



# Expanding the Frontiers of Enterprise Computing with Hewlett-Packard Linux Solutions

*An IDC White Paper*

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## Introduction

Linux is on the move. In a March 2001 IDC survey of nearly 900 corporate IT executives and managers in the United States and Western Europe, 25% reported Linux usage within the enterprise, a fraction nearly double the figure reported in the fall of 1999. The growth in spending on Linux has grown similarly, with 6% of the IT budget allocated to the Linux environment, up from 3% in 1999. Although the Windows operating environment still dominates by a wide margin, there is no doubt that Linux is carving out a place in the IT landscape, possessing significant growth potential.

This white paper examines the role of Linux within the corporate computing environment, noting some of the reasons why it has become an increasingly attractive alternative to other operating systems. The Linux market continues to grow, despite the dot-com downturn and the harsher economic and venture capital climates that exist today compared with 18 months

## IDC Opinion

Adoption of the Linux operating environment in the commercial space has grown steadily over the past few years, and IDC expects that it will become a common part of the enterprise computing landscape within a few years. Fueling the growth are the efforts of many companies, including Hewlett-Packard. HP views Linux as a "strategic operating system" and has devoted substantial resources across the company to make Linux as robust and reliable and as easily managed as HP-UX or Windows platforms. HP offers a comprehensive Linux strategy covering servers, workstations, storage, printers, server appliances, software, services, support, education, and training. Important initiatives such as its recently formed Linux Systems Operation (LSO) will provide an in-depth perspective into the advancement of Linux and open-source technologies.

HP's wide-ranging commitment to Linux is impressive, and IDC views HP as one of a select group of global vendors that has the worldwide presence and resources to help propel Linux to the next level of marketplace acceptance. In doing so, HP is well positioned to gain share among enterprises adopting Linux.

ago. Linux's flexibility, reliability, and cost-effectiveness, coupled with increasing interoperability with other computing environments, make it a force to be reckoned with. Not to be forgotten are the advances in servers, workstations, printers, and newer wireless devices that are now Linux-ready, opening the door to a computing environment that can be entirely Linux if desired.

We also look at the Linux strategy and offerings of Hewlett-Packard. HP has made a significant Linux investment covering all the major components necessary for enterprise computing, and the company's range of products and services involving Linux is impressive. The company is continuing to expand its Linux portfolio and either currently has available or will soon have products addressing secure computing with Linux, embedded Linux technology, 3D graphics, systems management, availability, and more.

### **The Emergence and Growth of Linux**

Rapid adoption of the Linux operating environment makes it clear that Linux has broadened its base far beyond its roots in research, engineering, science, and academia, although more so as a server system than as a client system. Now Linux is increasingly becoming an acceptable option for enterprise use in the role of a functional server, especially so in Internet- and infrastructure-related workloads. In some commercial markets, Linux has established itself as a viable alternative operating system, whereas in others, Linux is still used primarily by early adopters. IDC believes that Linux will take its place as an accepted part of the enterprise computing environment in most markets by 2005.

IDC sees Linux as an operating system in transition. Linux is clearly moving from the early adoption stage to becoming an established part of the IT infrastructure (see Figure 1). Some markets are adopting Linux more rapidly than others, yet Linux is appearing in all sizes of companies, in all geographical areas, and in many vertical markets. This software is well on its way to being considered a mainstream server operating environment in many sectors.

This is an adoption cycle reminiscent of that seen when Windows first appeared. Like other new entrants into the operating system market, Linux made its first inroads among users most inclined to try a new technology that offers greater flexibility in its use — particularly among researchers, scientists, and members of the academic community. These individuals were often engaged in technical and high-performance computing, making this environment an ideal proving ground for any operating system that would claim high levels of reliability and stability. At the same time, these users typically work outside a corporate IT support umbrella and employ a self-supporting work environment, allowing them considerable flexibility for their technology choices.

