



# Linux: A Journey into the Enterprise

*An IDC White Paper Sponsored by Red Hat*

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## IDC Opinion

It is clear that Linux has begun its journey from its roots as a software platform for research, engineering, scientific, and academic computing into the enterprise data center. In some markets, Linux has already established itself as an enterprise operating system. In other markets, Linux is still emerging from being used only by early adopters. IDC believes that Linux will take its place as an accepted part of the enterprise computing environment in most markets by 2004.

## Introduction

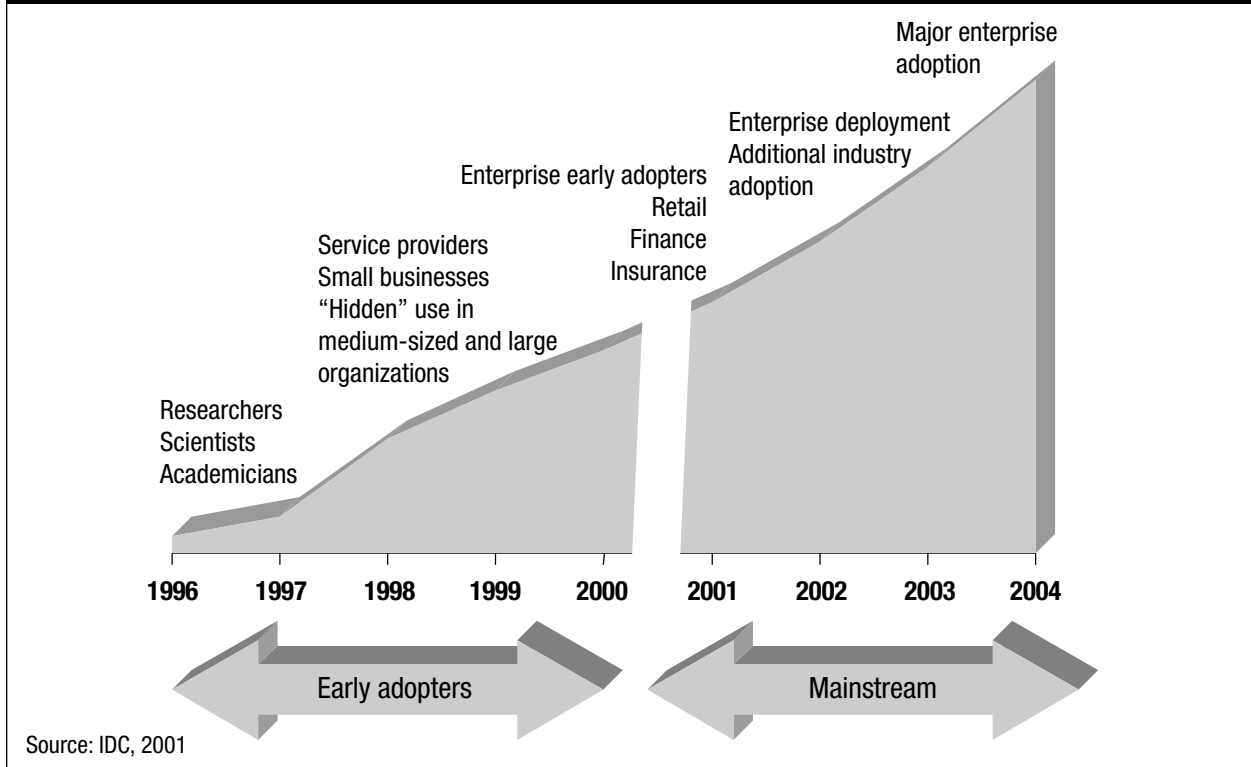
All journeys begin with a first step. Linux is well beyond its first steps as a legitimate option for enterprise computing. Linux has been receiving a great deal of market attention in the past few years. Since its introduction as a commercial product in 1993, IDC has often been asked for its opinion about this operating environment. Some of the typical questions are: *Where* is Linux software being used today, *how* is it really being used, *why* have certain key computing sectors chosen to implement Red Hat Linux, and *what* are IDC's forecasts for this operating environment over time?

## Linux Trends

When IDC examines the market for Linux using the demand- and supply-side research, it sees an operating system in transition. Linux is clearly moving from the early stages of adoption 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 all markets. This software is well on its way to being considered a mainstream operating environment in many sectors.

Although this "adoption cycle" is typical of successful, new software products entering the mainstream market, it is especially true of operating systems that are quick to "catch on." Also characteristic of how

**Figure 1  
Linux Enters the Mainstream**



Linux first found its way into evolving computing environments is the fact that the first users of Linux were researchers, scientists, and members of the academic community.

These individuals were often engaged in tasks that could be characterized as technical or high-performance computing. These "leading-edge" users often influence IT decision making in their organizations, although widespread adoption often lags behind the prime movers' initiatives.

### **Web Infrastructure**

Linux from Red Hat is becoming widely adopted as a platform for Web serving. Network surveys from many research firms show that Linux and Linux specifically from Red Hat hold a strong share of installed Web servers on the Internet.

Information technologists at service providers (Internet, application, and management services) and individuals in large and medium-sized organizations began using Linux as a platform for Web infrastructure and Web-based applications.

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A number of major Web retailers and Web search engines use Linux from Red Hat. Once again, commercial organizations see this use as a proving ground. The notion is that if Linux can handle these workloads that produce large volumes of network traffic, it might be successfully used for other applications. This paved the way for Linux to take up the task of supporting Web-based applications in finance and insurance industry organizations.

### ***File/Print Sharing***

Among the first uses of 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, were of great interest to organizations looking for ways to lower their hardware and software costs while still working with reliable, robust, and customizable tools.

