Standardization
The Secret to IT Leverage

An IDC White Paper
Sponsored by Dell Computer Corporation

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INTRODUCTION
Enterprise computing will continue its inexorable march toward industry standards, given the inherent price/performance, TCO, availability, and deployment advantages. New research from IDC confirms that this trend is not only a U.S. phenomenon. Results of this research with 340 organizations around the world about the benefits they see from adopting standardized systems and the pace with which they expect to migrate to them support these findings.

SUMMARY
IDC's new research of standardization in technology underscores its early research and call to action for users to migrate sooner for greater ROI. The research highlights:

• IT standardization evolves in levels, with each successive level opening the door for new users, driving an increase in market size, triggering new technology refinements and declining costs, and setting the stage for the next level of standardization.

• Return on investment (ROI) associated with the use of standardization increases with each new level of standardization.

• Those who migrate earliest to new standards obtain the highest levels of ROI.

• Standardization is an inevitable development in the IT industry.

IDC derived several key findings from the 340 organizations that responded to our survey:

• Lower cost has driven users' ROI from standardized systems once they passed critical performance thresholds. The lower cost extends not only to hardware but also to software, deployment, and services. Although U.S.-based IT decision makers overwhelmingly agree that the potential disadvantages to using standardized servers and storage for midrange to high-end needs have already been overcome, the majority of users in Europe, Asia/Pacific, and Japan see this occurring within the next two years.
• Standardized technology has driven the speed of innovation, the acceptance of new players, and the rapid expansion of the server and storage markets over the past few years. Standardized platforms will continue to benefit the end user in terms of market choice, market expansion, and technology innovation.

• Standardized products will influence suppliers of midrange and high-end servers and storage to lower their costs. Users of these products are looking for standardization to drive lower costs in other areas, including deployment, operations, software, and services.

• Product standardization enables predictable, repeatable data center processes to be outsourced. End users can benefit from a growing supply of outsourcing vendors that are now capable of meeting service level agreements.

NEW STANDARDIZATION IN SERVERS

The personal computer is a classic example of how successive levels of standardization have increased usage of IT by orders of magnitude.

But, to the point of this white paper, we find another transition underway in the market for computer servers — the engines of corporate computing today. Of the worldwide server purchases in 2001, 88% made up what IDC calls Standard Intel Architecture Servers (SIAS). This is a market dominated only a few years ago by proprietary systems — the IBM 3090, Digital Vax, and the Hewlett-Packard 3000.

Figure 1 shows how fast standardized servers — ones based on the standard Intel architecture — have come to dominate the market. Ten years ago, less than one in three servers installed was a standardized system; today, 85% are standardized. More discussion of standardization in the server market will take place below.

For vendors, this white paper serves notice that standardization — around de jure or de facto standards — is an inevitable fact of life in our industry. For technology users and implementers, it’s a call to action to migrate sooner rather than later.

THE BENEFITS OF STANDARDIZATION

Although this white paper doesn’t dwell on it, economic theory finds that the benefits in standards come from reduced transaction costs, reduced production costs, improved communications, and enhanced buying power.

To get a better handle on the benefits of standardization, in a survey of 340 server and storage users worldwide, IDC asked IT buyers what they saw as the benefits (see Server/Storage Survey Methodology sidebar for survey details).
Almost 60% of the companies surveyed said a significant benefit of using standardized products is lower cost of the product itself. But related costs are also lower — over half of the respondents feel that lower software costs are a significant benefit, as well as lower cost to deploy and operate, easier deployment, and lower cost of services.

Lower costs primarily drove the ROI, although embedded in the answer is the assumption that standardized systems have passed critical performance thresholds. Almost 60% of the companies surveyed said a significant benefit of using standardized products is lower cost of the product itself. But related costs are also lower — over half of the respondents feel that lower software costs are a sig-

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**Figure 1: The Rise of Standardized Servers**

![Graph showing the rise of standardized servers](image)

*Note: Installed is defined as three-year cumulative shipments.*

*Source: IDC, 2002*

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### Server/Storage Survey Methodology

To gain insight about the use of standardized servers, IDC conducted a survey of 340 server and storage user sites: 100 in the United States, 100 across Western Europe (United Kingdom, France, Germany), 100 in Asia/Pacific (China, South Korea, Australia, and Hong Kong), and 40 in Japan. All of the respondent sites:

- Use standardized servers (using Intel processors and Windows or Linux)
- Use some midrange or high-end servers costing $100,000 or more, most of which are proprietary; IDC wanted to get opinions on use of midrange and high-end servers

In addition, more than three-quarters of the sites use standardized storage (Windows-based, project-based, or other homogeneous storage area networks). Of the individuals who answered the questions, all participate in the server purchase process at their site, and more than 85% participate in the storage purchase process.

