

# DEMYSTIFYING THE CLOUD

Web-based software, storage, and other services  
are enticing alternatives to do-it-yourself IT.

But different cloud vendors have different strengths.

**W**HEN PEOPLE TALK ABOUT “plugging into the IT cloud,” they generally have something very simple in mind—browser access to an application hosted on the Web. Cloud computing is certainly that, but it’s also much more. What follows is the longer, more detailed explanation.

With so much happening in the technology industry around cloud computing, *InformationWeek* set out to define the megatrend in a way that helps IT professionals not only understand the nuances, but also make informed decisions about when and where to use cloud services in lieu of on-premises software and systems. Cloud computing represents a new way, in some cases a better and cheaper way, of delivering enterprise IT, but it’s not as easy as it sounds, as we learned in a discussion with a few yet-to-be-swayed CXOs. The venue was the recent Enterprise 2.0 conference in Boston, where *InformationWeek* and TechWeb, our parent company,

brought together senior technologists from the California Public Utilities Commission, Northeastern University in Boston, and Sudler & Hennessy to engage leading cloud vendors in an open forum on The Cloud.

Everyone agreed that cloud services such as Amazon Web Services, Google Apps, and Salesforce.com CRM have become bona fide enterprise options, but there were also questions about privacy, data security, industry standards, vendor lock-in, and high-performing apps that have yet to be vaporized as cloud services. (For a recap of that give and take, see “Customers Fire A Few Shots At Cloud Computing,” June 16, p. 52; [informationweek.com/1191/preston.htm](http://informationweek.com/1191/preston.htm).)

If we learned anything from our Enterprise 2.0 cloud forum, it’s that IT departments need to know more. Our approach here is to look at cloud computing from the points of view of eight leading vendors. In doing so, we’re leaving out dozens of companies that have a role to play, but what we lack in breadth, we hope to

**By J. Nicholas Hoover and Richard Martin**





compensate for in depth.

And this analysis is just the beginning of expanded editorial coverage by *InformationWeek* on cloud computing. Visit our just-launched Cloud Computing blog on InformationWeek.com, and sign up for our new weekly newsletter, Cloud Computing Report, at [informationweek.com/newsletters](http://informationweek.com/newsletters). We're also developing video content, an in-depth *InformationWeek* Analytics report, and a live events series in the fall.

Where does cloud computing fit into your company's strategy? We'd love to hear from you.

—JOHN FOLEY ([jpfoley@techweb.com](mailto:jpfoley@techweb.com))



Selipsky is wooing developers to AWS

**AMAZON**

Amazon made its reputation as an online bookstore and e-retailer, but its newest business is cloud computing. One of the first vendors in this emerging market more than two years ago, Amazon is a good starting point for any business technology organization trying to decide where and when to plug into the cloud.

Amazon's cloud goes by the name Amazon Web Services (AWS), and it consists, so far, of four core services: Simple Storage Service (S3); Elastic Compute Cloud (EC2); Simple Queuing Service; and, in beta testing, SimpleDB. In other words, Amazon now offers storage, computer processing, message queuing, and a database management system as plug-and-play services that are accessed over the Internet.

A tremendous amount of IT infrastructure is required to provide those services—all of it in Amazon data centers. Customers pay only for the services they consume: 15 cents per gigabyte of S3 storage each month, and 10 to 80 cents per hour for EC2 server capacity, depending on configuration.

Already, AWS represents three of the defining characteristics of the cloud: IT resources provisioned outside of the corporate data center, those resources accessed over the Internet, and variable cost.

Amazon's first cloud service was S3, which provides unlimited storage of documents, photos, video, and

**DIG DEEPER**

**SAAS STRATEGY** Web-based apps can be a compelling alternative to on-premises software, but you need a plan.

Download this *InformationWeek* Report at:

[informationweek.com/1182/report\\_saas.htm](http://informationweek.com/1182/report_saas.htm)

See all our Reports at [informationweekreports.com](http://informationweekreports.com)

other data. That was followed by EC2, pay-as-you-use computer processing that lets customers choose among server configurations.

Why is Amazon moving so aggressively into Web services? In its rise to leadership in e-commerce, the company developed deep technical expertise and invested heavily in its data centers. Now it's leveraging those assets by opening them to other companies, at a time when many CIOs are looking for alternatives to pumping more money into their own IT infrastructures. "What a lot of people don't understand is that Amazon is at heart a technology company—not a bookseller or even a retailer," says Adam Selipsky, VP of product management and developer relations for AWS.