This is exactly how a major supplier of network components employed Linux from Red Hat. This organization used Linux as the platform to support a network of more than 100 servers and 3,000 printers. This is exactly the type of application in which Linux demonstrates the attributes of being highly available, highly customizable, and low-cost software that runs on low-cost hardware. In essence, this type of Linux use could be seen as an early proving ground in commercial organizations.

### ***Retail Point of Sale***

Soon after, Red Hat Linux was adopted by a large retailer of home improvement products and a retailer of automotive parts and accessories. In these cases, Linux from Red Hat was used to support point-of-sale applications, information distribution via automated information kiosks, and inventory management.

These organizations indicated that Linux from Red Hat proved to be an unassuming workhorse that could handle the workload while requiring less maintenance than they believed would be customary in these environments.

### ***Enter Tools, Middleware, and Enterprise Applications***

Now that suppliers of enterprise applications and application development and deployment tools have announced Linux versions of their software, IDC expects that Linux will emerge as a platform for major enterprise applications toward the end of 2003.

What should be of particular interest to IS managers in large and medium-sized businesses is that Linux is being used by more than one-third of the respondents to IDC's Linux operating system study (September 2000) for systems management and that approximately 12% indicated that enterprise-class applications (e.g., enterprise resource management [ERM] and customer relationship management

[CRM]) were being run on Linux. This is clearly a harbinger as more and more vendors port their applications to Linux.

### ***Linux Evolution Is Not Happening in a Vacuum***

The evolution of Linux is not happening in a vacuum. 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.
- Organizations are consolidating midrange and high-end servers to reduce administration, software licensing, and maintenance costs.
- 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 and a platform for computationally intense applications. Parallel computing software and Web load 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 organizations.

It can be easily seen that Linux is well positioned to take advantage of all these market trends.

### **Examination of Current Linux Usage Patterns**

IDC has been examining the Linux market and trying to determine the answers to the following questions:

- Who is using this software?
- What applications are typically running on Linux-based systems today?

IDC has conducted demand-side studies tracking operating environments in June 1997, July 1998, November 1999, and September 2000. Here is a summary of IDC's findings.

### **Who's Using Linux?**

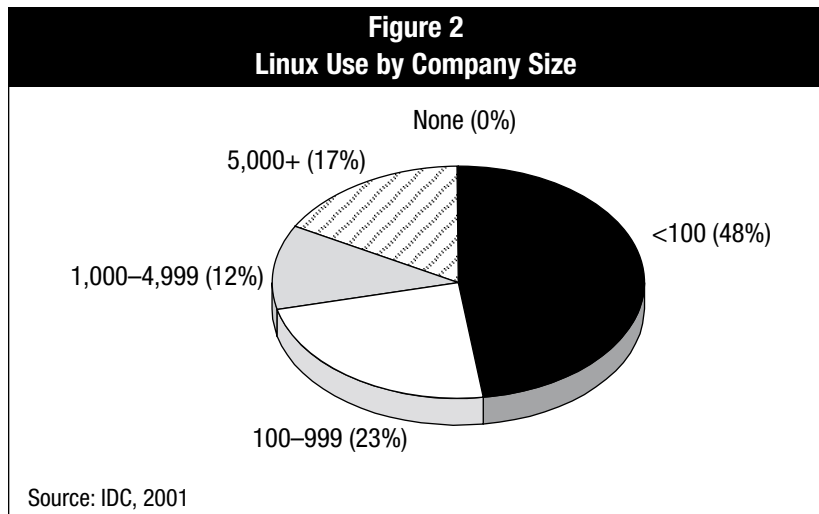
The use of Linux is evolving from its base of early adopters. The Linux user profile from previous IDC operating environments studies was the following:

- Highly technical, highly knowledgeable individuals conducting engineering, scientific, or academic studies
- Students and professors in academic computing environments
- Internet service providers (ISPs) and application service providers (ASPs)
- Unix value-added resellers (VARs) or independent software vendors (ISVs) creating solutions for small to medium-sized businesses
- Individuals working within large organizations

