



Cloud Computing and the Software Industry

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In recent years, “cloud computing” has emerged as an important trend in information technology. As the world’s foremost advocate for the software industry, the Business Software Alliance (BSA) is actively involved in addressing the opportunities and challenges raised by cloud computing.

What is cloud computing?

The US [National Institute of Standards and Technology defines cloud computing](http://csrc.nist.gov/groups/SNS/cloud-computing/) as “a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.” Cloud computing “is still an evolving paradigm” and covers “a large ecosystem of many models, vendors, and market niches,” according to NIST. (<http://csrc.nist.gov/groups/SNS/cloud-computing/>)

Cloud computing encompasses several related trends in information technology:

- Off-premises data centers offering computing services on an industrial scale;
- “Software as a service” (SaaS) delivered to customers via the Internet on an as-needed basis; and
- Broadband networks connecting a growing number of devices to these services, often wirelessly.

Millions of consumers have embraced cloud services that allow them to access applications and data from almost any location. A growing number of businesses, particularly smaller companies, are leasing server capacity and using Internet-based applications to perform key business functions.

Government agencies also are embracing cloud computing. In September 2009, the US General Services Administration (GSA) launched Apps.gov, an online “storefront” for federal IT customers to browse and purchase cloud computing services. During the BSA CTO Forum in Washington on September 21, 2009, US Federal Chief Information Officer Vivek Kundra told BSA members that cloud computing would allow the government to leverage common platforms across multiple agencies; reduce ownership

of infrastructure; save taxpayer dollars; and improve citizen access to services and information.

Infrastructure and Software Trends

In the traditional computing model, each business maintained its own data center with its own servers. As businesses added applications, they added servers to run the new applications separately to ensure the stability of the overall system. However, the capacity of such servers was often highly underutilized. Although the servers were not expensive, their proliferation increased electricity and cooling requirements, as well as the need to staff data centers with qualified systems administrators.



From left: Software CTOs Raj Nathan of Sybase, Mark Bregman of Symantec, and Dave McQueeney of IBM Federal discuss cloud computing and other topics with Vivek Kundra, US Federal Chief Information Officer, as part of the BSA CTO Forum, September 21, 2009.

The solution that arose was “virtualization” software, which enables servers to run multiple operating systems and applications at once, effectively transforming servers into many “virtual machines” that customers can access remotely. Users, particularly those with variable demand (such as seasonal businesses), can vary their consumption without needing to invest in enough servers to meet peak demand year round.

Companies that have built large “server farms” to offer these services include Microsoft, Amazon, Google, and Yahoo. Such facilities tend to be located where land, electricity, cooling, and labor are less expensive, and they may be located across national borders.

Other technical trends driving the adoption of cloud computing include the spread of affordable, high-capacity broadband networks (cable, fiber-optic, satellite, and wireless), and the development of more powerful, low-cost computer processing chips. The combination of these two factors allows a growing number of devices – such as laptops, “netbooks,” mobile phones, specialized handhelds, smart meters and appliances – to be embedded with more intelligent, portable, and “connected” capabilities.

In tandem with the evolution of physical infrastructure, a growing portion of software is being designed as service-oriented architecture (SOA) – services that users can mix and match as needed – and being distributed online, often for a pay-as-you-go charge. The core of the software may not reside on the user’s premises but rather on the provider’s servers, with access via the user’s Internet browser.

Pros and Cons Affecting Adoption of the Cloud Model

Beyond hardware and software capabilities, a variety of business factors are influencing the adoption of the cloud computing model.

The size of a given organization is one factor. According to a 2008 McKinsey & SandHill Enterprise Software Customer Survey, small companies are most interested in

the convenience and cost savings of subscription-based and on-demand applications, while large companies are more interested in on-premise applications and managed hosting.ⁱ

The types of applications and data being handled are another factor. Because cloud computing depends on Internet access -- which may suffer from latency and outages -- applications that are graphics-intensive, require large data flows, or handle business-critical functions are likely to stay on the premises. Also, organizations that handle sensitive data, such as financial and health care services, may face heightened legal and regulatory risks to the extent they transmit such data across various networks and store it with unrelated entities.

A 2008 survey by research firm IDC revealed the following views of enterprise software experts on the pros and cons of cloud computing.ⁱⁱ

Benefits commonly ascribed to cloud computing

- Easy/fast to deploy 63.9%
- Pay only for what you use 61.5%
- Less in-house IT staff, costs 57.0%
- Low monthly payments 53.3%
- Offers latest functionality 50.0%
- Encourages more standard IT 46.3%
- Sharing systems/information simpler 43.4%
- It's the way of the future 29.1%

(Percentage of respondents who said these benefits were "important" or "very important")

Challenges/concerns ascribed to cloud computing

- Security 74.6%
- Performance 63.1%
- Availability 63.1%
- Hard to integrate with in-house IT 61.1%
- Not enough ability to customize 55.8%
- Worried on-demand will cost more 50.4%
- Bringing back in-house may be difficult 50.0%
- Regulatory requirements prohibit cloud 49.2%
- Not enough major suppliers yet 44.3%

(Percentage of respondents who said these concerns were "significant" or "very significant")

The availability of reliable, inexpensive broadband service is another factor affecting the adoption of cloud computing. Government policies to accelerate broadband investment may play an important role in the uptake of cloud computing.

Given the various pros and cons, cloud computing is expected to grow and become a more significant element of software and IT business models – but not an outright replacement of such models.