The U.S. survey was conducted by phone in August 2001; the European and Asia/Pacific survey was completed in February 2002. Findings of the survey are included throughout the white paper.
significant benefit, as well as lower cost to deploy and operate, easier deployment, and lower cost of services (see Figure 2).

How these benefits show up in practice include:

- **Reduced cost of IT deployment.** Standard architectures allow deployment teams to roll out new applications faster and with fewer people.

- **Reduced cost of interoperating with business partners.** Electronic communications and access to common databases are easier to develop and support for multiple partners when standards are involved.

- **Improved negotiating power with vendors.** Standards drive product differentiation toward price and service and away from features and functions once basic expectations for those features and functions are met. This benefit makes buying decisions faster and simpler to make.

- **Simplified IT support and training.** Standard platforms simply demand less training and specialization by IT staffs.

![Figure 2: Benefits of Using Standardized Products](image-url)
• **Simplified purchasing, procurement, upgrade, and disposal.** The ecosystems that evolve around standard platforms create new services and lower administrative costs for buyers.

• **Economies of scale in software development, training, and application rollout.** Development teams don’t need to be split across multiple platforms; the need for complex software ports or integration goes away.

Of course, there can be barriers to standardization, as well. The leading barriers include a perception that there would be performance and power issues with such systems and incompatibility with existing nonstandard products. This barrier begins to fall when the price performance advantage of standardized systems outweighs switching costs. It erodes even more rapidly as the percentage of standardized products installed in an enterprise increases. Other issues that hinder standardization include lack of key software and a perception that these systems might not be available for mission-critical use.

However, in comparing the number of survey responses listing benefits with the number of responses listing barriers (Figure 3), the benefits outweigh barriers in a ratio of over 3:2. These respondents run both standardized and nonstandardized equipment in their enterprises.

![Figure 3: Benefits and Barriers of Standards](image)

**CATCHING THE WAVE EARLY**

As successive levels of standardization penetrate a market, there are added benefits for organizations that migrate to the standard platforms early. They gain experience and get an earlier ROI.

An example of this is borne out in case study research conducted in the 1990s by IDC on the ROI of collaborative applications. The stud-
ies came in two waves: first, early Lotus Notes implementation; second, the early use of Internet technologies.

Figure 4 shows the two sets of ROI measurements. Although the ROI associated with the first level of standardization (Notes) is high, the ROI associated with a higher level of standardization (Web) is much more significant.

Why? Look at the last line in Figure 4 — the number of people affected by the implementation. Web development allowed for a much faster application rollout across entire enterprises, and the universal platform cut training and support costs. The fact that per-seat cost for the software was much lower also helped, but most of the ROI gains came from faster deployment and lower support costs, not from lower initial system costs. But in either case, those who migrated earlier to the new standards obtained higher ROI than those who came later.

**Figure 4: Benefits Increase as Standardization Increases**

<table>
<thead>
<tr>
<th>Standardization</th>
<th>Wave 1</th>
<th>Wave 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Standard</td>
<td>Single Vendor</td>
<td>&quot;Free&quot; Software</td>
</tr>
<tr>
<td>Technology</td>
<td>Standard Platform</td>
<td>Universal Access</td>
</tr>
<tr>
<td>First-Year ROI</td>
<td>Lotus Notes</td>
<td>Web</td>
</tr>
<tr>
<td>Payback</td>
<td>95%</td>
<td>245%</td>
</tr>
<tr>
<td>Number of Users</td>
<td>1.5 years</td>
<td>1.5 months</td>
</tr>
<tr>
<td></td>
<td>27,000</td>
<td>165,000</td>
</tr>
</tbody>
</table>

Source: IDC ROI Case Studies in the 1990s

The IT marketplace has recognized the advantages of common or standardized technology. Respondents to IDC’s survey overwhelmingly cited the overall lower cost structure and ease of use as significant benefits of standardized technology. (Refer back to Figures 2 and 3.) The IT market sees standardized servers offering value today and tomorrow, as it witnesses annual price declines continuing to range between 35–50%.