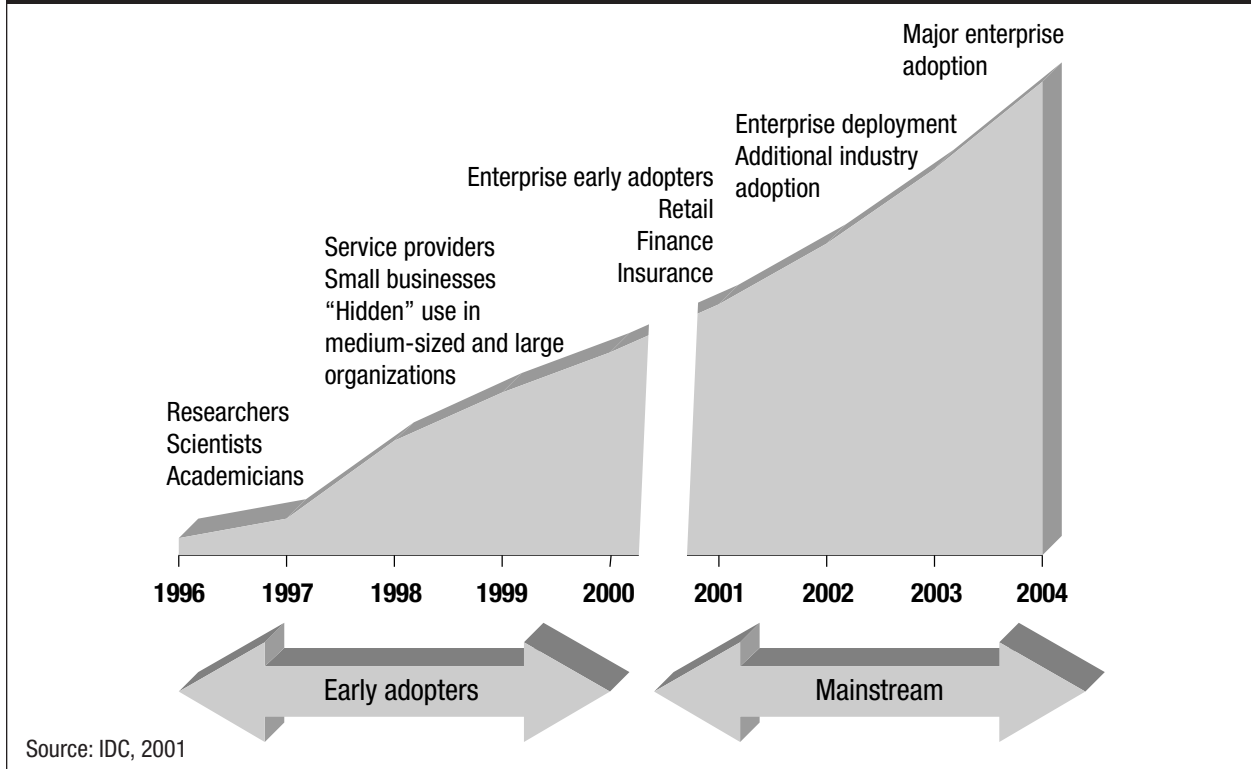
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**Figure 1  
Linux Enters the Mainstream**



***From Academia to the Commercial Sphere***

The benefits of Linux, particularly its reliability and low cost, became evident early on to certain classes of business users. One of the first widespread commercial uses of Linux took place among service providers (Internet, application, and management services). Such users found that the flexibility of the operating system (especially the ability to optimize applications based upon how the operating system worked or the ability to optimize the operating system source code itself for deployment-specific requirements) allowed them to successfully handle large workloads and volumes of network traffic.

In addition, Linux has seen significant deployment as a platform for Web infrastructure and Web-based applications in large and medium-sized organizations. Such commercial organizations typically find that Linux can handle robust challenges with relative ease and that it requires none of the licensing costs that some alternative operating environments mandate. Over time, this foothold will pave the way for use in other applications. This has opened the door for Linux to be used in supporting Web-based applications in industries such as finance and insurance.

Another popular early use for Linux within commercial settings was server-side file/print sharing. Freely available open-source software tools such as the file and print service software, Samba; support for many network protocols; and Web server software, such as Apache; allow companies to substitute a Linux server directly for a Unix, Microsoft Windows NT, or Windows 2000 server providing the same function. This type of usage is not unusual at

smaller organizations looking for a way to reduce server licensing costs associated with Microsoft products.

### ***Linux as a Mainstream Solution***

The emergence of Linux and an increasingly broad audience of users led to the growth of commercial Linux software vendors such as Red Hat, Caldera Systems, Turbolinux, and SuSE. While those companies could offer considerable expertise into using Linux on commodity Intel hardware, they were not able to offer hardware support or onsite consulting services. In addition, until 2001, none of these companies had a global organization. Instead, introducing Linux as a solution for an enterprise with international operations was left as a task for global computer companies.

To its credit, HP was one of the first large companies to embrace Linux as a solution that could be effectively integrated into its existing portfolio of products. While HP has had a long history of producing its own hardware, operating systems, and infrastructure stack for its own platforms, during the 1990s the company found itself — like many of its computer rivals — in competition with Microsoft from an operating system perspective. At the same time, HP and others benefited from selling Microsoft operating systems aboard its own hardware.

During this period, the company learned how to sell an operating system it did not own, and how to integrate that operating system into its portfolio as an equal to the company's other product lines. To properly support Windows on its server hardware, HP had to develop management tools and dedicate software development resources to support its customers using Windows aboard HP client and server hardware.

This experience with an operating system that was “not invented here” provided the foundation for HP to recognize Linux as an opportunity rather than a threat. During 2000, HP moved quickly to create a strategic business plan for creating Linux products and services and a technology road map for integrating Linux operating environments into the heterogeneous mix of systems common within HP's large company customer base.

The company went a step further and produced the industry's best story for Linux-Unix interoperability on both PA-RISC and IA64 hardware. The interoperability story offers application compatibility at the API level between Linux and HP-UX and binary compatibility across HP-UX and Linux on IA64 hardware.

### ***The Importance of Servers, Workstations, and Other Devices***

Most major hardware vendors have Linux programs of one sort or another, if only because they are seeing their customers demand more choice. Many systems vendors offer machines preloaded with Linux software and provide ongoing support, which makes acquiring and using this software easier for business organizations.

Although some hardware vendors have a significant bias toward Unix or Windows and have not made the investment necessary to ensure that their Linux offerings are on a par with their core offerings, others such as HP consider Linux to be a strategic operating system for their product plans.

