

RED HERRING

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DATA CENTRAL

Advanced **DATA CENTERS** will redirect innovation toward new technologies for truly distributed computing.

BY OM MALIK

T ERAFLOP-ON-TAP—just a fancy tag for a trend that will dictate the direction of research and development, investment dollars, and corporate spending next year. Giants like IBM and Hewlett-Packard, and startups like server maker Egenera and software maker Ensim, are developing new technologies that will transform the downtrodden Web-hosting business into an entirely new industry. The vision: highly advanced data centers will become critical hubs for Internet communications and accelerate the acceptance of emerging technologies like real-time computing, the wireless Web, and grid computing. Data centers also will accelerate the movement toward outsourced computing resources, bringing to fruition computing networks that are truly distributed, even across vast distances.

The growing importance of data centers comes at a time when the technology industry needs them badly. While investors were pouring billions of dollars into companies chasing ephemeral business models like Web hosting, application service provision, and other outsourcing operations, no one paused to consider the shortcomings of the Internet infrastructure. Outdated servers, puny routers, and flimsy storage systems had been thrown into action in order to support the hundreds of fly-by-night Internet businesses.

The gear had been developed for more modest client/server computing environments and was never designed to meet the demands of Internet computing. The result: sprawling warehouses stacked high with rows of expensive equipment. In a data-center rack, there can be as many as 50 servers, which means 50 network cables and 50 power sources.

Naturally, equipment costs outstripped revenue for the early Web-hosting, ASP, and outsourced computing companies. In



hindsight, it was only a matter of time before they—including the once high-flying Exodus Communications—headed to the bankruptcy courts. These were not bad ideas or terrible businesses; the Internet infrastructure that could make such services more cost-effective had simply not been developed.

Next year, entrepreneurs and their financial backers will make amends and develop products that will make data centers cheaper to equip and easier to manage. As a result, Web hosting is forecast to become a \$28.5 billion business by 2005—a sevenfold increase from the 2000 total of \$3.5 billion—according to Tier 1 Research, a market research firm. Most of these dollars will line the pockets of large telecoms (see chart, next page).

Sprint, for example, is building 20 new data centers, while Singapore-based SingTel has earmarked \$275 million to establish a network of Internet data centers throughout Asia by 2002. Carriers see data centers as communications hubs from which to offer value-added services like virtual private networks, voice

'THE DATA CENTER WILL BE THE CENTRAL OFFICE OF THE 21ST CENTURY.'

over IP, flexible bandwidth, and even hosted applications. “The data center will be the central office of the 21st century,” says Joseph Nacchio, CEO of Qwest Communications, which owns 16 data centers worldwide (see “Qwest’s Napoleonic Ambitions,” October 15, www.redherring.com/mag/106/qwest.html).

Today, however, most data centers are nowhere near as reliable as a central office, in which communications companies house network-switching equipment capable of routing millions of calls. Rarely, if ever, does a central office fail; they boast 99.99999 percent uptime. Meanwhile, most Internet gear cannot yet guarantee such reliability. This could thwart companies’ plans to shift more of their critical information and computing applications to data centers.

Stacking up more servers, routers, and storage devices is not the answer. “What you are doing is preparing an infrastructure for peak loads, and you do not know when those loads will happen,” says Arvind Krishna, director of Internet infrastructure research at IBM.

Companies like HP and IBM, in tandem with large telecoms like Qwest, will offer computing-on-tap. Entities will pay for computing power much the same way they purchase electrical power or any other public utility—they’ll pay for what they use. “When you make a contract with your phone company, it does not make any difference if you make 1 call or 15,000 calls. It should be the same in data centers as well,” says Mr. Krishna of IBM.

The thrust of innovation within technology will be redirected accordingly. Richard Friedrich, principal architect at HP’s Internet systems and storage labs, points to a not-so-distant future when hardware and software succumb to a “service-centric” computing model, in which processing power, storage, and software become online services.

