand capability**—Businesses can leverage the Internet to reach customers, partners and suppliers in the on demand computing era.
- **Flexible**—Linux, known for its record-setting horizontal scalability,⁵ scales easily to help meet the growth demands of your business.
- **Wide applicability**—Linux runs on a wide range of applications, from embedded devices to handheld devices (such as PDAs) to mainframes.

⁵Transaction Processing Performance Council, www.tpc.org. The TPC-H is a decision-support benchmark. The benchmark test was performed on a four-node xSeries 350, with each node featuring four Intel Pentium® III Xeon processors at 900 MHz and 4GB of memory, and running IBM DB2 Universal Database™ version 7.2 software and Turbolinux 7 Server.

- **Exceptional price/performance**—Reduced licensing costs and exceptional power combine to make Linux a great price performer, giving customers the opportunity to consolidate workloads onto fewer and less expensive servers.
- **Open**—Dependency on proprietary operating systems and solutions can create inflexibility. Linux integrates into multivendor environments, helping to deliver applications to better serve customers.
- **Reliable**—Linux provides greater uptime than Microsoft Windows, according to the Standish Research Group.⁶
- **Low cost**—Total costs (including equipment, software, administration and environmental factors) can be much lower than other operating systems.

⁶Standish Research Group report, "Is Linux Legit?" 2001.

Higher performance, improved flexibility, reduced time to market and lower costs: all are possible today with cost-effective Linux-based systems.



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Another example is Paris-based Compagnie Générale de Géophysique (CGG), a major player in the \$3.8 billion seismic services market. CGG created a cluster of Linux-based xSeries servers to support 3-D seismic surveys for producing subsurface images for oil and gas exploration. The Linux cluster provided 1.25 teraflops of processing power at half the cost of alternative platforms.

DaimlerChrysler, a world-leading automotive, transportation and services company, selected a 108-node Linux cluster of IBM IntelliStation workstations to perform crash-test simulations. The automaker selected Linux because it meets the performance and scalability requirements of the crash simulations at a significantly lower cost.

Use Linux for e-business on demand

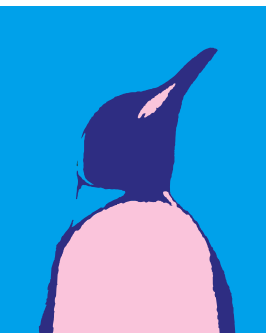
With intense global competition, you need to respond quickly to changing business conditions and customer demands by providing products and services to your customers when, where and how they want them—requiring an on demand business model. Industrial companies are using the openness and flexibility of Linux as the foundation for IT systems that enable faster responses to market conditions.

For example, many companies are improving their responsiveness by taking advantage of the flexibility of Linux clustering capability—so that they can quickly scale their computing requirements to meet unanticipated or rapid spikes in customer demand for processing data.

Use Linux as the foundation for e-business

Driven by the growing preferences of customers to do business over the Web, many companies are transforming their businesses from a solely bricks-and-mortar-based business to an e-business. Enterprises are leveraging the power of the Web for a wide range of applications—from improving customer satisfaction through self-service applications (such as allowing customers to configure and order products online) to improving the efficiency of the entire supply chain—from procurement to manufacturing to order fulfillment. For example, leading companies are using the Web to collaborate throughout their organization and with key partners, designers, engineers, suppliers and other manufacturers—to help develop and introduce new products, manage fluctuations in demand and maximize supply chain efficiencies.

e-business applications require a reliable, scalable IT infrastructure that can integrate with existing databases and applications, often across company, supplier and customer boundaries—precisely the value that Linux offers. Linux has a rich history of supporting e-commerce applications: the first applications of Linux were in Internet infrastructure areas. And now, the fast, streamlined, Internet-ready characteristics of Linux have attracted some of the largest industrial companies to build their e-business systems on Linux.



Germany-based SAS Automotive Systems, a joint venture between France-based Faurecia and Germany-based Siemens VDO, is a leading manufacturer of automotive cockpit modules such as instrument panels and steering columns. The Spain-based

subsidiary of the company wanted a more powerful and open computing environment to facilitate communication between plants. The company decided to implement three IBM *@server* xSeries servers running Red Hat Linux, Lotus® Domino™ and Lotus Notes® clients. The new implementation resulted in improved network performance, enhanced communications options and considerable cost savings.

IBM and Linux: helping industrial companies succeed in the new IT reality

Industrial companies face new challenges on several fronts: to develop, manufacture and sell products faster and cheaper today, while providing new ways to enable your customers to do business with you and be more responsive by adopting an on demand business model. Linux can provide the foundation for key IT initiatives that can make a difference. Higher performance, improved flexibility, reduced time to market and lower costs—all are possible today with cost-effective Linux-based systems. And who better to work with than IBM? We know the industrial sector and we know Linux. Use our experience to leverage Linux and make these key IT initiatives a reality in your business.





Why work with IBM to leverage Linux?

- IBM has thousands of Linux customer engagements worldwide.
- IBM has Linux-enabled its entire portfolio of hardware, software and services.
- More than 4,700 IBM Business Partners support Linux.
- IBM Linux Integration Centers, IBM Competency Centers and IBM Solution Partnership Centers around the world help customers design and deploy Linux solutions, help software vendors migrate their applications to Linux and provide software vendors with facilities to test their applications.
- IBM has invested more than \$1 billion in Linux, and an estimated 7,500 employees are involved in Linux development, research, sales and services roles.
- IBM has strategic relationships with key Linux distributors. IBM's dedicated Linux Operational Support Services provide world-class support, including training, technical support, consulting and implementation services.

For more information about Linux and IBM, please visit ibm.com/linux



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