This means that HP customers will have HP support regardless of whether they use HP-UX, Windows 2000, or Linux. Customers can feel confident that HP will support their platform choices if their selection includes Linux.

More importantly, HP clearly understands that today's IT world is heterogeneous and that a mixture of different platforms across the enterprise is a likely — and acceptable — scenario. HP has done a good job building out its infrastructure management tools and support services available for Unix and Windows environments and, during the past 12 months, has dramatically increased the variety of its Linux-based tools and service offerings. HP's Linux solutions elevate this relatively new server operating environment to the list of environments supported as part of HP's "always-on infrastructure" initiative.

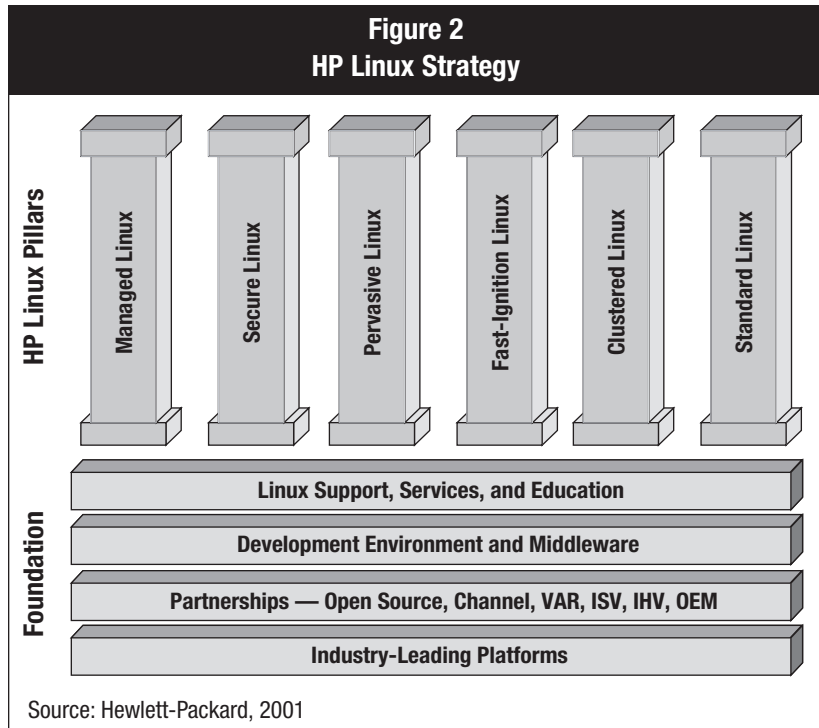
### **HP's Linux Strategy**

Although HP is a leading provider of Unix and Windows platforms, the company has also made a significant investment in Linux and now offers Linux solutions that complement its other computing environments. HP has publicly announced a comprehensive Linux strategy covering servers, workstations, storage, printers, server appliances, handheld devices, software, services, support, education, and training. The company recognizes that Linux will coexist with other platforms and is proactively supporting deployments mixing Linux with other server operating environments.

HP is aiming for a seamless computing experience across the extended enterprise, whether customers are using Linux or another operating system. This strategy allows for a homogeneous or a heterogeneous environment.

As shown in Figure 2, HP's Linux strategy consists of a four-stage foundation and six pillars. The foundation is made up of the following:

- **Support with multiple hardware platforms.** HP offers Linux on a wide range of 32-bit, 64-bit, and PA-RISC computing platforms, including servers, engineering workstations, desktops, and server appliances.
- **Partnerships.** HP has formed partnerships with industry leading vendors such as Oracle, Inktomi, SAP, RealNetworks, and Tibco. In addition, HP is a major contributor in the open-source community and has partnerships with companies such as Collab.Net, Ximian, Lutris, OSDN, and SourceForge.
- **Development environment and middleware.** HP is helping develop the Linux ecosystem by embracing the Linux community and making information freely available. The company has Linux development initiatives in systems, eservices, and mobile, and has hired noted open-source leader Bruce Perens as part of this effort. Perens is known as a former project leader of the Debian GNU/Linux distribution and founder of the Linux Standard Base. As an HP employee, he is assigned to "challenge HP management."
- **Support, services, and education.** HP supports the major Linux distributions (SuSE, Debian, Red Hat, Turbolinux, and Caldera/SCO) and maintains extensive professional deployment and support services as well as education and training programs.



The six pillars resting on the foundation pertain specifically to Linux and include:

- **Managed Linux.** An integrated approach to eservices management, multiplatform management, and device management using products such as HP OpenView, HP Servicecontrol Manager, and HP Tootools.
- **Secure Linux.** An approach to security that goes beyond the operating systems and includes hardware, firmware, and I/O. HP's Secure Linux is an HP-specific version of Linux (leveraging Red Hat open source) built especially for a secure, mission-critical environment. Features include compartments to isolate customers and applications; lock-down; audit; file system protection, and a secure administration model. It offers high levels of protection from common attacks.
- **Pervasive Linux.** Bringing Linux “everywhere” through standalone mobile devices (cell phones, set-top boxes, information appliances); mobile context managers (homes, neighborhoods, colleges); eservice servers (enterprises, service providers/integrators).
- **Fast-Ignition Linux.** Quick deployment of applications using application-specific “ignition kits” that are based on common services (e.g., management, drivers, networking, and security) and a common look and feel to caching, firewall, VPN, and so on.
- **Clustered Linux.** Robust, scalable, highly available Linux configurations used for mission-critical and computation-intensive applications, typically based on MC/Serviceguard for Linux and offerings from HP partner MSC.Linux, respectively.