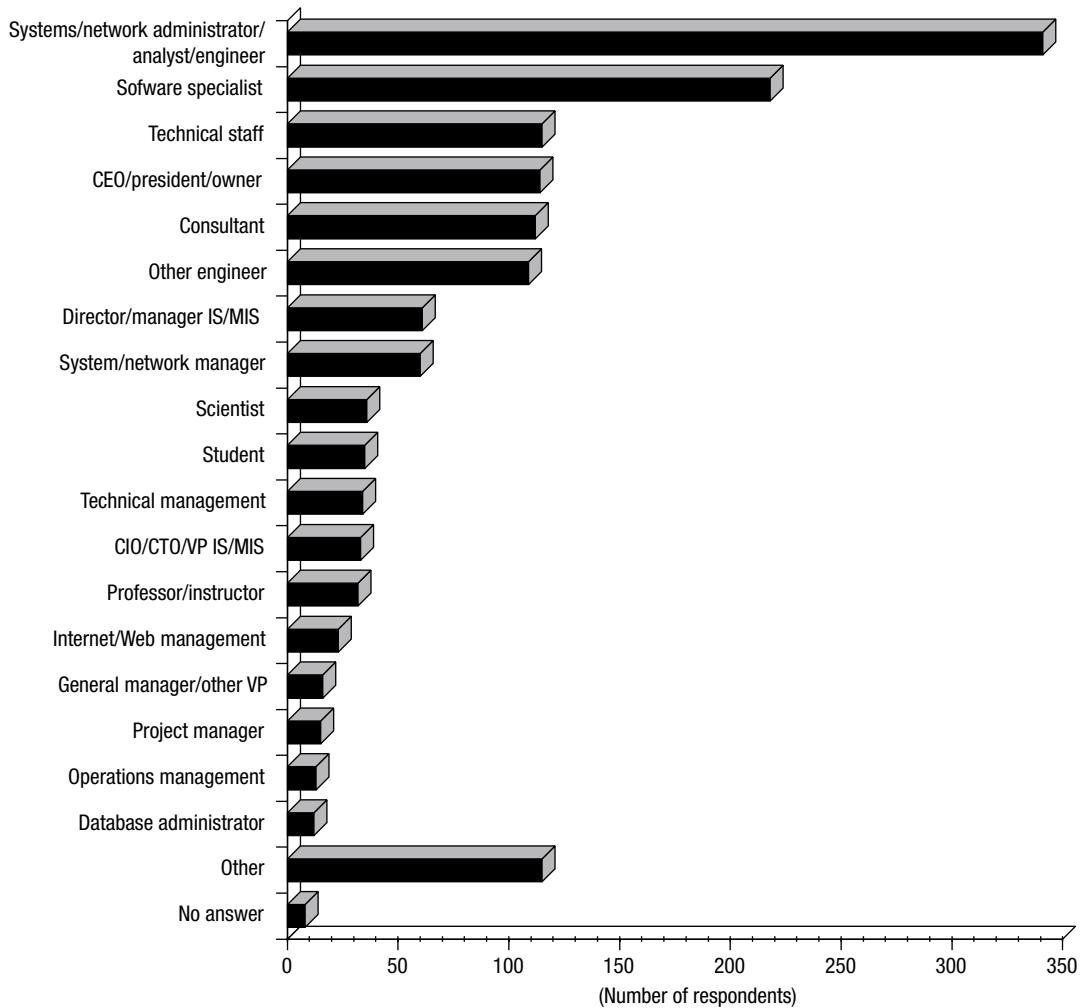
IDC's Linux operating system study conducted in September 2000 demonstrated that Linux use is expanding from this early base of users. Figure 2 shows that Linux is being used by organizations of all sizes.

Figure 3 shows that IT professionals, IT management, and organizational management have joined the others, indicating that they have Linux in their computing environment.

As applications, development tools, middleware, and serverware emerge for Linux, IDC expects Linux will increasingly be found in organizational computing infrastructure.



**Figure 3**  
**Linux Study Respondent Profile**



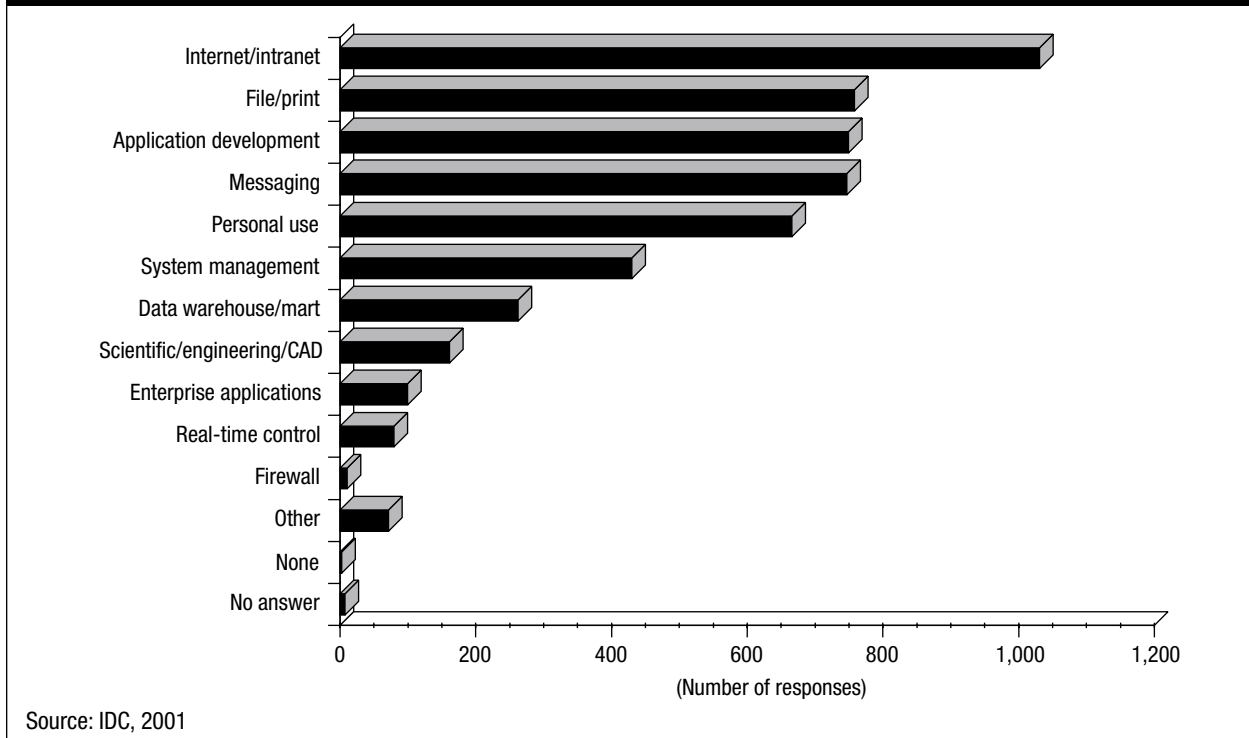
Source: IDC, 2001

### ***How Is Linux Being Used?***

IDC's studies show that Linux is being used in a number of ways. In the most recent study, 57.1% of the respondents said that Linux is running "a major application." This figure is quite a bit higher than in previous IDC studies on operating environments. Although this specific question did not indicate which application was considered major, it is a strong indication of the increasing importance of Linux.

Other questions in this study focused on how Linux was being used. Figure 4 shows what types of workloads are running on Linux servers.