**RAPID MARKET EXPANSION/ENHANCED VALUE**

The availability of standardized technology has led to major changes in the server and storage industry over the past few years. Standardization has driven the speed of innovation, the acceptance of new players, and rapid expansion of the market. The number of servers shipped worldwide more than doubled over the past five years, growing from 1.8 million in 1995 to 4.3 million in 2001. In contrast,
the average price of a server dropped by more than 50%, from $32,000 per server to $15,000. (Note: these figures are for the entire server market and include mainframes too.) The data implies that the server market has grown considerably as the price of each server has declined rapidly, representing great value for the customer. What is equally revealing is that industry-standard servers, which account for 88% of all the market, have driven the expansion of the servers shipped in 2000 and even into recession-hit 2001 (see Figure 5).

![Figure 5: Worldwide Server Shipments, 1996-2001](source: IDC, 2002)

To date, most standardized servers have been sold into what IDC calls the entry-level server category, those costing under $100,000. Some of these standardized servers have the functionality that was previously found in midrange and high-end servers costing $100,000 or more. Most servers costing $100,000 or more have been proprietary in design. If standardized server and storage products give so much ongoing value, then why has the market continued to purchase the higher-priced proprietary midrange to high-end servers and storage? One answer is the perception by some users that standardized servers have disadvantages compared to current midrange and high-end servers (i.e., the perception that not all software programs, databases, and functions are available or currently suitable for these devices). Overall, the majority of respondents to IDC's survey do not feel that there are major hurdles to using standardized servers and storage for midrange to high-end needs (see survey results in Figure 6).

In Western Europe, our survey highlighted some compelling drivers toward standardized systems. The key factors are:

- Lower hardware costs
- Easier deployment
- Higher performance hardware
- Better availability of hardware
Beyond these factors, a key motivation is the continuing shortage of skilled IT staff. But we do see barriers remaining to full deployment of industry-standard systems for higher-end applications. Some countries are simply more conservative than the United States in their deployments, and Europe (except to some extent in the United Kingdom) did not experience the kind of growth in Intel-based Internet infrastructures that was seen in the United States; and hence, there was less experience of the growth of racks, clustered Intel boxes, and 8-way and above running key parts of the infrastructure.

Japan has steadily risen to accept industry-standard servers. The rest of Asia/Pacific has always had the highest percentage of SIAS servers of any of the major markets (Figure 7). According to our survey results, lower costs are not the sole driving factors in Asia/Pacific or Japan — in these regions, we see a balance between lower costs of hardware and software, better availability of technical people, less training required for IT staff, and higher performance hardware.

### Figure 6: Disagreement with Potential Disadvantages of Standardized Servers and Storage

Beyond these factors, a key motivation is the continuing shortage of skilled IT staff. But we do see barriers remaining to full deployment of industry-standard systems for higher-end applications. Some countries are simply more conservative than the United States in their deployments, and Europe (except to some extent in the United Kingdom) did not experience the kind of growth in Intel-based Internet infrastructures that was seen in the United States; and hence, there was less experience of the growth of racks, clustered Intel boxes, and 8-way and above running key parts of the infrastructure.

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<table>
<thead>
<tr>
<th>Issue</th>
<th>United States</th>
<th>Europe</th>
<th>Asia/Pacific</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current vendor/no standardized products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key technologies not available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weak vendor reputation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesser quality service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less reliable service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient storage capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incompatible with current products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key software not available</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Uncertain vendor roadmap</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Lower power, not fast enough</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not for mission-critical use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IDC, 2002

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Japan’s IT professionals also appear to be among the most demanding in terms of performance.

Regional and cultural differences influence the speed of adoption of standardized products. The existence of key server companies in the United Kingdom (ICL), France (Bull), Germany (Siemens), and Italy (Olivetti) is evidence of these different national approaches and is undoubtedly a factor determining the region’s pace toward standardization. Currently, these barriers are being broken down as the influence of the European Community matures and governments sell off nationalized industries to the private sector (which then become open to normal market climates and conditions). The same can be said of Japan and, to a lesser degree, the Asia/Pacific region.

