

Should Businesses Move to the Cloud?

CASE STUDY

Cloud computing has just begun to take off in the business world. The biggest player in the cloud computing marketplace is one you might not expect: Amazon. Under its Web Services division (AWS), Amazon has streamlined cloud computing and made it an affordable and sensible option for companies ranging from tiny Internet-start-ups to established companies like FedEx.

AWS provides subscribing companies with flexible computing power and data storage, as well as data management, messaging, payment, and other services that can be used together or individually as the business requires. Anyone with an Internet connection and a little bit of money can harness the same computing systems that Amazon itself uses to run its now \$48 billion a year retail business. To make the process of harnessing the cloud simpler, Amazon added an automated service called CloudFormation that helps customers get the right amount of computing resources. Customers provide the amount of server space, bandwidth, storage, and any other services they require, and AWS can automatically allocate those resources.

Since its launch in March 2006, AWS has continued to grow in popularity, with \$1 billion in business in 2011 and hundreds of thousands of customers across the globe. In fact, Amazon believes that AWS will someday become more valuable than its vaunted retail operation. Amazon's sales pitch is that you don't pay a monthly or yearly fee to use their computing resources—instead, you pay for exactly what you use. For many businesses, this is an appealing proposition because it allows Amazon to handle all of the maintenance and upkeep of IT infrastructures, leaving businesses to spend more time on higher-value work.

The difference between cloud computing today and the cloud computing of the past is the scale of today's clouds and the amount of digital data requiring storage. This number has increased exponentially in the past few years. Web companies used to build dozens of data centers, often up to a half a billion dollars in cost per center. Leading cloud companies such as Amazon, Google, and Microsoft have built software that uses automated methods to spread data across the globe and control thousands of servers, and they have refined data center designs with the goal of increasing efficiency. Now, more

than ever, companies are turning to cloud computing providers like these for their computing resources.

Zynga is a good example of a company using cloud computing to improve its business in a new way. Zynga is the developer of wildly popular Facebook applications like *FarmVille*, *Mafia Wars*, and many others. With over 290 million monthly active users, Zynga's computing demands are already significant. When Zynga releases a new game, however, it has no way of knowing what amount of computing resources to dedicate to the game. The game might be a mild success, or a smash hit that adds millions of new users. The ability to design applications that can scale up in the number of users quickly is one of Zynga's competitive advantages.

Because of the uncertainty surrounding resource usage for new game launches, Zynga uses Amazon's cloud computing platform to launch new offerings. That way, it can pay only for the resources it ends up using, and once game traffic stabilizes and reaches a steady number of users, Zynga moves the game onto its private zCloud, which is structurally similar to Amazon's cloud, but operates under Zynga's control in data centers on the East and West coasts. Zynga's own servers handle 80 percent of its games. (Zynga recently started selling extra capacity on zCloud to other game-makers.) To streamline the process of moving application data from Amazon to the zCloud, Zynga has automated many computing tasks, selected hardware and chip configurations that are very similar to Amazon's, and makes significant use of virtualization.

There are a few reasons why Zynga is well-suited to use this combination of public and private clouds. The first is its business model, which involves games that have a tendency to be boom or bust. Rather than spending on computing resources of its own before the launch of each game, it's much more cost-effective to use Amazon's cloud services until Zynga can more accurately predict the computing power it needs. As a recent start-up, Zynga lacks the accumulated legacy systems and infrastructure typically found in older companies. The more systems a company has, the tougher it is to integrate its applications and data with cloud systems.

Although the consequences for server downtime are not as catastrophic for Zynga as they would be for a financial services firm, Zynga still needs

99.9 percent uptime. On its own financial reports, Zynga recognized that a significant majority of its game traffic had been hosted by a single vendor and any failure or significant interruption in its network could negatively impact operations. Amazon Web Services had an outage for several hours in April 2011 that made it impossible for users to log into some of Zynga's games.

However, owning data centers also comes with risks. If the demand for Zynga's games were to drop dramatically, Zynga would have too much IT infrastructure on its hands and losses could result. The most likely scenario has Zynga owning part of its data centers and relying on external services such as Amazon for the rest.

Not all companies use cloud computing in the same way that Zynga does, but many do. Outback Steakhouse wasn't sure how popular an upcoming coupon promotion would be, so the company used Microsoft's Azure cloud to launch the promotion. Outback ended up selling an unexpectedly large 670,000 coupons. Using the cloud, it was able to avoid taxing in-house systems unnecessarily.

InterContinental Hotels has revamped its infrastructure to include both private and public cloud usage. To improve response time for customers, InterContinental moved its core room reservation transaction system onto a private cloud within its own data center, but it moved room availability and pricing Web site applications onto public cloud data centers on the East and West coasts. In fact, InterContinental hopes to put all of its publicly accessible information in these public clouds so that customers receive faster results to site queries. Customers receive data faster if the data are located on a server that is physically close to them, and cloud computing helps InterContinental to take advantage of this.