Developers—defined as anyone, from individuals to the largest companies, who signs up for AWS—are glomming onto Amazon's infrastructure to develop and deliver applications and capacity without having to deploy on-premises software and servers. More than 370,000 developers are on board.

Amazon Web Services weren't aimed initially at big businesses, but enterprises are tapping in for the same reasons that attract small and midsize businesses—low up-front costs, scalability up and down, and IT resource flexibility. To better support large accounts, Amazon began offering round-the-clock phone support and enterprise-class service-level agreements a few months ago. For instance, if S3 availability falls below 99.9% in a month, customers are entitled to at least a 10% credit. Amazon isn't foolproof—its consumer-facing Web site recently suffered a series of outages and slowdowns.

Amazon hasn't morphed into a software-as-a-service vendor, but startups and other software developers are using AWS to offer their own flavors of SaaS. They include Vertica, which sells S3-based data warehouses, and Sonian, which built its archive service on Amazon infrastructure.

**GOOGLE**

Google built a supercharged business model around searching the Internet. Now it's opening its cloud to businesses in the form of application hosting, enterprise search, and more.

In April, Google introduced Google App Engine, a service that lets developers write Python-based applications and host them on Google infrastructure at no cost with up to 500 MB of storage. Beyond that, Google charges 10 to 12 cents per "CPU core hour" and 15 to 18 cents per gigabyte of storage. This month, Google dis-

closed plans to offer hosted enterprise search that can be customized for businesses.

Yet Google, like Amazon, has demonstrated the risks of cloud computing. Google App Engine last week was crippled for several hours. Google blamed the outage on a database server bug.

For end users, there's Google Apps—Web-based documents, spreadsheets, and other productivity applications. Google Apps are free or \$50 per user annually for a premium edition. Microsoft's PC-based Office 2007 suite, by comparison, costs up to \$500 per user.

More than half a million organizations have signed up for Google Apps—including General Electric and Procter & Gamble—and there are now some 10 million Google Apps users. But keep that in perspective: The majority of those users are consumers, college students, and employees of small businesses, not the corporate crowd. Google senior product manager Rajen Sheth acknowledges that Google's apps aren't intended to replace business tools like Office.

Google has taken steps to make its applications, originally aimed at consumers, more attractive to IT departments. Last year, the company acquired Postini, whose hosted e-mail security and compliance software is now part of Google Apps, and in April it partnered with Salesforce.com to integrate Salesforce CRM and Google Apps, including a premium package that comes with phone support and third-party software for \$10 per user each month.

Google is also adjusting to the reality that users sometimes need to work offline. Google Gears is a browser plug-in for doing that.

Google has teamed with IBM to provide cloud computing to university students and researchers. The Google-IBM cloud is a combination of Google ma-

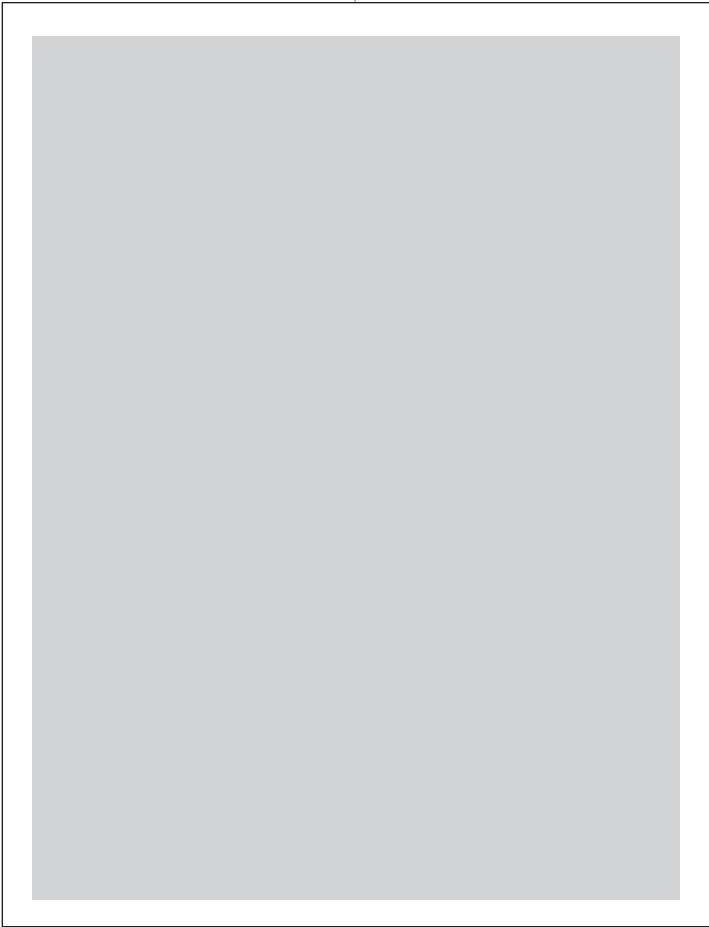
chines and IBM BladeCenter and System x servers running Linux, Xen virtualization, and Apache's open source Hadoop framework for distributed applications.