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Market Trends

IDC estimates that of the approximately \$383 billion spent in five major IT segments in 2008, \$16.2 billion – or just 4% – was consumed as cloud services. From 2009 to 2012, IDC expects spending on cloud services to grow almost threefold to \$42.2 billion. This level of spending will still be just 8.5 percent of all worldwide IT spending of \$493.7 billion. But spending on cloud computing will accelerate throughout the forecast period, capturing 25% of IT spending growth in 2012 and nearly a third the following year. Among the five market segments studied, business applications dominate cloud services spending both in 2008 and 2012. ⁱⁱⁱ

Worldwide IT cloud services spending by product/service type

	<u>2008</u>	<u>2012</u>
Business Applications	57%	52%
Infrastructure Software	18%	18%
Application Development and Deployment	11%	9%
Servers	9%	8%
Storage	5%	13%

Source: IDC, October 2008

BSA Members Are Leaders in Cloud Computing

Although BSA's software company members have traditionally come from the desktop applications and enterprise hardware markets, many are already leaders in cloud services delivered directly to customers, or in products and services that support the cloud ecosystem. Here is a sampling of such initiatives:

- **Apple:** Apple has announced plans to allow users to create, edit and store documents online with access from any computer. Apple also offers Ylastic, a tool to manage and monitor Amazon's cloud computing services via the iPhone.
- **CA:** CA offers a number of cloud products and services such as CA Identify and Access Management and infrastructure management solutions. In June 2009, CA acquired certain assets from Cassatt Corporation, a provider of cloud computing software that makes data centers more efficient.
- **Cisco:** Cisco offers a data center platform called the Unified Computing System, which unites computing, storage, access, and virtualization into a single system that provides infrastructure as a service.

- **IBM:** IBM offers a variety of cloud computing services, including its Computing on Demand product for enterprises, which provides computing capacity on an hourly, weekly, or yearly basis.
- **Microsoft:** Windows Azure is a cloud services operating system that provides developers with on-demand computing and storage needs to host, scale, and manage Web applications through Microsoft data centers. A Microsoft-backed research organization, Cloud Computing Futures, is focused on reducing the operational costs of data centers and increasing their adaptability and resilience to failure. Microsoft also provides its Office and SharePoint applications as cloud offerings.
- **SAP and Sybase:** In March 2009, the two companies announced a collaboration to deliver the SAP Business Suite for the first time to iPhone, Windows Mobile, BlackBerry and other mobile devices by integrating the SAP software with Sybase's mobile enterprise application platform.
- **Symantec:** Symantec offers Veritas Operations Services, an online services platform to help organizations identify risks in their data centers. It also recently announced a beta version of GoEverywhere, a secure online workspace that allows users to access their Web applications anytime, anywhere, using almost any device enabled with a Web browser.

Policy and Anti-Piracy Issues

The cloud computing trend presents a number of policy and legal implications for the software and IT industries, as well as the broader economy and society at large.

For example, under the cloud computing model, service providers may store and transmit sensitive data such as personal financial and health records, and this data may cross international boundaries as it is handled. This is raising questions about privacy, security, liability, and law enforcement. Cloud computing may also raise issues in government procurement, particularly if governments abandon impose certain mandates or preferences on cloud services.

BSA supports technology neutrality and opposes "one-size-fits-all" approaches to technology issues. Specifically, BSA believes the following policy principles will help cloud computing develop as it should:

- **Privacy, Security, and Choice:** The best way to incentivize innovation, privacy and security is through a competitive and diverse marketplace that allows software developers to offer a broad choice of products to meet consumer needs. Government must adopt a workable policy framework that safeguards consumers' ability to make informed choices while preserving industry's ability to provide convenient, cost-effective access to information, services, and products.

- **Government Procurement:** In procuring IT products and services, the governments' goal should be to acquire the best tools for the job, based on objective criteria such as performance, security, interoperability, and total cost to users. Citizens' interests are ill-served when governments impose rigid mandates on or give preferences to certain technologies over others. Also, distinctions in procurement processes between "products" and "services" may need to be fine tuned to prevent arbitrary inducements or barriers to cloud services.
- **International Cooperation:** The global nature of today's economy means that national technology policies must be developed in collaboration with international partners. Policies will run counter to the public's interests if they lead to divergent requirements from country to country.
- **Broadband and Innovation:** BSA calls for policies to promote investment in next-generation technologies to spur economic growth and innovation. This includes ensuring that tax laws provide predictable and real incentives for the private sector to research, develop and deploy new technologies; enhanced funding for basic and applied research in universities and government labs; and promoting the deployment of IT and broadband in all economic sectors.

Cloud computing also could change the nature of software piracy, a longtime problem that still costs the industry billions of dollars a year.^{iv} Under the cloud computing model, users' gain access to software through an Internet browser, and the software itself resides on the application providers' servers. This raises a number of questions:

- Will software be less vulnerable to piracy if it resides on centralized servers, making copying more difficult?
- Does cloud computing raise concerns about online theft of services?
- Which are the relevant legal theories, e.g., copyright, breach of contract?

As the world's leading force against software piracy, BSA will be studying these issues and helping its members address potential changes in legal and policy frameworks.

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ⁱ *Enterprise Software Customer Survey 2008, McKinsey & Company and the SandHill Group, p.5.*
http://www.interop.com/downloads/mckinsey_interop_survey.pdf

ⁱⁱ *IDC Enterprise Panel Report, IDC, August 2008.*

ⁱⁱⁱ *"IT Cloud Services Forecast 2008-2012: A Key Driver of New Growth," Frank Gens, October 8, 2008.*
<http://blogs.idc.com/ie/?p=224>

^{iv} *Sixth Annual Global Software Piracy Study, BSA and IDC, May 2008.*
<http://global.bsa.org/globalpiracy2008/index.html>