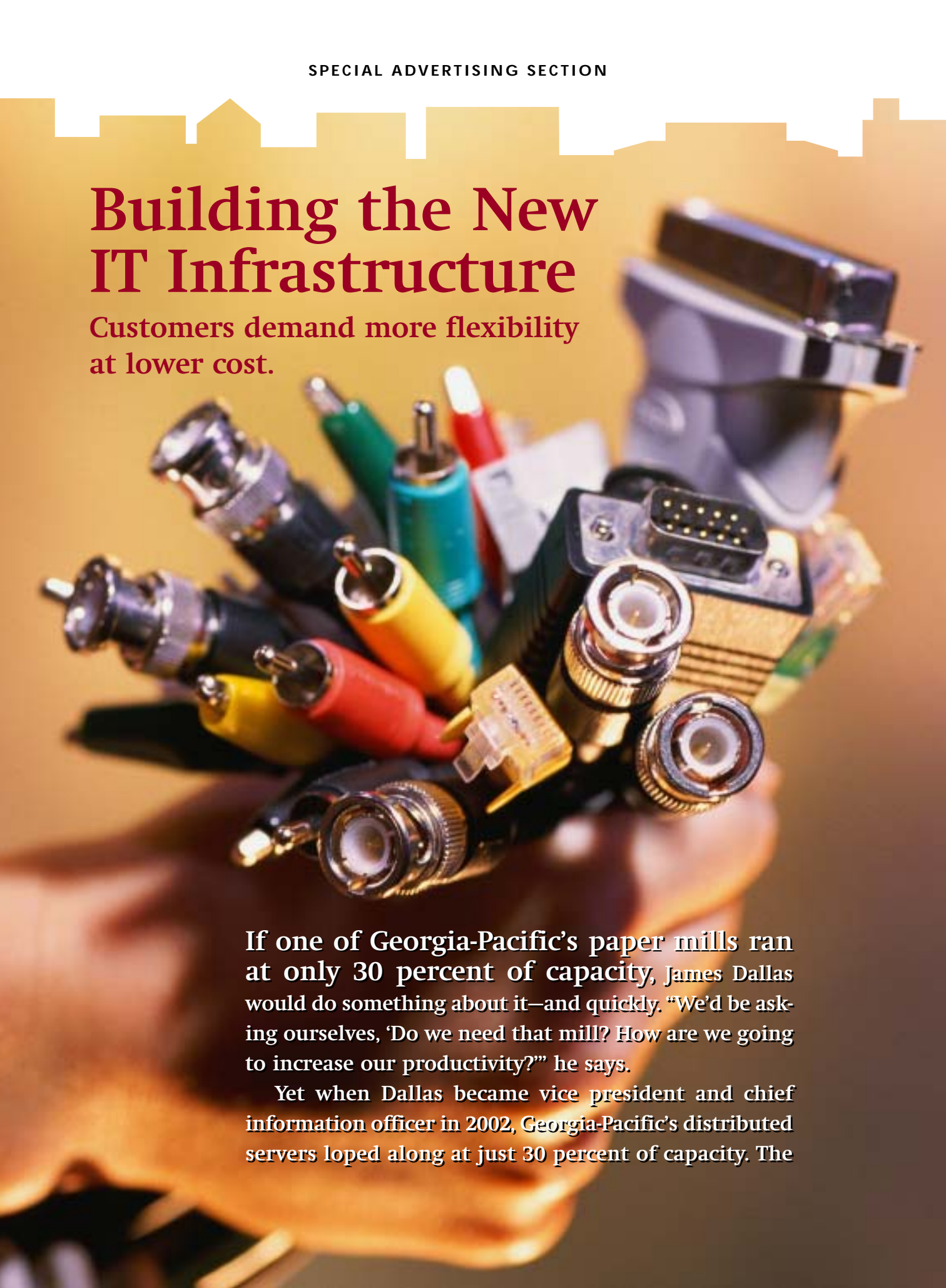


# Building the New IT Infrastructure

Customers demand more flexibility at lower cost.



If one of Georgia-Pacific's paper mills ran at only 30 percent of capacity, James Dallas would do something about it—and quickly. "We'd be asking ourselves, 'Do we need that mill? How are we going to increase our productivity?'" he says.

