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## Building-block data centers may reshape IT

Patrick Thibodeau and Eric Lai

**April 21, 2008** (Computerworld) A major transformation in the way that large data centers are built is under way, and the expected changes may have as much impact on IT productivity as the adoption of shipping containers did on operations in the freight industry starting in the late 1950s.

At that time, the shift from putting cargo on individual pallets to packing goods into much larger containers enabled shippers to load and unload vessels exponentially faster, with less labor. Now a similar transition is taking place in some data centers, via the use of [container-based systems](#) and other modular technologies.

Advocates say that replacing conventional racks of servers with systems built into shipping containers that can be rolled right into buildings will make it easier to set up data centers and add more processing power as needed. It also could pave the way for expanding the use of "compute clouds" to deliver online IT services — a development that might result in big changes within corporate IT departments.

Microsoft Corp. is one of the trailblazers of the containerized IT movement. In a suburb of Chicago, the software vendor is building a \$500 million, 500,000-square-foot data center that will hold up to [220 shipping containers](#). Each will arrive preconfigured with racks containing as many as 2,000 servers, along with networking and power-distribution equipment to facilitate the setup process.

Michael Manos, Microsoft's senior director of data center services, said the Lego-like approach being used at the new facility in Northlake, Ill., will help shake up a part of IT that's in need of some change. "Data centers are typically very conservative," Manos said. "If you look at a data center built a year ago and one built 10 years ago, they look very similar."

Consulting firm Gartner Inc. says that building-block designs such as the one Microsoft is implementing will lead to the "industrialization" of IT within megasize data centers. According to Gartner, such facilities will be able to provide the technical infrastructure needed to support compute clouds that can scale on demand as the use of Internet-based application services grows. In fact, Microsoft plans to use the Northlake facility to help meet the [processing demands](#) that its Windows Live and Office Live online services are expected to generate.

Online services can also be much less expensive for companies. For instance, Gartner analyst David Smith estimates that it costs about \$10 per month to provide e-mail services to an employee via internal systems. But doing so through an online cloud may cost only \$5 per month. "The economics are very compelling," Smith said at Gartner's Symposium/ITxpo 2008 event in Las Vegas earlier this month.

But by accelerating the adoption of utility-style computing, container-based systems could lead to a thinning of the IT worker ranks in corporate data centers — just as the advent of shipping containers reduced the need for longshoremen in ports 50 years ago. Online services "lessen your need for internal IT," said Adam Cohen, a Web architect for the municipal government of North Las Vegas.

Even the number of technicians needed to support modular systems may be less than what is required in



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conventional data centers.

The Microsoft facility will sprawl across about 12 acres of floor space and may have as many as 440,000 servers in the 220 containers that are being installed. And that's just on the first floor; an undisclosed number of additional systems will be installed on the second floor, which will have a traditional raised-floor layout.

But with just 35 full-time employees divided among the equivalent of four work shifts at the 24/7 facility, the average number of on-site staffers likely won't break double digits. "Working at a Microsoft data center can be a lonely experience," Manos said. Microsoft has similar workforces at some of its other data centers, but Manos noted that those are much smaller than the Northlake facility will be, in terms of both systems and floor space.

The impact of massive data centers like the one Microsoft is building, and the added online services that they may make possible, won't be felt quickly within IT departments. "People don't change their e-mail systems overnight," Gartner's Smith said.

Jim Bingham, CIO at the University of Kansas Medical Center, agreed that any such changes will take time within his organization. But Bingham does plan to consider external online services. "Not immediately, but definitely in the next three to five years," he said.

Vendors such as Sun Microsystems Inc., Rackable Systems Inc. and Verari Systems Inc. are selling container-based systems. IBM and Hewlett-Packard Co. have also developed modular data center technologies. But the appeal of cloud-based services may be limited in industries such as aerospace, defense and financial services, which all have to contend with numerous regulatory restrictions. And companies that have already installed integrated systems extensively may not see a great need to shift their server resources to outside providers.

John Enck, another Gartner analyst, said that containers — whether they're the 20-footers that Sun is marketing, or the 40-foot-long ones that Rackable and Verari are offering — may make sense only for companies building data centers on the same scale as Microsoft. In other words, very few. "It's about as leading-edge as you can get — and it's not for the masses," Enck said.

Customized, special-purpose servers — such as the ones Dell Inc. began offering last year to customers that buy more than 1,000 systems per quarter — may be a less-extravagant alternative.

### Inside the Box



#### MODULAR DATACENTER S20 (SUN MICROSYSTEMS, ABOVE)

Size: 20 by 8 by 8.5 ft.

Weight: 18,000 lb. (without servers) to 34,000 lb.

System Capacity: 280 server slots in seven racks, plus 40 more slots for networking and management devices

Internal Operating Temperatures: 50-95 degrees Fahrenheit

#### ICE CUBE MODULAR DATA CENTER (RACKABLE SYSTEMS)

Size: Available in 20- or 40-ft. lengths; 8 ft. wide

System Capacity: Supports up to 1,400 servers in 28 racks

#### FOREST CONTAINER SOLUTION (VERARI SYSTEMS)

Size: 40 by 8 by 9.5 ft.

System Capacity: Supports 1,400 servers or 11.5 petabytes of storage

Dell tunes all the systems in advance to support the specific applications that will run on them. One of the [early users](#) is search engine vendor Ask.com, which says the custom-designed systems have reduced its hardware costs and the amount of power its servers consume.

That kind of approach could provide data center managers with some of the modularity and efficiencies that Microsoft is aiming for in its Northlake facility, but on a more modest scale.

And even if more companies do embrace cloud-based online services in the years ahead, some users think that new opportunities will continue to open up within data centers.

After all, there is still a need for a significant number of longshoremen in U.S. ports. In fact, as trade between the U.S. and countries in Asia has increased, so has the demand for dockworkers, according to Craig Merrilees, a spokesman for the International Longshore and Warehouse Union, which represents about

25,000 longshoremen on the West Coast.

ILWU members worked 24 million hours in 2001, Merrilees said. But by last year, that figure had risen to just under 33 million hours.

Similarly, workers will still be needed to deal with online service providers, said Jason Dauwen, a software development manager at a company that makes software for financial services firms. "But it will probably be more business [analysts] than technical staff," said Dauwen, who asked that his employer not be identified.

DigitalChalk Inc., a vendor of online training systems, relies on Google Apps for its internal e-mail. And last year, it began using Amazon.com Inc.'s [Elastic Compute Cloud](#) service to support customer applications. But no IT staffers lost their jobs as a result of that move, said Troy Trolle, DigitalChalk's chief technical officer. Instead, they began managing the company's applications on the Amazon EC2 servers.