"One great advantage we have, and one of the reasons we started to explore this, is that we run one of the largest online apps in the world, if not the largest," says Sheth, referring to Google's Web search engine. The project, Sheth says, will help "foster new innovation and new ideas" about cloud computing.

Google and IBM have been cagey about any plans to extend their cloud collaboration to enterprises, but

it would be an obvious next step. "There's not that much difference between the enterprise cloud and the consumer cloud" beyond security requirements, Google CEO Eric Schmidt said a few weeks ago. "The cloud has higher value in business. That's the secret to our collaboration."

With its plug-and-compute simplicity, the cloud seems ethereal, but don't be fooled. Google's cloud represents a massive investment in IT infrastructure. Google has recently completed or is in the processing of building new data centers in Iowa, Oregon, North Carolina, and South Carolina, at an average cost of about \$600 million each.



## SALESFORCE

Salesforce became the proving ground for software as a service with its Web alternative to premises-based sales force automation applications, and dozens of SaaS companies followed. Salesforce's next act: platform as a service.

Marc Benioff's company is making its Web application platform, Force.com, available to other companies as a foundation for their own software services. Force.com includes a relational database, user interface options, business logic, and an integrated development environ-

**IN DEPTH / CLOUD COMPUTING**

ment called Apex. Programmers can test their Apex-developed apps in the platform's Sandbox, then offer the finished code on Salesforce's AppExchange directory.

In the early going, developers used Force.com to create add-ons to Salesforce CRM, but they're increasingly developing software unrelated to Salesforce's offerings, says Adam Gross, the vendor's platform VP. Game developer Electronic Arts built an employee-recruiting application on Force.com, and software vendor Coda crafted a general ledger app.

At the same time, Salesforce continues to advance its own applications, which are now being used by 1.1 million people. An upgrade due this summer will include the ability to access Google Apps from within a Salesforce application, more than a dozen new mobile features, an "analytics snapshot," enhanced customer portals, and improved idea exchange and content management.

Salesforce is getting into other cloud services, too. In April 2007, it jumped into enterprise content management with Salesforce Content, which lets users store, classify, and share information similar to Microsoft SharePoint and EMC Documentum.

Salesforce has adopted a multitenant architecture, in which servers and other IT resources are shared by customers rather than dedicated to one account.

"There's no question there's an evangelism involved with doing multitenancy, but, with education, customers quickly come on board with the model," says Gross.

The proof is in the sales figures. Salesforce's revenue grew to \$248 million in the quarter ended April 30, a 53% increase over the same period a year ago, keeping it on pace to become the first billion-dollar company to generate almost all of its sales from cloud computing.

**MICROSOFT**

If any technology company has had its cloud strategy questioned, it's Microsoft. Now, after a couple of years of putting the pieces into place, Microsoft is showing progress.

Some vendors envision a future where most, if not all, IT resources come from the cloud, but Microsoft isn't one of them. Its grand plan is to provide "symmetry between enterprise-based software, partner-hosted services, and services in the cloud," chief software architect Ray Ozzie said a few months ago. More simply, Microsoft calls it "software plus services."

Microsoft's first SaaS offerings for business, rolling out this year, are Dynamics CRM Online, Exchange Online, Office Communications Online, and Share-

# SMBs Will Rise To Cloud Computing

**I**F CLOUD COMPUTING OFFERS benefits to enterprise IT departments, it's an absolute godsend to small and midsize companies. Instead of making do with a small, under-resourced IT staff trying to emulate the productivity of IT outfits with multimillion-dollar budgets, smaller companies can now access enterprise-class technology with low up-front costs and easy scalability.