**Figure 4**  
**Linux Server Use by Application Type**



### ***Network/Web Infrastructure***

One of the early uses of Linux was to support basic network infrastructure services, including Web services, Web caching, firewalls, and network routing functions. It is clear that developers and administrators are aware of Linux's history of growing up on the Web and successfully supporting Web-based functions for many important Web search engines and Web sites. In this scenario, Linux is often seen running specific applications on separate appliance servers within a Web farm.

IDC's most recent study indicates that Linux is still being used this way.

### ***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 for Sendmail, Samba, and NFS.

### ***Application Development***

Application development was the third most common use for Linux operating environments in IDC's study — 42.1% of the respondents indicated that Linux is supporting application development. This has been a continued theme throughout the operating environment studies IDC has conducted since 1997. Since Linux offers all of the important Web application development and deployment tools, organizations deploy it as a low-cost development environment.

Unix users find that all the typical Unix development tools, databases, and some middleware are available. They adopt Linux to lower the costs of hardware and software components of Unix development.

Application development on a platform quite often also means application deployment will be on that same platform. The strong showing of Linux as an application development environment indicates that Linux has a bright future as an application deployment platform.

### ***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, 32.2% of the respondents indicated that Linux is being used for system and network management functions within their organization.

IDC is seeing an interesting trend emerge here in the appearance of the management service provider (MSP). Some organizations are finding it easier, less expensive, and, thus, a better choice to outsource their network and system management functions rather than build up their own staff. IDC will continue to watch this trend.

Red Hat is in the process of providing a complete Web-based solution for system management (see Figure 5).

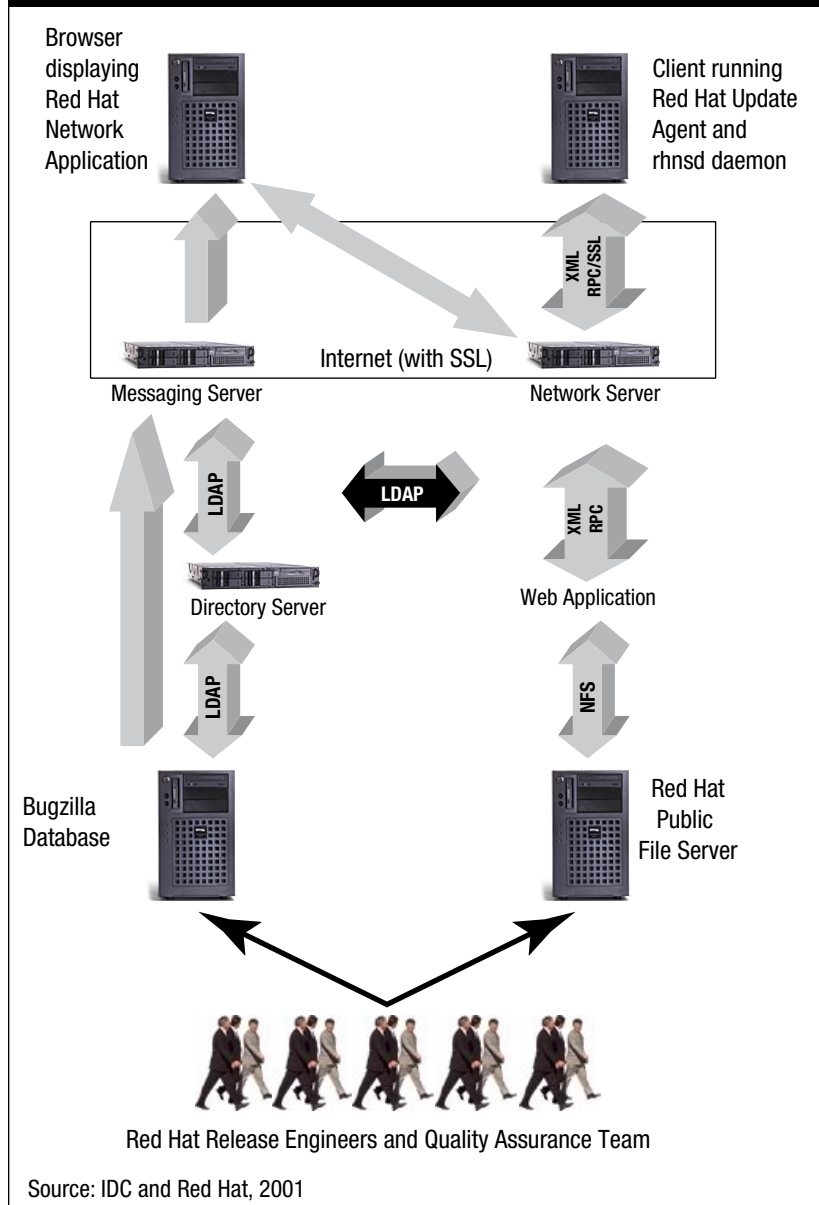
### ***Red Hat Network and Software Manager***

Red Hat Network is Red Hat's systems support and management environment, designed to give Linux technical administrators a single location and interface for performing system administration tasks across any number of machines running Red Hat Linux. Red Hat Network is more a platform than a service, providing the core infrastructure for security, system profiling, service configuration, alert notification, customer service, and billing necessary for reliable, secure remote management services.

Software Manager is the first subscription service available under the Red Hat Network umbrella. Software Manager aims to simplify the task of tracking, downloading, and installing software updates, and thus improve system reliability. Based on Red Hat's technology, Red Hat Package Manager (RPM) Software Manager, uses a dynamically maintained system profile to send users notifications (called Errata Alerts) about updates relevant to their system. Users can then download updates from a dedicated high-speed FTP server or choose to install them directly on selected systems.

Other capabilities are expected to be made available on this platform in the future.