- **Standard Linux.** HP supports five standard Linux distributions (SuSE, Debian, Red Hat, Turbolinux, and Caldera/SCO) and certifies them on its volume systems. HP also uses Debian as its internal development platform. HP is a major supporter of the Linux Standards Base as a way for the industry to provide a consistent Linux environment for application developers.

Through a coherent strategy that incorporates the hardware, software, services, and partnership elements that are of value to the typical enterprise, HP delivers end-to-end solutions for real world, mission-critical, business applications. HP's Linux strategy draws upon traditional HP strengths in technical leadership, scalable, and high-performance computing, bringing cost-effective solutions to customers.

Let us now look at some of the key HP products that comprise the company's offerings.

### ***HP Hardware Supporting Linux***

HP's entire family of Intel-based Netserver products are supported and certified on Linux. Additionally, several models of HP's servers built on the PA-RISC architecture support a PA-RISC port of Linux, which was ported through an effort by HP and the open-source developer community.

HP is developing or partnering with others to bring a full range of appliance server solutions to market. In addition, HP has recognized the value of server blades and bladed architectures and is bringing to market a portfolio of products that address customer needs in this area.

HP workstations offer the stability of Linux, the affordability of an Intel-based workstation, and advanced 3D graphics.

HP commercial desktop PCs run the major Linux distributions and offer powerful price/performance capabilities.

HP is the codeveloper (with Intel) of the recently introduced Itanium architecture and has led the way in making Linux on Itanium a reality. HP fully supports all certified distributions of Linux on HP Itanium servers and workstations. HP works closely with the open-source community in maintaining the Linux kernel for Itanium, enabling the company to shape the direction of this new technology.

HP has also worked with the open-source community to port Linux to HP 9000 A and L class PA-RISC servers. This gives customers with HP Unix installations a natural migration path to Linux as well as interoperability. Through these development efforts, HP has demonstrated that it understands that the open-source community is a vibrant entity that companies need to work with, rather than something that should be co-opted into a corporate structure.

HP provides a full range of storage solutions including servers, storage, tape, software, services, and networking infrastructure. In addition, Linux applications can be deployed granularly on existing storage devices and SAN, leveraging existing management processes and staff resources.

HP's Linux experience extends to printers, offering over 70 printers that are supported by Linux, with more than 40 of those drivers released as open-sourced software. HP brings the power of the Internet to printing by offering new ways of accessing, managing, and printing information.

Finally, HP is also porting Linux to consumer devices offered by the company and its partners. HP envisions a world in which nearly any device can be Linux-enabled, allowing it to communicate with other devices or with network infrastructures. Integral to this effort is HP's development platform for Java applications, Chai, which is used within a variety of embedded applications.

### **Software**

HP brings systems and network management software to Linux, providing customers with solutions that are optimized for HP hardware.

HP Tootools is a multidevice (e.g., printers, servers, and desktops) management tool for discovery, inventory, and monitoring of heterogeneous operating environments.

HP Servicecontrol Manager (SCM) allows users to monitor, manage, and execute tasks across multiple HP servers simultaneously — whether they are running Linux, HP-UX, or Windows. SCM provides a single point of control through its integration with other HP systems management tools.

HP brings CPU resource management to Linux with Process Resource Manager (PRM). This technology allows users to monitor, control, and optimize system resources.

HP's OpenView software suite is an eservices management solution, addressing the management of applications, systems, services, the Internet, networks, hardware, and storage, which supports Linux through agent technology.

HP MC/Serviceguard for Linux protects mission-critical applications from a wide variety of hardware and software failure. Multiple node systems (up to four) are organized into an enterprise cluster that delivers highly available application services. HP MC/Serviceguard for Linux monitors the health of each node and quickly responds to failures in a way that minimizes or eliminates application downtime.

The Chai Appliance Platform is used for developing and running Java applications on embedded devices. It provides the software components needed to quickly build the next generation of intelligent products and solutions such as PDAs, printers, smartphones, and set-top boxes. HP estimates that there are over 2 million Chai-enabled devices currently in use within the industry.

The company also offers a Secure OS software for highly trusted Linux configurations. This approach is based on containers, where each application is in a protected and secure environment. HP built these enhanced capabilities for Linux based on experience in multilayer and military-grade secure systems. HP worked with the open-source community to build this enhanced version of Linux and offers it to customers for installations where higher levels of security or resistance to attack are required.

### **Support, Services, and Training**

HP is well known for providing excellent support, and the same level of critical systems support offered for HP-UX and Windows is available for Linux. HP provides comprehensive Linux support, ranging from standard 24 x 7 support to mission-critical services, for the five major Linux

distributions. This provides customers with increased availability, higher performance, and predictable support services for all platforms.

HP Education provides 22 Linux courses and also offers Linux Professional Institute (LPI) certification. Linux training can be tailored to a company's business-critical needs.

HP's consulting, integration, and installation services and pre- and post-sales support allow customers to use "one-stop shopping," effectively making HP accountable for uptime and performance.