Important as those things are, they're only the first steps in a larger shift. Cloud computing doesn't just level the playing field—it promises to tilt it in the other direction. Simply put, today's most powerful and most innovative technology is no longer found in the enterprise. The cloud makes leading-edge technology available to everyone, including consumers, often at a far lower cost than businesses pay for similar or inferior services.

Years ago, most people had access to the best technology at work, Google VP

Dave Girouard said recently. "You had a T1 line to access the Internet at the office, for example, then went home to watch three channels of TV."

Those days are gone. Compare a typical Exchange Server, offering perhaps 500 MB of e-mail storage per user, to Web-based e-mail services that give users up to 7 GB of storage at no cost. (Google's corporate version offers 25 GB per user for \$50 a year.) Likewise, compare on-premises enterprise content management systems to easier-to-use and more-flexible cloud-based publishing and sharing systems like Blogger, Flickr, and Facebook. They're free, too.

Those comparisons may not be relevant to big companies, but they are to SMBs. While large enterprises typically



use the cloud for infrastructure services such as storage, SMBs are more likely to plug into the cloud for day-to-day productivity applications, says Michelle Warren, a senior analyst at Info-Tech Research.

In fact, as cloud computing matures, we'll see small companies rely on the cloud for more and more of their technology needs, gradually eschewing the costs and complexity of in-house IT infrastructure.

"We're moving toward a world where IT is outsourced," Warren says. "Maybe not 100%, but 95%. It will happen more in the SMB than in the enterprise, for sure."

—FREDRIC PAUL, publisher and editor in chief of TechWeb's bMighty.com, which provides technology information to SMBs

Point Online. Each will be available in a multitenant version, generally for small and midsize businesses, and a single-tenant version for companies requiring 5,000 or more licenses. For consumers, Microsoft's online services include Windows Live, Office Live, and Xbox Live.

A handful of large companies—Autodesk, Blockbuster, Energizer, and Ingersoll-Rand among them—are early adopters. Anyone who doubts that Microsoft has entered the cloud services game should consider this: Coca-Cola plans to subscribe to 30,000 seats of Microsoft-hosted Exchange and SharePoint by next year.

Microsoft senior VP Chris Capossela says customers can mix and match hosted and on-premises versions of its software, an attractive option for companies with branch offices that lack IT staff. Microsoft hasn't disclosed pricing for its online services, but Capossela says it's naive to think that cloud services will be cheaper than on-premises software over the long haul. "You're going to pay forever," he says. "It's a subscription, for goodness' sake."

What's next? A project called MatrixDB would extend on-premises SQL Server databases to Microsoft-hosted databases in the cloud. That's still a couple of years away, but it hints at future possibilities. And Microsoft points to BizTalk Services, its hosted business process management software, as one element in a forthcoming "Internet service bus" that functions like an enterprise service bus, albeit online.

As for the Windows operating system, Microsoft's upcoming synchronization platform, Live Mesh, and some of the Windows Live services will be more tightly integrated with it.

The shift to cloud services has forced Microsoft to rethink not just the way its products are architected, but its data center strategy, too. For years, Microsoft leased

its major data centers, but it has now begun to design, construct, and own them, with U.S. facilities recently completed or under construction in Illinois, Texas, and Washington, and another under way in Dublin, Ireland.

## SUN MICROSYSTEMS

John Gage, Sun Microsystems' co-founder, coined the phrase "the network is the computer" nearly 20 years ago. Arguably, that was the beginning of the cloud—but the wind changed direction.

