

## WHITE PAPER

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# Cloud Computing Drives Breakthrough Improvements in IT Service Delivery, Speed, and Costs

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April 2009

## IDC OPINION

Cloud computing promotes a new dialogue between business and IT decision makers. It allows decision makers to define business service requirements first and then decide how to balance the use of shared, internal virtualized IT resources and external public services most cost-effectively while maintaining required levels of cost, performance, security, and business resilience. This focus on business service priorities results in better IT resource utilization, reduced cost of operations, faster business service provisioning, and better alignment of IT spend to business service-level requirements. Although cloud computing still is in the early stages of development, IDC believes that it is poised to drive breakthrough speed and cost improvements in IT service delivery across the enterprise. Specifically, IDC's research indicates that:

- ☒ CEOs are driving IT leaders to speed up deployment of mission-critical IT solutions while demanding that ongoing IT operations improve resource utilization and make staff more productive.
- ☒ Cloud computing solutions offer IT buyers a range of public, private, and hybrid options for quickly and efficiently harnessing the power of virtualization, automated service management, consumption-based billing, and self-service resource allocation technologies.
- ☒ With the burgeoning availability of cloud computing services and enabling technologies, IT decision makers can take full advantage of these architectures both on premises and over the Internet, making the security, performance, and cost trade-offs that are most appropriate for their specific performance, security, and business resilience requirements.
- ☒ IBM has embraced the cloud computing vision across its hardware, software, and services portfolio both internally and for its clients. By partnering with customers, developers, universities, and service providers, IBM is supporting the development of a broad cloud computing ecosystem and providing its customers with a wide range of in-house and public service offerings.

In challenging economic times, cloud computing not only provides a sustainable path toward improved IT agility but also delivers immediate cost benefits.

## IN THIS WHITE PAPER

This white paper discusses the business drivers motivating IT buyers to consider cloud computing as an alternative to traditional dedicated IT architectures and in-house sourcing models. It describes how cloud computing architectures and services address many emerging requirements and outlines how IBM is investing to support public, private, and hybrid cloud solutions. The paper concludes with a discussion of the challenges facing cloud computing providers and buyers and describes why IDC believes this market will overcome these challenges and more than double in scope and scale by 2012. This is a critical time for CIOs and business executives to explore this emerging IT service delivery model and to begin formulating plans to take advantage of it.

## SITUATION OVERVIEW

Today's business is conducted across highly connected environments where geographic borders and time zones blur and business transactions flow 24 x 7. To make informed decisions, executives need real-time access to accurate information about products, customers, markets, and competitors. They need to extract the utmost value from every investment by maximizing resource utilization and holding down costs.

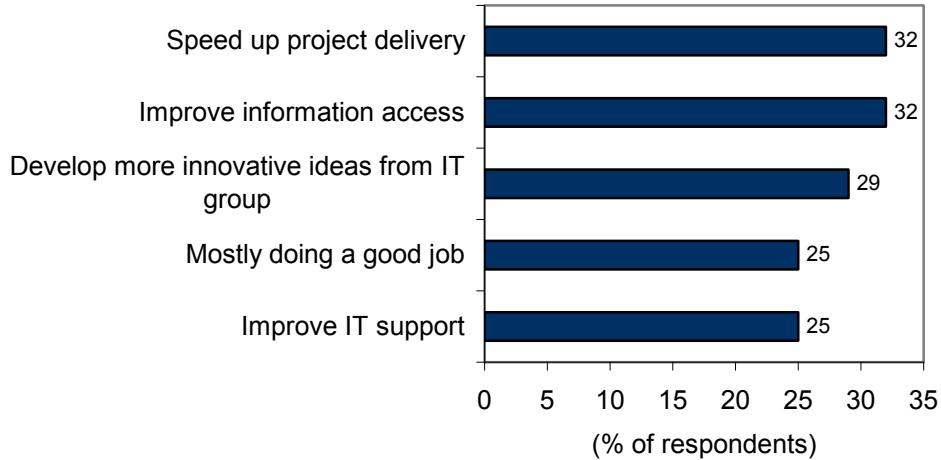
A decade of IT-enabled innovation has significantly contributed to the establishment of highly fluid and dynamic business environments. The Internet and mobile computing allow employees, contractors, and partners to work as virtual teams — anywhere and anytime. Simultaneously, embedded computing and smart sensors permit organizations to track, route, and optimize many types of resources on the fly.