Yet when Dallas became vice president and chief information officer in 2002, Georgia-Pacific's distributed servers loped along at just 30 percent of capacity. The

paper products and chemical company is an all too typical example of a common phenomenon: Customers, consultants and vendors agree that the vast majority of companies' IT infrastructure operate at only 25 to 30 percent of capacity.

Dallas wants to boost utilization of his IT infrastructure to at least 80 percent while giving employees faster and more detailed information about the business. By centralizing management of its IT infrastructure and reducing the number of data centers it runs, Georgia-Pacific is already saving \$90 million a year.

### Investing and Saving

The company is one of thousands of organizations that are saving money by investing in new equipment and software that enables them to consolidate data centers and otherwise improve the efficiency of their IT infrastructures. In fact, a survey by Gartner released this year found that "developing an efficient and flexible" IT infrastructure was the top priority of almost 1,000 CIOs.

And their infrastructure focus is reflected in dramatic increases in spending. More than six out of 10 respondents to an AMR Research survey on IT budgets expected to increase their budgets by more than 10 percent, noted AMR Research Analysts Jim Shepherd and Fenella Scott in a recent report.

The spending increases are targeted at specific infrastructure segments, which include servers, personal computers, routers, switches, hubs and other networking gear as well as the operating systems and other platform software required to run an organization. Server shipments, for example, are leaping almost 13 percent this year, according to IDC, after single-digit growth during the past recession (see chart, "Soaring Demand for Servers"). Furthermore, roughly a quarter of the AMR Research survey respondents said their top priority was replacing personal computers.

Many organizations see value in adopting new hardware, software and communications technologies that offer a combination of cost and performance benefits. Among these IT resources are blade servers, the Linux operating system,

Web services and virtualization software, which allows disparate computing devices to appear as a single, logical computing resource to the end user. CIOs also are being driven by new business models such as "utility" computing, where companies buy only the computing horsepower they need, as well as by IT and business professionals working together to redesign the computing systems that drive their businesses.

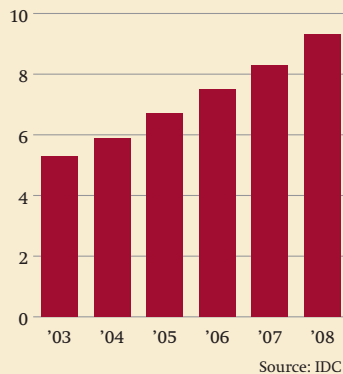
### Why Focus on Infrastructure?

Traditionally, an IT infrastructure was created piece by piece for individual business units or to run specific applications. To meet performance and availability levels demanded by business managers, each application typically got enough servers, networks and storage to meet peak demand even if most of that hardware sat idle most of the time, says Yogesh Gupta, chief technology officer at Computer Associates International.

That's because, he says, CIOs themselves rarely could determine how much it cost to provide a given level of application uptime. Rarely, if ever, was the

### Soaring Demand for Servers

(yearly worldwide shipments, millions of servers)



overall productivity of the infrastructure measured, adds Georgia-Pacific's Dallas, or was action taken to improve it.

The business downturn of the last few years made customers demand lower costs. But now, "business is picking back

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up,” says John Lutz, vice president of sales for IBM’s OnDemand business, “and people need to be ready to respond.”

A company wants its IT systems to handle a new business process—such as issuing a new type of loan or providing online order tracking—in days, not months.



Business users want their IT counterparts to tell them, for example, how much it will cost to provide two-second vs. three-second response time for an application so they can decide how much speed to pay for, says an industry analyst.

In addition to speed and expandability, the new infrastructure must be flexible. That is critical, particularly when companies need to merge their information systems with those of other companies, says Rick Lowrey, executive vice president of the enterprise division at ERP software vendor Deltek Systems. With widespread consolidation in the small to midsize enterprise, “nine times out of 10,” he says, customers ask how they will merge systems such as accounts payable and financial reporting if they acquire another company or are acquired.

Indeed, with cost pressures still intense even as the economy improves, customers are demanding IT infrastructures that reduce costs while delivering greater scalability and flexibility. Between 75 and 85 percent of IT budgets are used “to simply maintain existing systems,” says Amit Chatterjee, director of Netweaver Product Marketing at SAP AG, leaving only 15 to 25 percent to build new, innovative applications. SAP customers want improved IT infrastructures so they can keep IT spend-

ing level while devoting more dollars to new systems that drive growth, he says.