Sun "got it backwards," CTO Greg Papadopoulos

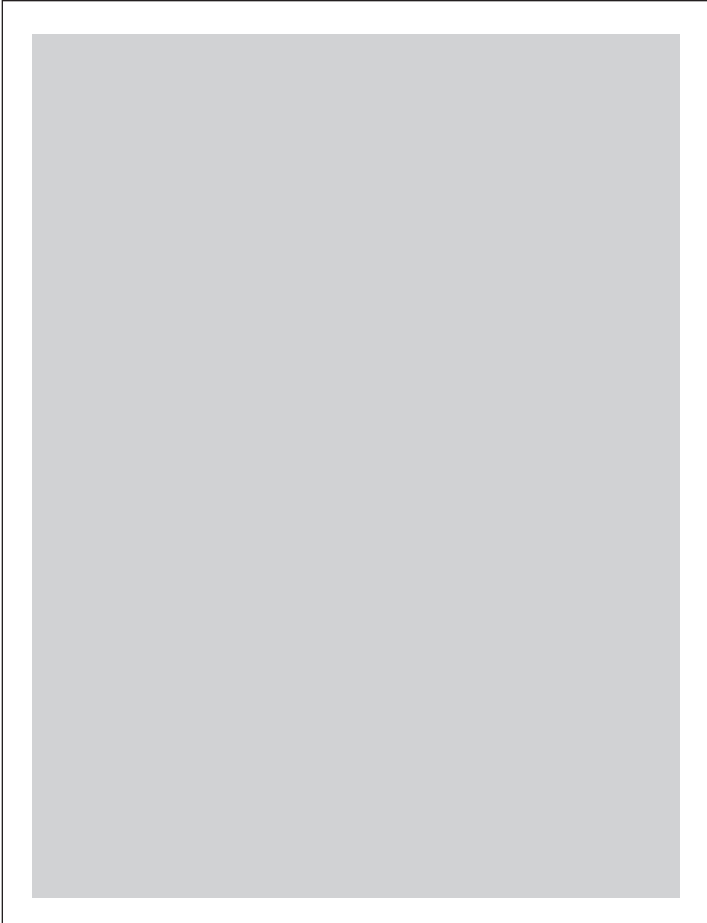
now says. How so? With its Sun Grid technology, Sun focused on mission-critical, highly redundant data center environments. "We found that nobody cared about that," says Papadopoulos. "They just want it to be easy to use."

Making cloud computing easy to use is now the focus of two initiatives at Sun: Network.com, a collection of grid-enabled online applications available on a pay-per-use basis, and Project Caroline, a research effort to make cloud-based resources available to developers working on Web applications and services. They coincide with what Papadopoulos calls "Red Shift," his theory that computing demand

will exceed capacity at many companies. The obvious solution: cloud computing.

Network.com is evolving into a "virtual on-demand data center" that customers can use in real time as business demands change, says senior director of software Mark Herrin.

Project Caroline is intended to become a hosting platform for SaaS providers. The goal is to make it "far more efficient to develop multiuser Internet services rapidly, update them frequently, and reallocate resources flexibly and cost-efficiently," according to Sun. An open





## IN DEPTH / CLOUD COMPUTING

source project led by Sun VP of technology Rich Zippel, Caroline supports applications built in several programming languages, including Java, Perl, Python, Ruby, and PHP. "We don't really think that 'all applications will tie back to Sun servers on the Internet,'" Zippel writes on his blog. "We're really bullish about the ability to develop, deploy, and deliver software services on the Internet."

Like Microsoft, Sun expects businesses to continue to need some of their own IT infrastructure. Sun's data-center-in-a-box, Blackbox, is designed for companies that face massive computing requirements but aren't ready to shift all their infrastructure to the cloud. Similarly, Sun's Constellation groups together Sun Blade 6000 servers.

"The public clouds will be spillover points for enterprises," says Papadopoulos. "They'll be able to make a judgment. I may not like my crown-jewel data living in the cloud, but it'd be good to pull in another 1,000 nodes and do some work."

### IBM

IBM last year unveiled Blue Cloud, a set of offerings that, in IBM's words, will let corporate data centers "operate more like the Internet by enabling computing across a distributed, globally accessible fabric of resources." The pieces of Blue Cloud include virtual Linux servers, parallel workload scheduling, and IBM's Tivoli management software. In the first phase, IBM is targeting x86 servers and machines equipped with IBM's Power processors; in phase two, IBM will loop in virtual machines running on its System z mainframes. Blue Cloud is "not just about running parallel workloads but about more-effective data center utilization," says Denis Quan, CTO of IBM's High Performance On Demand Solutions unit.

IBM's first commercial cloud computing data center is going up in Wuxi, in southern China. It will provide virtualized computing resources to the region's chip-making companies.

IBM's advantage in cloud computing is its expertise in building, supporting, and operating large-scale computing systems. IBM got into cloud computing a few years ago with its Technology Adoption Program, an "innovation portal" run out of the Almaden Research Center to give engineers on-demand resources, such as DB2 databases and Linux servers.