To summarize, Hewlett-Packard has moved quickly to develop a comprehensive Linux and open-source strategy, covering systems, software, services, peripherals, and partnerships. HP's early entry into this product area gives the company a legitimate claim as one of the first global computer companies to elevate its support for Linux to a level equal to that of its other enterprise product lines.

Overseeing the strategy and development of HP Linux is the newly created HP Linux Systems Operation (LSO), which will provide an in-depth perspective into the advancement of Linux and open-source technologies. HP can point to key technology differentiation in management, security, and availability on Linux, as it has deep experience in the multiplatform, "always-on" environment for mission-critical solutions.

In addition to offering a wide range of Linux products and services, HP has led many efforts to bolster the Linux community. For example, HP is a strong supporter of the Linux Standards Base and is active in supporting the open-source community with code and through organizations including Open Source Development Lab, Free Standards Organization, GNOME Foundation, KDE League, and Apache Foundation. HP has also expanded its Linux ISV program, which, among other things, offers software developers access to IA-64 systems through its Solution Partner Program.

### **Linux Evolution Depends on Many Factors**

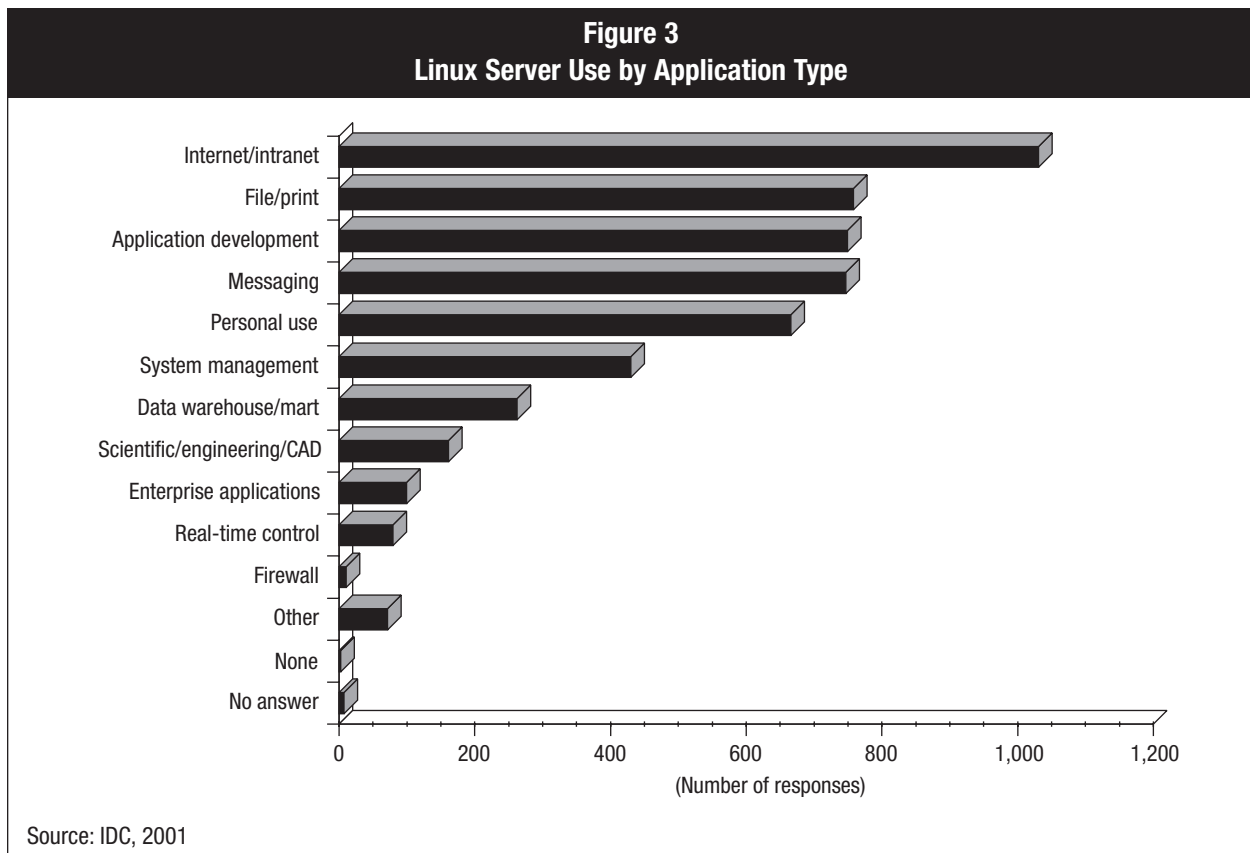
The evolution of Linux depends on more than just reliable software and hardware. Many other trends are supporting this transition, including the following:

- Organizations are moving to high-volume systems to reduce costs. Linux is available for almost every high-volume architecture (and a number of lower-volume architectures), and can help facilitate application portability across disparate hardware architectures.
- Web-based applications are being introduced to allow customers, suppliers, and employees to work together, regardless of their location. Linux grew up on the Internet and the Web and is quite comfortable there.
- Organizations are moving to farms of appliance servers on the low end to provide flexible, reliable front ends to Web-based applications. On the higher end, Linux serves as a platform for computationally intense applications. Web, parallel computing, and workload balancing software have been available on Linux for several years.