Analysts agree. Customers are asking not only whether their IT infrastructures can adapt to changing business needs, but whether they can change in ways “that increase the economic value of the infrastructure and whether we can drive costs out of the process” of making those changes, says Scott Lundstrom, chief technology officer at AMR Research.

#### Blades Slice Hardware Costs

Small, yet powerful rack-mounted blade servers and storage take up less space and require less power and air conditioning than traditional servers. They also are easier to reconfigure because an administrator need only plug and unplug wires on a single rack rather than trace cables among standalone devices. “Blade servers help you reduce the total hardware expenditure, so the net cost of doing what you did before actually goes down,” says SAP’s Chatterjee.

In this highly scalable and reliable environment, “applications can run across multiple blades and data can get replicated across multiple storage devices,” explains Traver Gruen-Kennedy, vice president and chief evangelist at Citrix Systems, and they can be managed easily with robust management software.

These servers and special software fulfill the business users’ need to obtain critical information regardless of where they are located, the device they are using and the version of an application they are running, says Gruen-Kennedy. New devices ranging from handhelds to mobile phones and even watches that can display data “are coming along so quickly these days you almost don’t have time to develop an application for a specific device,” he says. By using software that can run applications on servers but transmit only changes in the interface to the user’s device, adds Gruen-Kennedy, IT organizations can “develop an application and invest in testing it only once while deploying it everywhere.”

#### Linux and Open Source

Another new infrastructure tool is the combination of low-cost servers and the Linux operating system. Linux is attractive not only because of its low cost, but because its open-source model means it is not controlled by a single vendor. It is enhanced and modified by a worldwide network of volunteer developers.

The end-user financial impact of the open-source software movement, however, is one of the most contentious issues in information technology circles today. Is it a financial benefit or a boondoggle?

Studies have shown customers can save on hardware costs, ranging from a factor of three to a factor of 10, when shifting from a proprietary hardware/software combination to an open-source platform, according to Jeff Hawkins, vice president of the Linux business office at Novell, one of the leading Linux vendors. In addition, Hawkins notes that software costs alone can be three to five times lower for an open-source solution.

Microsoft and other software vendors as well as some analysts disagree. They say the total cost of ownership of a Windows-based application can be less than Linux because more functionality is bundled into Windows.

“Discussions with five companies that tracked their total costs indicated Linux was between five and 20 percent

## Resources

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more expensive than Windows,” noted Forrester Research Analysts Julie Giera and Adam Brown in a controversial April 2004 report entitled “The Costs and Risks of Open Source.” The analysts did, however, note specific circumstances where a Linux-based implementation was less expensive.

As IT managers and techies in general became comfortable with Linux as a reliable operating system for non-critical tasks, they began to move it into more important roles. Specifically, the Linux operating system and the Apache Web server application software have become a popular duet in many organizations.

**With widespread consolidation of small to midsize companies, almost all customers ask vendors how they can merge systems.**



Typically, cost comparisons are extremely dependent on specific circumstances. C-level executives considering an IT recommendation to shift to an open-source approach or facing a decision to base a new application on an open-source platform need to dig deep to fully understand the ramifications.

And those ramifications are not just financial. While the “real” cost of Linux vs. Windows and Unix is somewhat debatable, even open-source zealots acknowledge that their hardware and software platform isn’t ready to take on the biggest and most challenging IT tasks. The scalability, performance and other aspects of the open-source products are not quite up to the levels of more established operating system platforms such as Windows running on large servers.

Most organizations are experimenting with Linux and low-cost servers to determine the benefits and disadvantages. “Linux initially was adopted at the periphery of the network,” Hawkins notes. “It was used in less-critical business functions, areas where it was relatively risk-free for organizations to try it. In the beginning, there was a lot of experimentation.”

In the past two years many leading applications vendors such as SAP have begun offering Linux versions of their mission-critical software. Along with other open-source packages such as the MySQL database software, IT departments now have a variety of choices that may or may not offer significant cost benefits.

#### New Software Approaches

Several new approaches to computing promise to further enhance the efficiency of an organization’s infrastructure. They are known as a services-oriented architecture, virtualization and utility computing.