This sea change will be as dramatic as the previous transitions from mainframes to minicomputers to client/server networks. And because enterprises are loath to get rid of their legacy equipment, it will be a step-by-step process, lasting three to five years. Supply chain, e-commerce, sales automation, and customer relationship management applications—many of which are available in versions enabled for Internet-based computing—will be outsourced to data centers. But because these are critical programs, the shift will happen only when data centers are shown to be failure-proof.

Data-center reliability hinges on new hardware dubbed blade servers—circuit boards consisting of 12 to 124 processors and ancillary chips. Typical enterprise servers use only 16 processors. Startups like Egenera, FiberCycle Networks, and Zetari, as well as industry giants like HP, Compaq Computer, and IBM are developing these new blade servers.

Here’s where it gets interesting. Data centers could provide

“infrastructure on demand” with little or no operator intervention, says HP’s Mr. Friedrich. Retail Web sites, which have greater processing and storage needs during the year-end holidays, or the U.S. Internal Revenue Service, which needs more computing resources during the tax season, could simply order additional computing when they need it, rather than acquiring enough computing power to handle peak periods and then having it remain idle during slow ones. And if data centers were connected, like the power grid, during “off-hours” in

one area, a data center could provide services for users in other parts of the world. The rudiments of such a service are offered by Rackspace Managed Hosting, a small, profitable Web-hosting operation in San Antonio, Texas.

New data-center technologies will also be profitable for their operators. Currently, data-center space costs about \$800 per square foot (including construction and equipment), but about \$212 per square foot is typically the most that data centers can charge.

“We’re running up against real physical constraints: the availability and cost of power and space. Every data center is looking at that issue and trying to optimize, as opposed to just improving performance at any cost,” says Michael Swavely, president and chief operating officer of RLX Technologies, a maker of energy-efficient servers.

By reducing space and power requirements (using more dense and efficient equipment), data-center operators are hoping to spread the total costs of ownership among hundreds of customers. Vern Brownell, founder and CEO of Egenera in Marlboro, Massachusetts, says his company’s blade servers are 50 percent cheaper than comparable legacy Unix servers used in the data centers. Similar cost savings are expected from storage

systems and equipment designed specifically for data centers. Ultimately, lower equipment costs mean lower-priced services and respectable profit margins.

Data centers will lead a fresh round of technology innovation. With their far-reaching impact, data centers will stimulate improvements in a broad swath of technology sectors, changing forever the locus of computing. ■

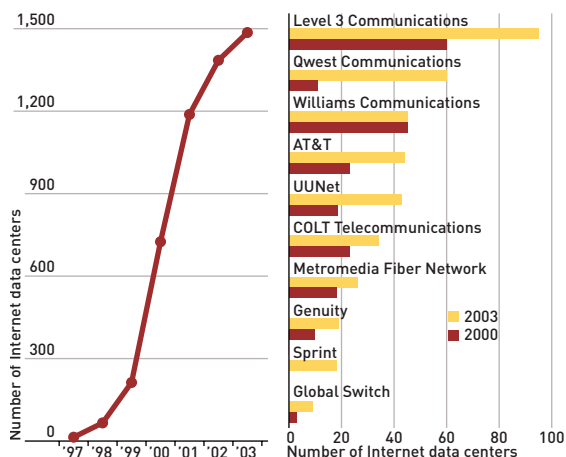
The Herring Take » Data Centers

Data centers will become hubs of Internet computing, speeding acceptance of new technologies like grid computing, wireless Web, and IP services.

WINNERS: Hardware, communication, niche-hosting, and chip companies like IBM, HP, Compaq, Qwest, Sprint, Rackspace, Interland, Ensim, and Egenera.

LOSERS: Traditional data-center operators like Exodus; legacy equipment makers like Sun Microsystems and EMC.

More and more companies will outsource applications to the data center, but the transition is expected to be slow and steady.



SOURCE: Tier 1 Research



BECAUSE THESE ARE CRITICAL PROGRAMS, THE SHIFT WILL HAPPEN ONLY WHEN DATA CENTERS ARE SHOWN TO BE FAILURE-PROOF.