- Organizations are increasing their focus on core functions and outsourcing noncore functions (including hosting of Web sites, hosting of supporting applications, hosting of storage, and management of systems, clusters, and networks) to a mix of services providers. Linux is part of the infrastructure at many of these service provider organizations.

With its heritage on the Web and in distributed computing, Linux is well positioned to take advantage of all these market trends.

Other questions in our recent Linux survey focused on how Linux was being used. Figure 3 shows what types of workloads are running on Linux servers.



### **Network/Web Infrastructure**

One of the early uses of Linux, and still a popular use, is to support basic network infrastructure services, including Web services, Web caching, firewalls, and network routing functions. In this scenario, Linux is often seen running specific applications on separate appliance servers within a Web farm.

### **File/Print Sharing and Messaging**

Organizations often indicate that Linux is being used as a low-cost and reliable platform for file/print sharing and electronic messaging. Linux is often used as a platform to support Sendmail (groupware/email), Samba (Windows/CIFS print and file services), and NFS (Unix and Linux file services).

### ***Application Development***

Application development was the third most common use for Linux operating environments in IDC's study, with 42% of respondents indicating that Linux is supporting application development. Since Linux offers all of the important Web application development and deployment tools, organizations deploy it as a low-cost development environment.

### ***System Management***

Linux's strong position as a platform for Web infrastructure and its growing position as a platform for enterprise applications indicate that it is also likely to be increasingly important as a platform for system and network management functions. In IDC's January 2000 Linux study, 32% of the respondents indicated that Linux is being used for system and network management functions within their organization.

### ***Data Warehousing and Analysis***

Nearly 20% of the respondents indicated that they were using Linux to support some data warehousing or knowledge management application. IDC believes that this can be attributed to the availability of database software (both open-source and single-vendor software), development tools, low system software costs, and the ability to provide good performance on a relatively small system.

### ***Scientific and Technical Computing***

Linux has been used as a platform for technical, high-performance computing applications from its earliest availability. A number of parallel computing software packages have become the foundation for the newest generation of parallel "supercomputers" used by research, engineering, and academic organizations.

Research organizations such as Cern, FermiLab, and Oak Ridge National Laboratory have indicated that they use Linux as a platform for high-performance computing using hardware from leading vendors. Shell International Exploration & Production PV has assembled what is being called the world's largest Linux supercomputer (consisting of more than 1,000 servers) for use in high-end seismic imaging and analysis. Likewise, Sandia National Labs has three Linux compute clusters consisting of a composite total of over 3,200 nodes, the largest of which contains 1,600 Linux nodes.

One submarket that falls under this umbrella is 3D and animation. HP is focusing considerable energy on this market. In fact, the company has brought 3D graphics technology to workstations and desktop systems and is vying to capture the opportunity as 3D computing makes a shift from Unix to Linux workstations at companies such as Dreamworks and others.

### ***IDC's Projections on the Future Role of Linux***

As noted earlier, IDC's research shows that Linux now consumes about 6% of the corporate IT budget (hardware, software, staff, and services). This figure is expected to grow to nearly 9% by 2002, indicating that Linux will form an integral part of many organizations' computing infrastructure over the next few years. IDC forecasts that shipments of Linux Server Operating Environments (revenue-based and free) will increase at a compound annual

rate of 24.8% from 2001 to 2005, reaching 8.2 million units in 2005. The installed base of Linux Server Operating Environments (revenue-based and free) will increase at a compound annual rate of 33.5% from 2001 to 2005, reaching 14.8 million units in 2005.

From a server hardware perspective, IDC expects Linux to achieve the greatest growth in terms of operating system sales associated with new servers. While Linux represented only 10% unit share of the server hardware sold in 2000, IDC expects this operating system to increase its share to nearly 28% of the server hardware market by 2005. The significant growth of Internet-related applications and infrastructure is expected to be one of the primary drivers for new server Linux growth.