**Figure 5**  
**Red Hat Network Architecture**



### **Replicated Site Solutions**

Linux supports nearly all of the major development tools and database products used for these applications. Linux's low cost, smaller system requirements, and basic reliability contribute to it being an attractive platform. IDC believes that Linux is replacing Unix in some of these applications.

These attributes, in fact, caught the eye of a major automobile manufacturer. This organization is using Red Hat Linux to connect and support the information requirements of 10,000 people at headquarters with another 20,000 at dealerships.

The challenge this organization faced was how to best provide information-dense content to the dealers over a WAN using rather limited bandwidth. A primary requirement was the ability to store and forward cached content efficiently and reliably. This auto manufacturer searched for a commercial off-the-shelf (COTS) caching application that would also allow specific customized modifications to optimize the cache.

The solution was to configure and implement Red Hat Linux on standard Intel boxes. Immediate hard savings of \$650,000 were realized by this manufacturer. The company expects to save \$1 million by implementing Red Hat Linux in its dealership deployment.

Another example was a large automotive dealer services network. In this case, Red Hat Linux was selected to be the platform deployed into more than 18,000 automobile and truck dealerships.

This company is using Red Hat to stage and deploy its servers. Second, it is making sure it has a port for all of the different devices that it has. It has some unique requirements for communication to its systems from the different car manufacturers. Some run SNA, others TCP/IP, and yet others bisynchronous communications. This means that systems and network integration is an important part of the overall solution.

This company offers its customers a server with specified hardware and a CD with Linux so that the system is as turnkey as possible. This allows the company and its dealers to integrate between SNA, TCP/IP, bisynchronous and other communications protocols and devices. There is a tremendous amount of network traffic going over the system. Some of this company's largest clients have 2,000 people connected to one of these systems throughout four or five states in the United States.

IDC expects that the cost savings for both hardware and software as well as the availability of source code for custom enhancements, performance optimizations, and so on, will make Linux increasingly interesting to developers of replicated site applications for large to medium-sized organizations.

### ***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- and closed-source software), development tools, low system software costs, and the ability to provide good performance on a relatively small system.

This belief was borne out in a recent implementation of Red Hat Linux and Oracle 8i to provide fast, reliable, and extremely cost-effective database management. The college of pharmacy at a state university used the Red Hat operating system and the Oracle database application to not only migrate their research data but also to provide fast, secure access to that data worldwide: high reliability, high performance, low cost, and with little ongoing maintenance requirements.

### ***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. Compaq, IBM, and SGI have all announced supercomputer sales based upon Linux in 2000.

Research organizations such as Cern, FermiLab, and Oak Ridge National Laboratory have indicated that they use Linux as a platform for parallel computing.

### ***Purchasing Intentions***

Although Linux has not yet established itself as a major player in enterprise applications, when IDC asked more than 1,500 IT decision makers what their investment plans were for the period of 2000–2001 in a study conducted in November 1999, IDC was surprised to see Linux show up as the number 3 platform for investment behind Windows 2000 and Windows NT. This finding supports IDC’s contention that Linux will become part of many organizations’ computing infrastructure over the next few years.

### **Linux: What Does This Mean to You?**

IDC will examine what Linux could mean to both potential partners of Red Hat and to end-user organizations considering Red Hat Linux-based solutions.

### ***Partners***

When the current Linux usage patterns and workloads are examined, Red Hat partners have opportunities in the following areas:

- Client solutions
  - Workstations for researchers, engineers, and academicians running software developed by their own community
  - Desktop and mobile solutions for organizations running server-centric applications or applications developing their own transactional applications

- Server solutions
  - Workgroup solutions requiring low-cost support of database, electronic messaging, Web-based applications, and basic file/print services
  - Small to medium-sized business solutions, which traditionally were supplied for Intel/Unix systems
- Network infrastructure — Linux could support basic communications, routing, security, and electronic messaging on low-cost and yet high-performance systems.
- Web infrastructure — Linux could support Web services, Web caching, firewall, electronic messaging, and Web-based applications on low-cost, rack mounted systems from many suppliers.

Red Hat's partners are in a position to emphasize the fact that system software and both server and client hardware are likely to cost less than in competing solutions. These low-cost solutions are also likely to provide similar performance to more expensive solutions built using competing technology. The reliability and stability of Linux is another plus factor.

Red Hat's partners would be in a position to point out the increasing number of applications, application development and deployment tools, middleware, serverware, storage software, and hardware options available to the users of Linux. Each week something new is being announced in these areas.

### ***Organizations***

Organizations considering a Red Hat Linux-based solution are likely to be pleased by the low-cost system software, the reliability, the performance, and the potential of using lower-cost hardware to support their computing infrastructure.

Furthermore, Unix users are likely to feel at home almost immediately. Linux, being designed to look like Unix, will seem familiar to end users, developers, and administrators just a few minutes after they've first used it.

Organizations are quite likely to be pleased by the growing list of applications, application development and deployment tools, middleware, serverware, storage software, and hardware options that are available to the users of Linux.

As these organizations plan to deploy Web-based applications, Linux solutions are likely to be increasingly attractive.

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

### ***As Unix Moves Toward Consolidation, Linux Will Emerge as a Natural Partner***

Unix will continue to demonstrate a marked consolidation as more and more Unix shops move toward high-end computing systems. These organizations are likely to consider low-end solutions built upon Linux. This 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 at all likely that Linux will replace Unix, it is likely that Linux will be installed alongside Unix systems.

IDC anticipates that this is the most probable scenario — Red Hat Linux creating a beachhead in supporting computing roles, notably in Web infrastructure first, and then later to support mission-critical applications or components of these applications.

Additionally, IDC has found that Linux is often running in large enterprises without the knowledge of the CIO or MIS. This is not surprising since Red Hat Linux often makes its “debut” on servers routinely managed by systems administrators who have brought the product into their computing environments on their own, often for the purposes of quietly proving its efficacy among their colleagues first, and their boss second!