A services-oriented architecture is one of the most talked about possible solutions to an inflexible infrastructure. It is a way of writing and deploying software that provides common functions such as printing or order entry across different applications and different computing platforms. This makes it easier to shift processing loads onto the most cost-effective hardware as needed and to change information systems as business needs change.

Virtualization treats multiple hardware and software components as if they were a single, “virtual” resource. A relat-

ed capability is partitioning, which divides a single server into multiple “virtual” machines running different applications or even different operating systems. “People don’t want to have a dedicated server for every application they support [or] a dedicated server for every instance of every application,” says AMR’s Lundstrom. Health insurer Cigna, for example, is using software-partitioning capabilities from both IBM and Microsoft, says Chief Technology Officer Marcus Shipley.

Utility computing—the ability to buy computing power on demand, much like electricity or water—already is working for Mobil Travel Guide. When the company began re-architecting its Web site in 2002 from a simple informational gateway to a site that processes transactions for business partners, it considered traditional outsourcing, where the customer owns the hardware and the outsourcer manages it at its own sites. But IBM offered a new product called Linux Virtual Services, where “we buy the computing and network capabilities as a utility” hosted on an IBM Linux mainframe, says Paul Mercurio, senior vice president and CIO.

Because Mobil Travel Guide orders the amount of computing power it will need from IBM each month, the Web site can grow from its current 1,000 visitors per month to tens of millions without increasing its two-person operations staff. “If you own the hardware, you’ve paid for the capacity you will require on the peak day and you’re paying for it every day of the year,” he says. Because Mercurio buys computing power as needed, he avoids capital spending and “can be opportunistic” in forging partnerships that would drive more volume to his site, confident the mainframe can handle almost any surge in traffic.

#### New Role for Telecom

When companies look at how much of their enterprise data systems’ throughput and disk space goes unused, they start exploring better ways to use those resources. Over the last two years a

popular C-level answer has been telecom.

Although tempting, many companies have quickly discovered that turning voice into data is not as straightforward as adding a new database application. The technology works well, but when voice-over-IP (VoIP) meets the data infrastructure it's not always immediate, clear calling.

First, there are the ever-present interoperability issues with existing hardware and software that were not designed with VoIP in mind. And the few elements that were designed for voice traffic are more than likely highly proprietary and won't work with competing systems.

Second, companies quickly discover that multimedia content cannot be handled like traditional data content. Voice traffic takes up a lot more room than data, and "voice is extremely less forgiving," says Deborah Kline, an Avaya senior manager. The way a network typically handles data—with packet assembly and prioritization—simply won't work with voice. A 60-second delay in an e-mail transmission is barely noticeable, but a two-second delay in a telephone call is extremely obvious.

"When you put voice on your data network, you need to do a full network assessment," Kline says. "You can't have a cavalier attitude that 'my network is ready for voice.'"

But Kline says that those infrastructure hurdles are worth working out because the VoIP capabilities are so vast.

Although VoIP arguments tend to dwell on the significant potential long-distance cost savings, Kline says its capabilities make it worthwhile.

For example, many companies today have building-specific telephone systems that prevent calls from being switched from one building to another. Toll-free calls coming into the wrong building must dial in again.

**Think Big, Start Small**

Some CIOs may choose to—and can afford to—be more proactive than others in moving toward a services-oriented architecture, says SAP's Chatterjee, "taking a business plan from a CEO and, as the CIO, identifying" where services-oriented platforms could play a role.

Others who are more conservative will start to reduce costs through, for example, a server consolidation process, he says, and then adopt services-oriented software or platforms to address "pain points" as they arise in the business, with an eye toward how those individual applications or platforms will eventually work together.

Cigna's Shipley suggests first "identifying non-core, non-mission-critical processing, doing some testing and getting some experience with the technology." Then, he says, "If you have replacement plans, you want to replace those [systems] with infrastructure that offers this type of flexibility."

Indeed, IT infrastructure architects need to know where they want to end up. But they must work toward that goal through individual projects, each of which delivers a return on investment. Cigna, for instance, is 18 months into a drive to create an efficient and flexible infrastructure for the company and is on track to reduce its server count 25 percent by early next year.

"It takes some forethought and planning, but this technology is real," Shipley says. "The onus is on the IT community to figure out how to turn this technology—this new IT infrastructure—into a viable platform for delivering business solutions more flexibly." ■

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