Start-up companies and smaller companies are finding that they no longer need to build a data center. With cloud infrastructures like Amazon's readily available, they have access to technical capability that was formerly only available to much larger businesses. For example, online crafts marketplace Etsy uses Amazon computers to analyze data from the 1 billion monthly views of its Web site. Etsy can then use its findings to create product recommendation systems that allow customers to rank which products they like best and to generate a list of 100 products they might enjoy. Etsy's engineers and managers are excited about their ability to handle these types of issues on someone else's computer systems.

IBM, Cisco, and other traditional data center giants realize that cloud computing is a threat to their technology infrastructure business. As a solution to rising computing costs, they have been steering their customers toward virtualization software, which allows them to run many more applications on each individual server that they buy. There are also many companies that simply have too much legacy technology to use the cloud effectively. For example, Credit Suisse has 7,000 software applications running on its systems that have been developed over the past 20 years. Ensuring that all of these applications would work the same way in the cloud would be more trouble than it's worth.

Many other companies share Zynga's concern about cloud reliability and security, and this remains a major barrier to widespread cloud adoption. Amazon's cloud experienced significant outages in April and August 2011 and again on June 14 and 29, 2012. Normally, cloud networks are very reliable, often more so than private networks operated by individual companies. But when a cloud of significant size like Amazon's goes down, it sends ripples across the entire Web.

According to Amazon, a simple network configuration error caused a major multiday service outage in Amazon's East Coast region from April 21–24, 2011. Amazingly, the error was most likely a simple error made by a human being during a routine network adjustment. Sites affected included Reddit, Foursquare, Engine Yard, HootSuite, Quora, Zynga, and many more. On June 14 and June 29, 2012, AWS suffered outages due to power failures in its primary East Coast data center in North Virginia. Many popular Web sites, including Netflix, Heroku, Quora, and Pinterest, as well as Web sites of smaller companies, were knocked offline for hours.

The outages were proof that the vision of a cloud with 100 percent uptime is still far from reality. Experts have conflicting opinions of how serious this is. A June 2012 report issued by the Paris-based International Working Group on Cloud Computing Resiliency estimated that the major cloud computing services were down about 10 hours per year or more, with average availability at 99.9 percent or less. Even this small amount of downtime can lead to large revenue losses for firms that need 24/7 availability. Nevertheless, some large cloud users such as Netflix believe that overall cloud service availability has steadily improved. Neil Hunt, Netflix's chief product officer, believes the cloud is becoming more reliable, and that AWS gives Netflix much larger scale and technical expertise than it would have otherwise. A

number of experts recommend that companies for whom an outage would be a major risk consider using another computing service as a backup.

Still, cloud computing has finally gone mainstream, and the major cloud providers have the sales numbers to prove it. Amazon, Microsoft, Google, and other cloud providers will have to continue to work to avoid outages, while other companies must decide whether the cloud is right for them, and if so, how to most effectively use the cloud to enhance their businesses.

Sources: Charles Babcock, "How Game-Maker Zynga Became a Cloud Vendor," *Information Week*, May 14, 2012; Charles Babcock, "Cloud's Thorniest Question: Does It Pay Off?" *Information Week*, June 4, 2012; Zack Whittaker, "Amazon Explains Latest Cloud Outage: Blame the Power," *ZDNet*, June 18, 2012; Stuart J. Johnston, "Cloud Outage of 13 Providers Reveals Downtime Costs," *searchcloud-computing.com*, June 22, 2012; Charles Babcock, "4 Companies Getting Real Results from Cloud Computing," *Information Week*, January 15, 2011; Charles Babcock, "Amazon Launches CloudFormation to Simplify App Development," *Information Week*,

February 28, 2011; Ashlee Vance, "The Cloud: Battle of the Tech Titans," *Bloomberg Businessweek* (March 3, 2011); Peter Svensson; Steve Lohr, "Amazon's Trouble Raises Cloud Computing Doubts," *The New York Times*, April 22, 2011; Charles Babcock, "Post Mortem: When Amazon's Cloud Turned on Itself," *Information Week*, April 29, 2011; Patrick Thibodeau, "Amazon Cloud Outage Was Triggered by Configuration Error," *Computerworld*, April 29, 2011; and Charles Babcock, "Zynga's Unusual Cloud Strategy is Key To Success," *Information Week*, July 1, 2011.

CASE STUDY QUESTIONS

1. What business benefits do cloud computing services provide? What problems do they solve?
2. What are the disadvantages of cloud computing?
3. How do the concepts of capacity planning, scalability, and TCO apply to this case? Apply these concepts both to Amazon and to subscribers of its services.
4. What kinds of businesses are most likely to benefit from using cloud computing? Why?