As these changes occur, there is still a wide and varied installed base of local proprietary systems that are in continued use in key parts of the IT infrastructure. By comparison, the United States market has seen both the speed of vendor consolidation and acceptance of industry-standard technology reduce the number of tier 1 players down to five major companies (from over 20 less than 10 years ago) using four main operating systems. In Europe and Asia, vendor consolidation is also occurring, but it has different dynamics that challenge the use of industry-standard servers. For example, Britain’s ICL is a subsidiary of Fujitsu (Japan), which has a very strong partnership with Fujitsu Siemens (Germany). Each company shares technology, but despite being part of the same group, each continues to develop its own version of industry-standard servers. Although Fujitsu is a global player in the truest sense, the example above demonstrates the challenge it has to normalize the use of server technology through product and company integration.

Figure 7: SIAS Market Share by Region, 1996-2001

Source: IDC, 2002
Today, there appears to be a lot of variation between the regions when considering the challenges that still face standardization. These include uncertain technology roadmaps and reputation, the lack of products offered by current vendors, power issues (Europe), software availability, and concerns over use in mission-critical applications. But the trend is undeniable, and a transformation is on the horizon (Figure 8).

As highlighted in IDC’s earlier research, U.S.-based IT decision makers overwhelmingly agree that the potential disadvantages to using standardized servers and storage for midrange to high-end needs have already been overcome, while the majority of users in Europe, Asia/Pacific, and Japan see this occurring within the next two years. There are several reasons for this significant shift. First of all, the current economic pressure being felt worldwide will force IT executives to reexamine their total cost of ownership. Indicators would suggest that the Western European economic climate will follow that of the United States in six to nine months. In the United States, the IT industry has already seen a significant push to reduce overall costs of computing, and many executives are meeting their targets by replacing existing technology with industry-standard platforms. The survey results confirmed that many of the elements to reduce costs were already recognized benefits from standardized servers and storage.

Additionally, as technology refreshes occur, many of the perceptions that standardized servers and storage don't have either the compute capacity or the storage capacity will be overcome. Technology that
was purchased for Y2K readiness is now fully depreciated and will be replaced either later this year or next year.

The current challenge of regional acceptance of industry-standard technology is valid and cannot be overlooked. However, the trend toward standards-based systems is unmistakable. Many of the hurdles mentioned earlier are being overcome by IT executives as they better understand the capabilities of the technology and the financial benefits that can be achieved.

**CHALLENGES TO PROPRIETARY MIDRANGE AND HIGH-END SERVER AND STORAGE PRODUCTS**

Current market and technology shifts can be described as fuel for the server and storage revolution. Most historical revolutions start from below and work their way up. The same can be seen today as standardized products address the challenges or limitations for the existing midrange and high-end server and storage products.

Respondents to IDC's survey voiced several limitations or problems with current midrange and high-end servers:

- Proprietary midrange to high-end systems are typically expensive to acquire (hardware and software) and support.
- Because these systems tend to be proprietary, they strictly limit interoperability.
- It is difficult to work with legacy applications or find skilled staff.

Reflecting this, respondents to IDC’s survey expressed a strong desire for improvements in future midrange and high-end servers and storage. These include lower costs across the board — hardware, software, and related services, as well as internal deployment and operation — better interoperability with other servers, easier deployment, and ease of scaling the Internet infrastructure (see Figure 9). Respondents in Japan were particularly emphatic about the need for improved price/performance and lower hardware and software costs.

As such, a key influence that standardized products will exert on the more expensive platforms will be the need for suppliers of midrange and high-end servers and storage to lower their costs. After years of being able to keep the costs high as a result of their homogeneous environments, these suppliers will find customers demanding the same value proposition that they receive on current entry standardized products. Demands for this value proposition are clearly reflected in the key reasons that the survey respondents say why they would consider buying standardized midrange and high-end servers and storage. The reasons focus heavily on lower costs — of hardware, deployment, operations, software, services — and also include easier deployment and scaling of the Internet infrastructure.

European respondents to our survey ranked easier deployment, better price/performance of hardware, better availability of technical people, less training of IT staff, and more vendor choice significantly higher than U.S. respondents. Asia/Pacific respondents are demanding hardware price/performance improvements, while European and
Asia/Pacific decision makers are less concerned about costs of related services than their counterparts in the United States. The marketplace demand for the benefits embodied in standardization will lead to an increased share of the market for standardized servers. IDC predicts that standardized servers will continue to increase as a percentage of all servers through 2005 (see Figure 10).