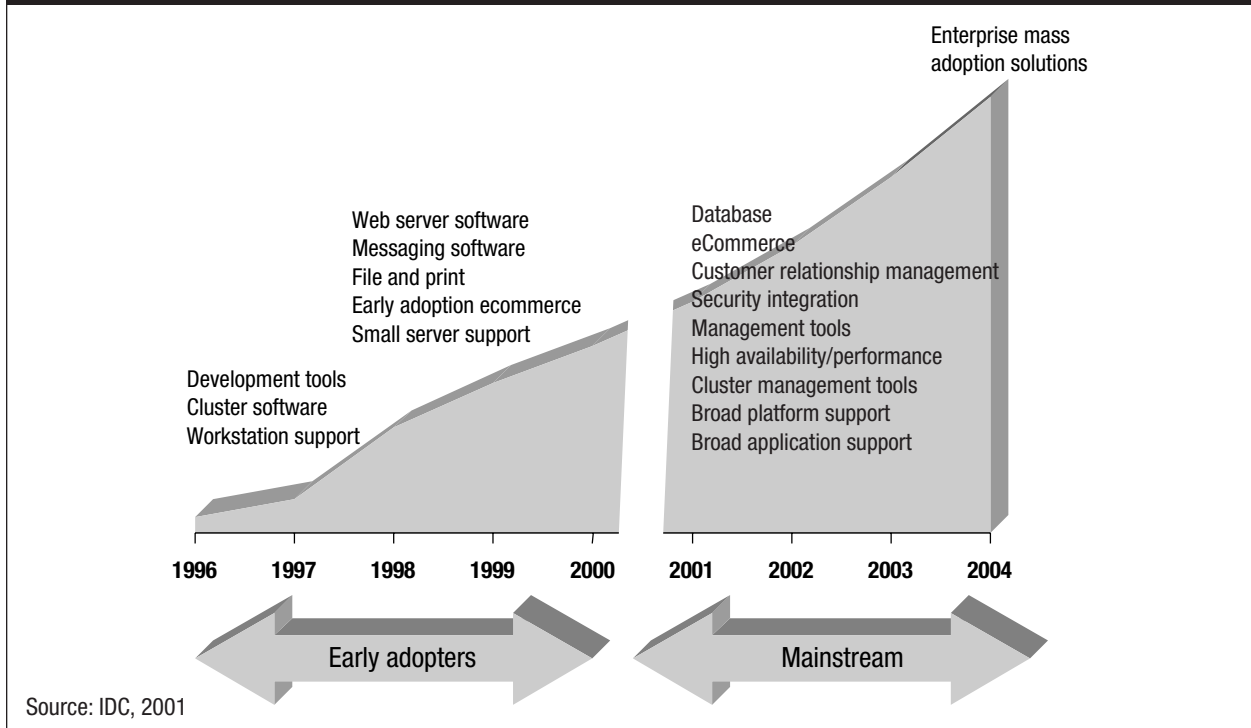
Another significant trend influencing Linux adoption in the server hardware market is the growing acceptance of prebundled server solutions or appliance servers. HP has recognized this trend by developing or partnering to bring a full range of appliance server solutions to market. Linux is the leading operating system for network edge appliance servers dedicated to workloads such as load-balancing, caching, security, and Web serving, to name but a few. As appliance servers continue to gain market share at the expense of general-purpose server platforms, Linux is expected to gain considerable share at the edge of the network.

Finally, the emergence of server blades and bladed architectures will also heavily influence the uptake of the Linux OS. HP has recognized the value in this distributed architecture and has begun to develop a portfolio of products that directly address the needs of this segment. Linux is expected to play a major role in the development of bladed architectures — especially initially, as the bulk of these devices will be directed toward edge-of-the-network Internet workloads.

Unix will continue to demonstrate a marked consolidation as more and more Unix shops move toward high-end computing systems. Such organizations are likely to consider low-end solutions built upon Linux, as the operating system provides the same tools their Unix specialists have come to know and trust. Furthermore, Linux supports the same application architectures supported by Unix. Although it is not likely that Linux will replace Unix, it is likely that Linux will be installed alongside Unix systems. In fact, Hewlett-Packard is not alone in positioning Linux as the entry-level “Unix-like” operating environment within its portfolio of products.

Linux is not expected to be generally recognized as a platform for high-end enterprise applications all at once. As Figure 4 shows, mainstream adoption will depend on factors such as databases, security integration, cluster management tools, and platform support. For example, the ability of Linux administrators to easily manage clusters or distributed systems will be an important factor in determining how quickly large-scale Linux implementations are adopted.

**Figure 4**  
**Dependencies for Mainstream Linux Adoption**



### Key Challenges Facing HP and Linux

HP has made a significant commitment to Linux and has helped contribute to its adoption. Still, success for Linux is not yet assured. IDC studies still find that some users report that Linux is not yet a “safe choice,” indicating that it will be some time before Linux achieves the status of Unix or Windows for guaranteed performance and ease of use. In tough economic times, companies often leverage what they already have, and the small Linux base pales in comparison to Unix and Windows installations.

In addition, there have been some claims by proprietary software proponents that the use of Linux may lead to the loss of intellectual property rights. While such claims may appear to be self-serving, they cannot be ignored.

Furthermore, HP is facing challenges from Compaq, Dell, IBM, and others. Each of these companies wants to claim the Linux crown for itself. IBM, in particular, has made a broad and highly visible corporate effort to support and extend Linux, and it has made the operating environment available for its four major computing architectures. For the IBM mainframe, Linux represents a means to bring new life to an important but comparatively low-volume environment that is no longer attracting important ISV investment dollars. By comparison, HP is focusing its Linux efforts squarely on high-volume Linux opportunities.

## Conclusion

In spite of the uphill battles Linux faces, the operating system is poised to become a mainstream operating system in all sizes of organizations, in numerous markets, worldwide. Its reliability, stability, and low acquisition cost is appealing to many end user organizations. The ease with which the software can be customized is quite appealing to technically sophisticated organizations that offer compute or other computer-based services to other companies. The fact that many application development and deployment, middleware, serverware, and application products are freely available from the Internet helps as well.

Linux can in many cases support workloads similar to those supported on Unix, but on smaller commodity systems, which can lower the cost associated with hardware. At the same time, open-source software such as Linux could even lower the costs associated with building Windows environments, since certain functions such as print and file, Web serving, and even database access can be provided by Linux without disruption to Windows client systems.