### ***Preloaded Linux Increasingly Important***

Compaq, Dell, Hewlett-Packard, and IBM are all offering systems preloaded with Linux software. This makes acquiring and using this software easier for business organizations. Small organizations, medium-sized organizations, and distributed sites within large organizations are likely to take advantage of this support when working with their technology partners to acquire computing solutions. These organizations are interested in low-cost software and hardware, reliability, ease of customization, and low costs of maintenance. Linux is perceived to provide these features.

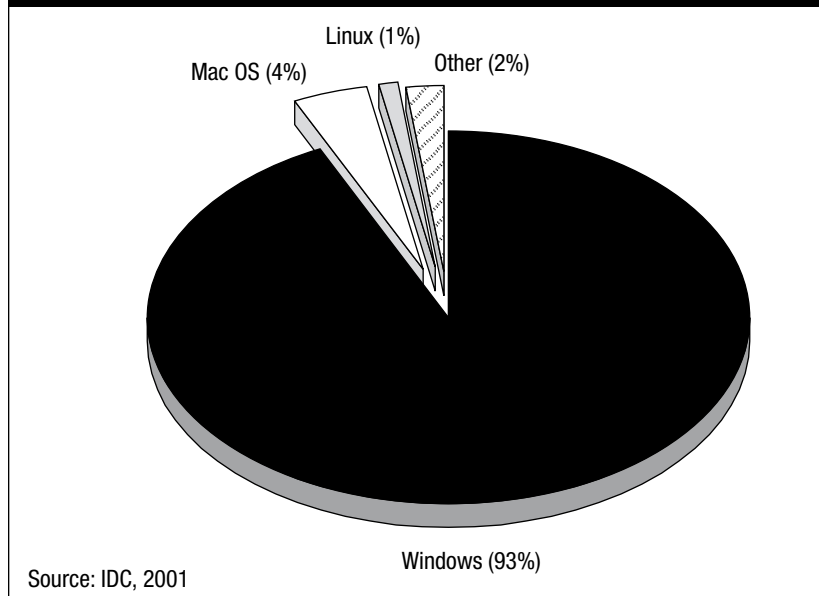
## **Linux's Position in the Operating Environment Market**

Linux has experienced remarkable growth both as a client operating environment (COE) and as a server operating environment (SOE) since IDC first began including it in its operating environments research in 1995.

### ***Client Operating Environments***

Linux paid shipments grew from holding fifth place behind Windows, Mac OS, Unix, and OS/2 in 1995 to holding the number 3 position in IDC's preliminary research for 2000 (see Figure 6).

**Figure 6**  
**Client Operating Environment Shipments, 2000 Estimate**



### ***Linux as a Client Operating Environment***

The Windows and Linux were the only two COEs that showed growth for 2000. Linux, with an increase of almost 25% from 1999 to 2000, reached 1.5 million paid copies. Critics and nonbelievers can no longer dismiss the Linux market as a fad, as unit license shipments continue to expand dramatically.

In 1999, Red Hat held 46.7% share of the Linux COE market. IDC expects Red Hat to hold a similar share when final research is published later on this year.

### ***What Does Linux Need for COE Success?***

IDC is often asked what is holding back Linux as a COE. Personal applications and support for less popular peripheral devices appear to be the most important factors.

Consumers and knowledge workers within organizations usually select a portfolio of applications they need to be productive first. The choice of operating system and hardware platform come next. If the needed applications are available only on Windows, then Windows will be the only platform considered. Although alternatives exist, many of the most popular applications are not yet available on Linux. Consumers and knowledge workers are most likely to adopt software they know than to search out alternatives.

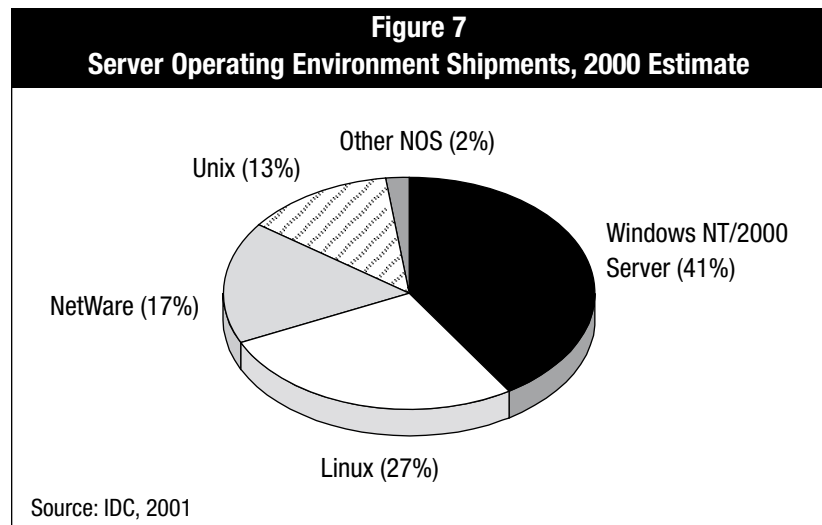
The client portion of many client/server applications is being made available on Linux by many of the suppliers of application deployment environments and applications. As this happens, organizations can consider Linux as a platform for their workers who run only custom or

packaged transactional applications. IDC calls these people transactional workers. The small size, reliability, and performance of Linux make it attractive for organizational use.

Another factor that is likely to help Linux become an important COE platform is the move toward Web-based, server-centric applications. Linux has all the attributes needed to be one of the platforms of choice for users accessing these applications, regardless of whether the device used is an Internet appliance, a mobile computer, or a more traditional desktop system.

### **Server Operating Environments**

Linux paid shipments grew from holding fifth place behind Windows, NetWare, Unix, and OS/2 in 1995 to holding the number 2 position in 1999 and in IDC's preliminary research for 2000 (see Figure 7).