For businesses to succeed in today's competitive real-time markets, senior executives need IT teams to speed up all aspects of IT solution provisioning, reporting, and operations. In a recent IDC survey (see Figure 1), senior business leaders stated that the top messages they want to communicate to their own IT leaders are:

- ☒ Increase speed of IT project delivery
- ☒ Improve access to information
- ☒ Develop more innovative ideas
- ☒ Improve IT support

**FIGURE 1**

Most Important Messages That CEOs Want to Impart to CIOs and Senior IT Managers



Note: Multiple responses were allowed.

Source: IDC's Enterprise Panel, 2008

It goes without saying that senior business leaders want IT to ensure that the technologies, processes, and management tools used to deliver business services are secure, compliant, resilient, and cost-effective. Those solution attributes are table stakes needed for any kind of IT investment to be considered in the current global economic environment.

### **Cloud Computing Offers Fast, Flexible IT Sourcing Options**

Given the business conditions described earlier, more and more senior business and IT decision makers recognize the need to prioritize IT investments based on business requirements. As a result, many organizations are reconsidering their traditional, time-consuming "do-it-yourself" approach to project-based IT solution sourcing. Rather than tie up capital and headcount and then wait months for the implementation of dedicated servers, storage, network, and software, many organizations are looking for alternatives that allow them to deploy new applications and services more quickly and cost-effectively, while better matching IT spending levels to the ups and downs of business requirements. Cloud computing solutions offer businesses a set of IT architectures, platforms, and services that can address many of these demands.

IDC defines cloud computing as the delivery of shared IT services, under virtualized service management, accessible via Internet standards and infrastructure. Cloud computing solutions generally incorporate the following capabilities:

- ☒ Highly scalable and virtualized server, storage, and network infrastructure, which is shared by a mix of workloads and user communities
- ☒ Service catalogs and service management best practices separate service levels and service definitions from the hardware (This enables IT teams and business leaders to focus priorities on business requirements and service levels.)
- ☒ Automated IT management and orchestration to coordinate and optimize request-driven allocation of resources based on service profiles, SLAs, and business priorities
- ☒ Consumption-based accounting/billing that enables IT to match resource consumption to business services and recover costs based on use

Cloud computing solutions can be deployed as large-scale public utility computing offerings such as the IBM Compute on Demand services or via a software-as-a-service (SaaS) model such as IBM LotusLive or IBM Information Protection Services. Cloud computing also can be implemented as a private datacenter architecture where enterprises make use of virtualization, automation, service management, and consumption-based chargeback mechanisms to share resources across multiple applications and business groups efficiently.

Cloud computing's service-oriented approach to IT delivery permits organizations to make choices about when to consolidate, virtualize, and automate internal IT resources and when to purchase third-party services to supplement or replace in-house systems that can satisfy business requirements more efficiently and economically than in-house solutions.

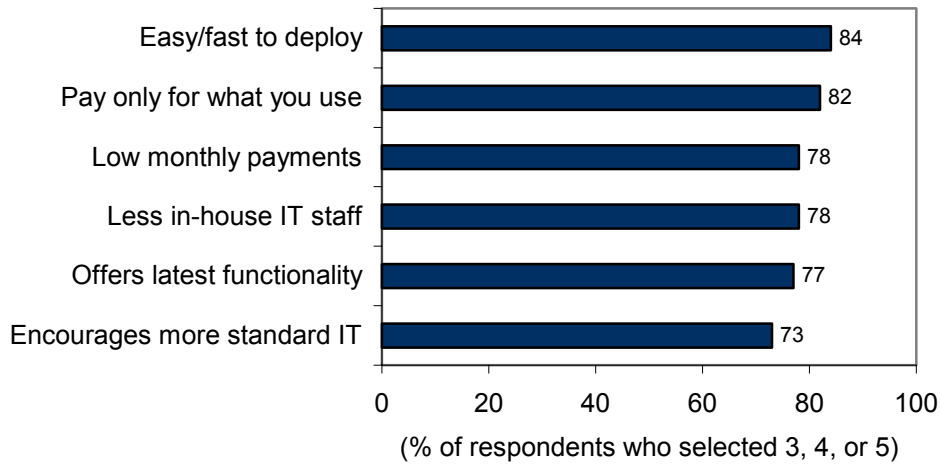
The availability of private and public cloud options enables businesses to cost-effectively match their unique security, resilience, performance, and cost requirements to the most appropriate cloud platform. Emerging hybrid cloud architectures are being designed to enable enterprises to integrate private and public cloud solutions across a common management and service-level reporting space with sufficient security and business resilience built in.