**BUILDING THE DATA CENTER ON STANDARDIZED TECHNOLOGY**

The splitting of workload between server appliances, data base servers, and general-purpose servers, made possible by server standardization, has opened up several key advantages to the end user. By using common components and optimizing their abilities, the new servers provide several benefits:
• **Scalability.** Servers and storage built under these conditions can be easily scaled outward as demand for additional resources are needed. Adding more compute power or disk storage to a Web-hosting server or a NAS device is as easy as sliding a thin server into a hosting rack.

• **Reliability.** These servers are built from components that are optimized for specific use or function. Their operational ease of use increases the platform reliability at a relatively low cost. Additionally, standardization enables continuous application availability by facilitating load balancing among servers at a site should a single server go down or even be taken offline for upgrading.

• **Manageability.** The use of consistent hardware running common and optimized software in servers and storage devices has significantly reduced the operational complexity and lessened the level of management skills needed. The combination of increased reliability and manageability advantages help to improve the ROI.

• **Connectivity.** Creating servers and storage devices that use industry-standard connectivity protocols has wide-ranging benefits for the IT manager, as described in more detail below.

![Figure 10: Worldwide Server Shipments, 2000-2005](image-url)

Source: IDC, 2002

Today's servers and storage platforms that use standard or common components have enabled a more flexible data center. As the processing capabilities of these devices improve with new and faster chip architecture and enhanced connectivity capabilities (albeit through ubiquitous bus architecture and ethernet protocols, or emerging switched fabric), the overall total cost of computing will naturally be reduced over time. The key to this is that the technology remains open and based on industry standards. If we assume that this is maintained, then the future Internet infrastructure may be a reality for everyone. A glimpse of the technology required for this to happen is described below.
CHALLENGES FOR STANDARDIZED SERVER AND STORAGE PRODUCTS

IDC believes that the trend toward more widespread adoption of standard server and storage architectures is inexorable, paralleling similar standardization adoption experiences in IT over the past 40 years. But as with all technology standards, there are barriers to adoption that must be overcome - many of which the survey respondents identified (refer back to Figure 3). Most barriers have been overcome sufficiently — or soon will be — so that standardized servers and storage are seriously considered for midrange and high-end needs (refer back to Figures 6 and 8). But challenges remain for standardized servers and storage to meet all midrange and high-end needs, as follows:

- Some respondents viewed standardized products as not being ready for mission-critical use. Closely related to this challenge is the lack of key software. Emerging standardized products tend to lack the mature support structures that grow up and evolve over time around mission-critical applications.

- Standardized server and storage products are often mutually incompatible with current products and solutions in place.

- Power and reliability concerns have always been present when comparing standards-based and more mature product lines. These are a function of scale and ability to effectively handle complexity.

- Vendors of products competitive to standards-based solutions don't stand still. They are also focused on surmounting barriers and improving their products.

The history of both the IT and server industries indicates that standardized products will steadily close the gap with nonstandard products.

CONCLUSION - THE MOMENTUM IS IN FAVOR OF INDUSTRY STANDARDIZATION

In the race between proprietary and industry-standard servers, users have voted increasingly in favor of the industry-standard servers. Over the past five years, industry standard servers (SIAS) have steadily gained share at the expense of proprietary system-based servers (see Figure 11).

Declining prices for standardized servers have tempered the steady gain in revenue share; however, the increased value has been a boon for server buyers. Functionality previously found in the midrange and high-end server markets is now often available in the lower-cost, smaller industry standard servers. This potent combination of value and functionality has enabled the standardized platforms to move deeper into the IT infrastructure to support a wide range of applications.
During the past 20 years, the IT industry has seen what can happen when server and storage technology has remained proprietary and has witnessed the improvements that have happened when it has been turned over to more common and standardized offerings:

- Lower cost hardware and improved price performance
- Lower total cost of ownership, including software, services, and staffing
- Better availability of products, services, and staffing
- Easier deployment and scaling of companies' Internet infrastructure

These benefits of standardization to IT operations empower users of standardized products to better meet their overall business requirements by:

- Enabling quicker deployment of new technologies to provide new capabilities and increased competitiveness
- Permitting flexible deployment of IT resources, improving IT's ability to better support business processes and functions
- Lowering the capital investment required by IT

The benefits of IT standardization will provide much needed help to IT operations as they wrestle to overcome the challenges of a difficult business environment. The development of technology on standardized platforms will continue to benefit the end user in ways that foster market choice, market expansion, and technology innovation.
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