Last October, IBM announced a partnership with Google to provide cloud computing gateways to universities. Intended as a way of teaching university students how to use parallel programming models, the initiative is "critical to the next generation of cloud-based applications," Quan says. Three cloud computing



Cloud computing must be easy, says Sun's Papadopoulos

centers for academia have gone live, one at Almaden, one at the University of Washington in Seattle, and one in a Google data center.

For IT departments, IBM's cloud software, systems, and services can be brought together into what the vendor calls the "New Enterprise Data Center," with quality-of-service guarantees to reassure CIOs that there's nothing hazy about the cloud.

### ORACLE

Despite its sometimes-contradictory signals, Oracle was an early proponent of the on-demand model, launching Oracle Business OnLine in 1998. At that time, CEO Larry Ellison described the new Web-based delivery model as an extension of the company's existing software business. Today, it's clear that Oracle's destiny lies in the cloud, even if the company has been reluctant to switch its lucrative on-premises software license business over to a subscription model.

Speaking to financial analysts last September, Ellison downplayed the SaaS movement, saying there's no profit to be made in delivering applications over the Internet. (He's obviously wrong on that point.) President Charles Phillips has said Oracle plans a "stair-step" approach to the cloud, gradually moving on-premises customers over to Web-based software.

Oracle got into cloud computing in one fell swoop with its 2005 acquisition of Siebel Systems for \$5.8 billion. At the time, Oracle executives called the deal a beachhead against SAP, but it's clear in hindsight that Siebel's on-demand CRM applications were every bit as important to Oracle's long-term strategy. Oracle On Demand comprises much of the vendor's software stack, including the company's flagship database.

Oracle has developed a "pod" architecture for its on-demand data centers. Pods can be configured for indi-

vidual customers, in clusters for large companies with multiple departments, or in multitenant versions for shared use.

Oracle's on-demand business generated \$174 million in revenue in the fiscal quarter ended March 26, up 23% from the same quarter last year, and it's on track for \$700 million for the year. While On Demand represents only about 3% of Oracle's revenue, it's the fastest-growing part of the business, with 3.6 million users.

To support growth, Oracle, like other cloud service providers, is building a new data center. This summer, it will break ground on a 200,000-square-foot facility in Utah and puts the initial investment at \$285 million.

## EMC

CEO Joe Tucci barely touched on EMC's plans for cloud computing at EMC World last month, but you can be sure he's thinking about it. The cloud by its very nature is a virtual computing environment, and where there's virtualization, there's EMC, owner of VMware.

Earlier this year, EMC acquired personal information management startup Pi and, with it, former Microsoft VP Paul Maritz, who's been tapped as president of EMC's new cloud infrastructure and services division. In fact, the acquisitive EMC has been pulling in for a few years companies that bolster its abilities to deliver on cloud computing. In 2004, it bought Smarts, whose software configures distributed networks and monitors storage. And last year, EMC acquired Berkeley Data Systems and its Mozy backup services.

EMC has expertise in information life-cycle management, which is one area where it expects to have a role in cloud computing. "If we look at EMC's core asset portfolio, all of the key areas of the information infrastructure lend themselves not only to current models of

up-front acquisition but also the new model of SaaS and pay-as-you-go subscription delivered over the Internet," says CTO Jeff Nick.

Nick sees companies moving to cloud storage and information management services as a way to "outtask" jobs to cloud computing vendors. "The key to storage in a cloud environment is not just to focus on bulk capacity but as much as possible make it self-managing, self-directive, and self-tuning," Nick says.

What kinds of cloud services might EMC offer? Storage is a no-brainer, though it doesn't have such an

offering yet. Beyond that, EMC might be able to bridge compliance monitoring across online and on-premises storage. EMC sees opportunities for SaaS business process management and collaboration, as well as personal information management for consumers. Data indexing, archiving, disaster recovery, and security are all possibilities, too, Nick says. Several of EMC's acquired businesses, including Documentum (indexing and archiving), RSA (security), and Infra (IT service management) are likely paths to getting there.

EMC's VMware division will find its way into the mix. "We want to be the plumbing and the enabler of

cloud computing," says VMware CTO Stephen Herrod.

Like his colleague Nick, Herrod is looking ahead. He hints at enabling on-premises server infrastructure to scale up via on-demand virtual servers, disaster-recovery scenarios, and using management software like that acquired in VMware's purchase of B-hive Networks to maintain service-level agreements.

In other words, today's cloud represents just the beginning of many new possibilities.

Write to J. Nicholas Hoover at [nhoover@techweb.com](mailto:nhoover@techweb.com).