For organizations implementing private cloud architectures, the shift to a shared infrastructure model enables IT to more rapidly provision applications and services, even using self-service request portals. As shown in Figure 2, senior IT decision makers who are currently evaluating or testing cloud solutions indicate the most compelling benefits are:

- ☒ Speed and ease of service and application deployment on top of shared infrastructure resources
- ☒ The opportunity to pay or charge back for what is consumed rather than rely on flat rate per-head or per-device allocations
- ☒ The ability to substantially improve IT staff productivity via the use of automation, self-service request management services, and in the case of public clouds, service providers taking responsibility for selected IT operations requirements and in turn freeing IT staff to focus on higher business priorities

**FIGURE 2**

**Benefits Most Widely Ascribed to the Cloud/On-Demand Model**



**Notes:**

Each benefit was rated on a scale of 1 to 5 (5 = very important).

Multiple responses were allowed.

Source: IDC's Enterprise Panel, 2008

For organizations that subscribe to public cloud or SaaS services, additional benefits include:

- The ability to pay monthly based on utilization as an alternative to making significant one-time capital investments
- Ongoing, rapid access to updates and new technologies built into a public cloud service provider's standard refresh cycles

## **IBM'S CLOUD COMPUTING STRATEGY AND PORTFOLIO**

IBM has embraced the cloud computing vision across its hardware, software, and services portfolios. Using flagship computing products such as System z mainframes and BladeCenter servers, combined with a range of service management, automation, and virtualization management software products, IBM offers enterprise and service provider customers a number of options for constructing cloud computing platforms and dynamic infrastructure environments. From a services perspective, IBM offers a number of options to help enterprise and service provider customers design, plan, and implement cloud solutions that meet specific performance, cost, security, and business resilience requirements. The firm also offers a growing array of IBM-branded cloud services.

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## **IBM Leverages Internal Cloud Computing Lessons to Shape Cloud Computing Strategy**

IBM's cloud computing vision is anchored in more than five years of experience supporting the high-performance needs of the firm's internal research community. To meet internal IBM development teams' requirements for on-demand access to large-scale test and development environments, IBM developed its own "deep computing" platform, now known as the IBM Research Computing Cloud (RC2), which provides more than 3,000 IBM researchers and developers with on-demand, self-service access to compute services around the world and is used as a test bed for cloud computing innovation.

Externally, over the past several years, IBM has built out its Cloud Computing infrastructure, which provides IBM's service provider and enterprise customers access to large-scale shared cloud computing resources housed in a network of nine cloud computing centers around the world. As part of the broader Cloud Computing portfolio, IBM offers a commercial Compute on Demand service that rents compute cycles by the day, month or year using the same architecture and self-service technologies that are used to support RC2.

Also, as part of the Cloud Computing program, IBM works collaboratively with customers to create customized cloud computing solutions. Recent examples of IBM cloud computing solutions include the following:

- ☒ A global business-critical information restoration, recovery, and business resilience solution for beauty products company Elizabeth Arden
- ☒ A data protection service and infrastructure recovery solution for the United States Golf Association
- ☒ A Compute on Demand agreement to support the global requirements of life sciences data management and analysis firm Indigo BioSystems
- ☒ An on-demand infrastructure resource to support Nexxera, a financial services transaction processing hub
- ☒ Infrastructure services to support TOTVS, an SMB ERP-as-a-service provider in Brazil and Mexico
- ☒ A joint IBM/Google program to support an academic cloud computing initiative sponsored by the National Science Foundation (NSF)

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## **New IBM Products and Services Aim to Jump-Start Cloud Computing Buildouts**

In February 2009, IBM significantly extended its cloud computing product and service portfolio to include additional management software, service, and partnership capabilities. This set of announcements included the first service management for cloud software products designed to enable service providers and enterprises to build

and manage clouds on their own as well as a number of IBM service offerings. These latest additions include:

- ☒ The Service Management Center for Cloud Computing, which provides customers with a platform on which to build and manage cloud services (The cornerstone of the Center is Tivoli Provisioning Manager 7.1, upgraded to support virtualization provisioning, and the newly introduced Tivoli Service Automation Manager. During 2009, IBM has committed to further fleshing out the Center with a number of additional offerings based on existing service software management tools.)
- ☒ IBM Strategy & Planning Services for Cloud Computing and Implementations services for Cloud Computing for enterprise and service provider customers looking to design, test, and deploy cloud computing applications and architectures in a secure environment
- ☒ An initiative with network equipment partner Juniper Networks to demonstrate how hybrid public/private clouds can interoperate seamlessly and securely
- ☒ Extension of a partnership with Amazon Web Services (AWS) to host a new "pay-as-you-go" Amazon Elastic Compute Cloud (EC2) service, with access to development and production instances of a number of products, including IBM DB2, Informix Data Server, WebSphere sMash and WebSphere Portal Server bundled with Lotus Web Content Management, and Novell's SUSE Linux operating system distribution
- ☒ IBM-branded subscription services for Information Protection, Lotus Collaboration, and LotusLive (For example, the IBM Information Protection Services offers Tivoli Storage Manager Continuous Data Protection for Files as a fully hosted service. IBM intends to deliver additional Tivoli capabilities through the cloud in the future.)
- ☒ The "Resilient Cloud Validation" program, which evaluates the resilience of cloud service provider environments using a rigorous set of benchmarking and design validation programs (Approved service providers are permitted to use the IBM logo "Resilient Cloud" when marketing their services.)

IBM recognizes that widespread adoption of cloud computing architectures will require the support of a broad ecosystem extending beyond IBM itself. To that end, IBM continues to work with dozens of universities and hundreds of third-party developers to promote the design and implementation of a broad array of cloud-enabled applications and services.

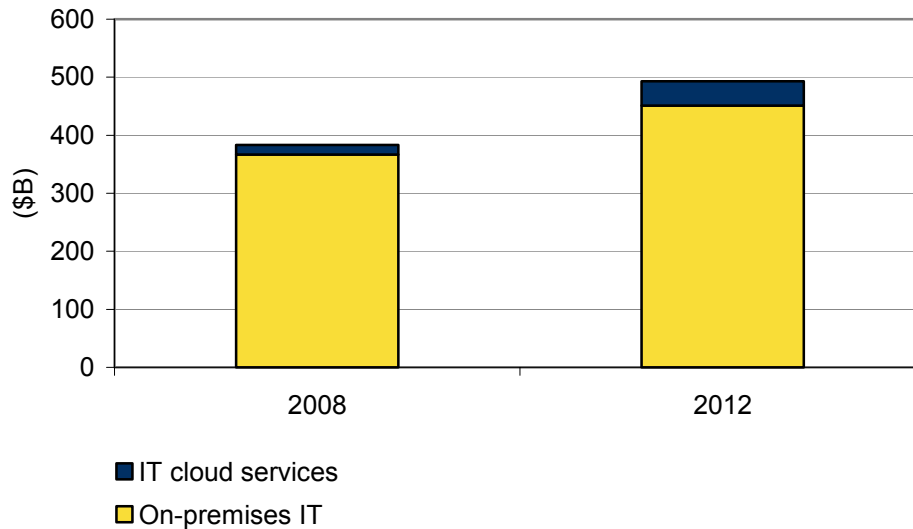
## **FUTURE OUTLOOK**

IDC believes cloud computing is an important new model for the delivery of business services that will transform IT purchasing, sourcing, and provisioning models over the next decade. Cloud computing is still in the very early stages of development, with most activity being driven by early adopters and visionaries. In 2008, IDC estimated that just 4% of worldwide IT spending — or \$16 billion — was allocated to public

cloud computing services, including SaaS, platform as a service, and related on-demand-style offerings. By 2012, IDC forecasts those types of services will total \$42 billion, or 9% of worldwide IT spending (see Figure 3).

**FIGURE 3**

Worldwide IT Spending by Consumption Model, 2008 and 2012



Source: IDC, 2008

Simultaneously, on-premises IT infrastructure investments are becoming increasingly virtualized and are being brought under cloud-style automated service management frameworks. IDC's research indicates that by 2012, 19.1% of all new server shipments will be virtualized and the average number of virtual machines per server will increase from five in 2008 to eight in 2012.