### **Linux as a Server Operating Environment**

By now it should be clear to even the most pessimistic observer that Linux is more than a passing fad. In early 2000, IDC had projected that Linux shipments would increase at a 1999–2004 compound annual growth rate (CAGR) of 28.4%. While it is not yet clear if that forecast is too conservative, it is evident that the first year of IDC's forecast window has exceeded that CAGR average. Linux grew 24.4% between 1999 and 2000. Just more than 2 million copies of Linux were purchased in 2000. In 1999, Red Hat held a 52.4% share of the Linux SOE market.

During 2000, a number of factors converged to boost Linux shipments in the market, including the following:

- **Legitimacy through association.** With strong vocal and financial backing by heavy hitters, including Intel, IBM, Hewlett-Packard, Dell, Compaq, and Siemens, Linux gained significant credibility with end users. It is easy for a customer to conclude that, if IBM is willing to risk its credibility with its conservative customer base by endorsing and placing Linux systems in the market, there must be something real about it. IBM, HP, Intel, and NEC, along with a number of contributing partners, furthered their commitment to Linux by creating and funding the Open Source Development Lab in Portland, Oregon.
- **High-flying IPOs during 1999.** Until the tech sector stock melt-down during the first half of this year, anything that ended with “.com” or had the name “Linux” in it was almost guaranteed to be a success — at least in the stock market. Although investors have returned to their senses and stock values are once again more closely related to earnings-per-share ratios than to their corporate naming conventions, the boost in visibility surely helped Linux companies of all sorts. Both public and privately held companies are benefiting from the vastly increased visibility that Linux gained from the spectacular run-ups that took place in 1999.
- **Heavy emphasis on bundling.** Most of the major Linux vendors have worked out bundling deals with the hardware original equipment manufacturers (OEMs), including IBM, HP, and Dell. When workstations and low-end servers ship out, a copy of Linux is often included. While that constitutes a valid revenue shipment, it doesn't necessarily result in a deployment.
- **Increasing availability of application software, development tools, database software, middleware, serverware, and management tools for Linux.** Oracle, IBM, Sybase, Informix, Progress, Lotus, Computer Associates, Tivoli, and many others began offering their software on Linux. Once again, organizations are expected to feel more comfortable with a platform when their supplier for enterprise software supports Linux.
- **Support offerings have become more extensive and robust.** Several distributors of Linux, such as Red Hat, Caldera, and SuSE, provide support for their releases in a variety of easy-to-purchase options, including pay-per-incident all the way through to 24 x 7 x 365 phone support.

### ***What Does Linux Need for SOE Success?***

Linux has been quite successful as a platform for network infrastructure services (Web server software, Web caching software, file/print services, distributed directory/naming services, and basic communications services), database software, and parallel computing applications.

Linux in its current form has limited single machine scalability. To date, the Linux community has addressed this issue by using functional server computing techniques. That is, placing each of the functions that collectively create an application environment on separate systems and then linking them together with middleware or serverware.

These techniques won't work for many important enterprise applications. These applications must run on medium-sized to large single systems. The current version of the Linux kernel (2.2) will not scale beyond four to eight processors. This is simply not enough for some applications. The next version of the Linux kernel (2.4) is expected to improve the single system scalability considerably. At the time this paper is being published, Linux distributions based upon the 2.4 kernel are beginning to appear.

### ***Dependencies***

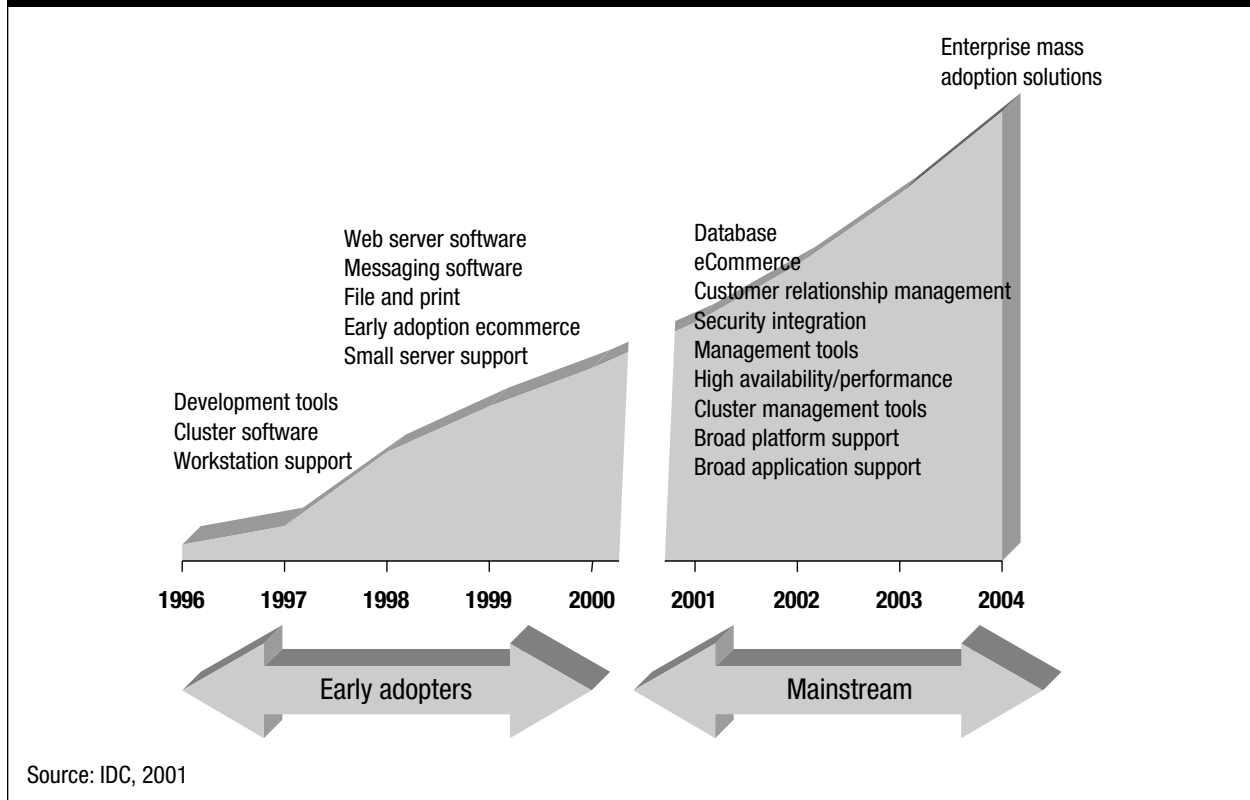
Linux is not expected to be generally recognized as a platform for enterprise applications all at once (see Figure 8). There are many dependencies, including the following:

- Broad hardware support
- Availability of application development and deployment software
- Availability of middleware and serverware software
- System, cluster, Web farm, and network management software
- Major enterprise applications, such as enterprise resource management, knowledge management, CRM, financial applications, and so on.

Linux is not often found as the platform for enterprise applications because the following types of software are only now becoming available on Linux.

- **Enterprise applications.** For the most part, suppliers of ERM, CRM, manufacturing automation, and so on, have just started making their applications available on Linux. Since organizations have come to rely on packaged application software rather than developing their own, Linux has not yet established itself as a platform for these applications.
- **Clustering and high-availability software.** Software allowing applications and data to remain available even though their original host is no longer accessible started to become available in mid-2000. Enterprise-class applications must be available at all times. This means that Linux-based solutions will have to prove themselves in actual use for broad-scale adoption to occur.

**Figure 8**  
**Dependencies for Mainstream Linux Adoption**



- **Storage software.** Software designed to virtualize storage so that it survives the loss of its original host, such as file movement software, file system replication, storage device configuration, and management software, has not been available on Linux. In 2000, several vendors announced the availability of beta-test software in this category. Once again, Linux must prove itself to become a member of the enterprise application platform club.
- **Application development and deployment tools.** Linux has had a wealth of development tools, such as C++, Perl, Python, and so on, for quite some time. Enterprise application tools from Oracle, IBM, Informix, Sybase, and so on, became available in 2000.
- **Enterprise management tools and frameworks.** To be considered a platform for enterprise applications, a platform must be considered easy to manage. The tools provided with Linux offer knowledgeable administrators with the tools needed to manage a single system. Managing clusters or distributed systems require better, easier-to-use tools. Suppliers of enterprise management tools and frameworks brought their products to Linux during 2000.

Nearly every issue preventing Linux from being considered an enterprise application platform is being addressed either by the open-source community or by suppliers of proprietary solutions.

### ***Linux as an Embedded or Handheld Environment***

A new market is emerging for system software for embedded and handheld devices, which will be companions for traditional PCs and servers. Linux is expected to hold a major position in these markets due to its size, reliability, and the freely available source code.

Appliance servers are another area in which Linux is likely to be increasingly found. As appliance servers are used to support database software, distributed file system software, and various applications, Linux will likely be tapped to be the embedded operating environment.

While most people consider Red Hat Linux as an IT implementation, it has garnered significant success as an embedded product brought in by marketing rather than MIS. IDC spoke with several such companies that profile the ability to gain sales rather than just operational efficiency by exploiting Linux's reliability, scalability, and cost. In one example, a large supplier of telecommunications components indicated that it was in the process of inserting Red Hat Linux into virtually all its component products for telecommunications corporations.

The initial value proposition that convinced this organization to use Linux was its high availability (more than 99.999% uptime) plus free licenses and full scalability. This organization and its customers will be able to very easily upgrade equipment already sold and installed in the field. This new operating system has quickly garnered more than 25% of this organization's telecommunications product line and is growing rapidly.

### ***Web Application Platform***

As Web-based applications come to the forefront, Linux is likely to become increasingly important. Linux is often used as a platform for Web services, Web caching, Web security, and so on. IDC expects this trend to continue.

### ***Business Application Platform***

As business applications, application development and deployment, middleware, and serverware become available on Linux, IDC expects Linux's use as a platform for business applications to increase.

### ***Red Hat and Red Hat Network Could Lead to Lower Costs for Linux***

Red Hat's system software and Red Hat Network could address costs associated with staffing, server hardware, client hardware, and system software portions of the model in the following ways:

- Development costs could be reduced through the use of Red Hat's services organization.

- Deployment could also be accomplished on lower-cost hardware. Linux software runs on smaller, and thus lower-cost, desktop and server systems, which could lower the overall cost of server hardware. Furthermore, Linux system software is available either at no charge if an organization is willing to download the software from Web mirror sites or at very low cost as packaged software. Regardless of how an organization obtains the software, it can be replicated on new systems at no charge.
- Management costs can also be reduced through the use of Red Hat Network.

IDC is conducting studies to determine the actual impact of these factors on the three-year cost of ownership. The findings of this research will be published later this year.

### **Conclusion**

Linux has started to become a mainstream operating system in all sizes of organizations, in all markets, worldwide. Its reliability, stability, and ease with which the software can be customized is quite appealing to organizations. The fact that many application development and deployment, middleware, serverware, and application products are freely available on the network helps as well.

Linux often can support similar workloads on smaller systems, which can lower the cost associated with hardware. At the same time, open-source software such as Linux could lower the costs associated with software. Red Hat Network could be utilized to lower the costs of staffing. When summed up, this could mean a lower total cost of ownership.







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