Fueling Linux's growth are the efforts of many companies, including Hewlett-Packard. HP views Linux as a "strategic operating system" and has devoted substantial resources to make Linux as robust and reliable as its other platforms. HP offers a comprehensive Linux strategy covering servers, workstations, storage, printers, server appliances, software, services, support, education, and training. Important initiatives such as its recently formed Linux Systems Operation will provide an in-depth perspective into the advancement of Linux and open-source technologies.

Hewlett-Packard is aggressively bringing mission-critical capabilities such as manageability and clustering to Linux. HP also has put one of the industry's best interoperability programs into place, allowing users multiple choices for moving applications between Linux and HP-UX. The company is committed to providing customers with the products and services that are necessary in today's heterogeneous computing environments. By supporting Linux with a broad range of systems, software, and services, forming partnerships with key players, and making key contributions to the open-source community, Hewlett-Packard is advancing Linux and its place within the corporate IT architecture. These efforts are making the Linux story more "Unix-like" from a manageability, security, and interoperability perspective.

HP's wide-ranging commitment to Linux is impressive, and IDC believes that as the industry consolidates, a few major players will deliver the bulk of the industry's hardware, infrastructure software, and services. HP's focus on volume opportunities aboard IA32 and IA64 hardware should enable the company to build a sizable customer base in this market.

IDC views HP as one of a select group of global vendors that has the worldwide presence and resources to help propel Linux to the next level of marketplace acceptance. In doing so, HP is well positioned to gain share among enterprises adopting Linux.

## **Side Effects: Creating Award-Winning 3D Animation Software on the HP Platform**

Founded in 1987, Side Effects Software is a privately held company specializing in advanced 3D graphics and special effects software for the film, broadcast, and game industries. The company's primary strength has to do with special effects for feature films such as *The Matrix* and the 2001 release *Lord of the Rings*. Side Effects has created award-winning "procedural technology," an approach to animation that is very nondestructive and allows faster generation of very complex scenes. It has many advantages over traditional techniques of modeling and animation and is used by production studios such as Disney, Digital Domain, Dreamworks, and Electronic Works.

In 1997, Side Effects began evaluating the Linux operating system even though there was no support for accelerated 3D graphics on Linux or even 3D software packages running on Linux. Side Effects, however, recognized the potential demand for such a product. Its customers often came from a Unix background but were also experimenting with less expensive Windows NT solutions running on lower-cost workstations. Linux seemed to fit the goal of combining Unix-like integration and interoperability with standard software running on relatively inexpensive hardware platforms.

Side Effects decided to port its software to Linux in 1998 and sought a hardware partner that would help it "push the envelope." Several hardware vendors were considered, but often their platforms were not as robust and stable as production studios required. HP, however, was an exception. Both HP and Side Effects had several mutual customers that were very interested in moving to Linux, and the two companies began a discussion. Because HP already had Intel-based accelerated 3D graphics workstations running Windows NT, the company was able to develop a viable, robust Linux solution about a year earlier than other vendors. Given how fast-moving the business environment has become, this was a huge advantage, as Side Effects was able to bring its product to market much faster than it would have been able to otherwise. Now all major 3D vendors have announced support for Linux, and the operating environment has become an accepted part of the animation community.

Paul Salvini, CTO of Side Effects Software, sums up why the company has partnered with HP as follows: "The difference was HP's desire to come out with a Linux workstation early and their commitment to using code they had developed on two separate platforms to create a Linux offering even while technical standards were evolving. I think that it's phenomenal that a company would do that. It speaks well to HP's internal organization. Coming out with a Linux solution was a vision we shared with them, but not too many other people were believers. Now it's obvious that people are moving to Linux and that it was the right thing to do. But at that time people were questioning our strategy, saying that Linux wasn't a serious thing and why are you doing this? HP's strength was that it anticipated customer needs and made a commitment while others sat on the fence." He adds, "Now we're working on Itanium-based products with HP. They always impress me with the agility of their organization given their size."

## **ViaWest: Delivering Reliable Internet Hosting Services on HP Servers**

Headquartered in Denver, ViaWest Internet Services Inc. offers broadband access, hosting, colocation, and high-availability network consulting to small and medium-sized businesses in the western United States. ViaWest combines the technical strengths of a national Internet provider with the community presence and personal service of a local business. The company delivers reliable, customized Internet solutions to its customers and has offices in Colorado, Arizona, Nevada, and Utah.

ViaWest wanted to offer a Linux-based hosting solution because it saw a great need for a non-Windows NT/2000 solution. Linux has long been considered a standard operating system among ISPs because of its stability, customizability, low cost, and other strengths. The company made the decision to source Linux from Red Hat and sought a reliable hardware platform from a vendor committed to Red Hat's distribution. After an extensive review of various hardware platforms, the company made the decision to purchase HP. HP has demonstrated a major commitment to making Linux an integral part of the enterprise computing landscape, and HP also offers ViaWest's customers a choice of either the Linux or Windows 2000 operating environments. This dual support makes HP an attractive choice for a hosting product. In addition, HP offered an attractive financing package and a first-rate technical support team, making the decision a low-risk one.

HP and ViaWest have had a sound business relationship over the years, and Bruce Kiefer, vice president of IS, is a supporter of the HP Linux strategy. He expects to be an HP customer for many years to come.

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