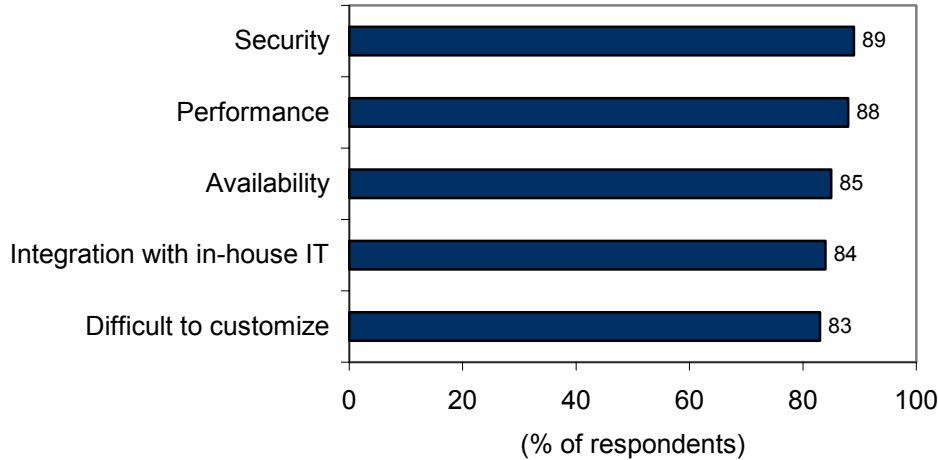
## CHALLENGES/OPPORTUNITIES

IBM has made broad-based commitments to cloud computing at a very early stage of the market's development. As a result, the firm and its early cloud computing customers face many of the challenges that often confront early-stage technologies and services. As shown in Figure 4, whether considering private or public clouds, IT decision makers are concerned about cloud security, resilience, performance, and availability and want to be sure that cloud-supported services and information resources can seamlessly interface with existing in-house systems and processes.



**FIGURE 4**

Cloud Computing Implementation Challenges Described as "Significant"



Note: Multiple responses were allowed.

Source: IDC's Enterprise Panel, 2008

In recognition of these customer concerns, IBM has introduced a number of consulting, implementation, and certification offerings to help enterprise and cloud service provider customers improve security and resilience. Nonetheless, the majority of IT customers are still very early in the cloud computing learning curve and are likely to focus more on pilot projects and proof of concepts in the near term. Cloud represents a fundamentally different way of assigning IT infrastructure resources to workloads. And, as many early cloud users are finding, the notion of sharing IT infrastructure resources can engender significant concerns about whether data will be kept safely and confidentially. Even within an enterprise considering deploying a private cloud, different functional business units may fear that sharing infrastructure with other groups might open up their confidential data to unwanted access.

Many customers that are relying on third-party cloud service providers are anxious about how to promote seamless integration and service delivery across hybrid public/private systems and worry that standardized SaaS applications and cloud service models will reduce their organization's ability to work productively.

For IBM and its customers, cloud computing provides significant opportunities to speed up IT delivery and reduce capex and opex costs to provide organizations with infrastructure solutions that can rapidly adjust to changing business workload requirements.

To successfully harvest the potential benefits of cloud computing, IT buyers need to shift their thinking from focusing on hardware, software, and tools to focusing on how to best define and deliver business services and SLAs. They must also be comfortable with making strategic decisions about when customized applications and

workflows provide competitive advantage versus when standardized solutions will do just as well. IBM needs to help customers work through this transition by providing deeper insight into enterprise-scale ROI and setting customer expectations appropriately.

## **CONCLUSION**

Adoption of cloud computing represents a major cultural transformation for many IT decision makers and the lines of business they support. Business and IT executives need to think freshly about "make versus buy" sourcing decisions for their IT service delivery capabilities. IBM faces both the challenge and the opportunity of educating customers about the value of focusing on business services first and the opportunities for cost savings and business agility that can come from cloud computing architectures and services. IDC's research indicates that many early cloud computing adopters are finding these types of offerings to be sufficiently secure and flexible while helping to reduce costs and standardize service levels. IDC believes cloud computing options will increasingly garner serious consideration from a wide range of businesses and will become a standard sourcing option for many types of applications and infrastructure solutions.

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