


Benefits to Cloud Computing

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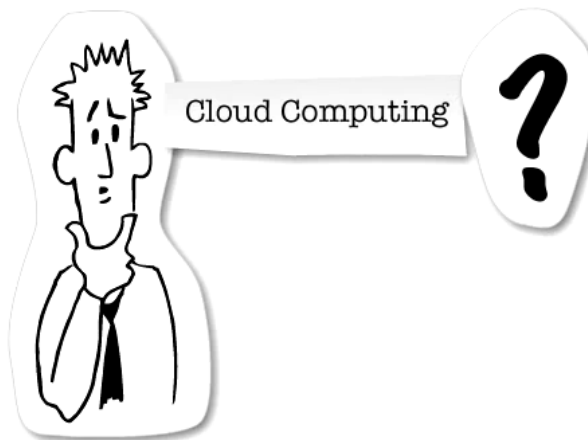
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1.0 WHAT IS CLOUD COMPUTING?

What is Cloud Computing?

Cloud Computing Plain and Simple

☆☆☆☆☆



That's Easy: It's Technology-as-a-Service over the Internet in a Utility Based Model

Why all the confusion then?

The Cloud Computing phenomenon has arrived. After many false starts and bobbled introductions, it is now safe to say that the world has reached the Cloud Age. Everyone is talking about it. Over the last 12 months, just about every IT vendor on the planet has introduced a new product, solution, or service with the word "Cloud" in the title.

So what's the big deal? Let's get a handle on this first. Here are a few definitions:

In its simplest form, Cloud Computing is a style of computing in which IT-related capabilities are provided "as a service", allowing users to access technology-enabled services from the Internet without knowledge of, expertise with, or control over the technology infrastructure that supports them.

According to Wikipedia, the term Cloud Computing refers to "a paradigm of computing which dynamically scalable and often virtualized resources are provided as a service over the internet, or 'cloud'. The term 'cloud' is used as a metaphor for the internet based on how the internet is depicted in computer network diagrams. The cloud is a metaphor for the Internet and is an abstraction for the complex infrastructure it conceals.

To further "cloudy" the waters (no pun intended), the term "**Managed Services**" has increased in popularity over the last few years. So what are Managed Services?

According to Wikipedia, **Managed Services** are defined as "the practice of transferring day-to-day related management responsibility as a strategic method for improved effective and efficient operations." A managed service provider (MSP) provides delivery and management of network-based services, applications, and equipment to enterprises, residences, or other service providers. *In other words, they are the third-party organizations that provide cloud services to customers.*

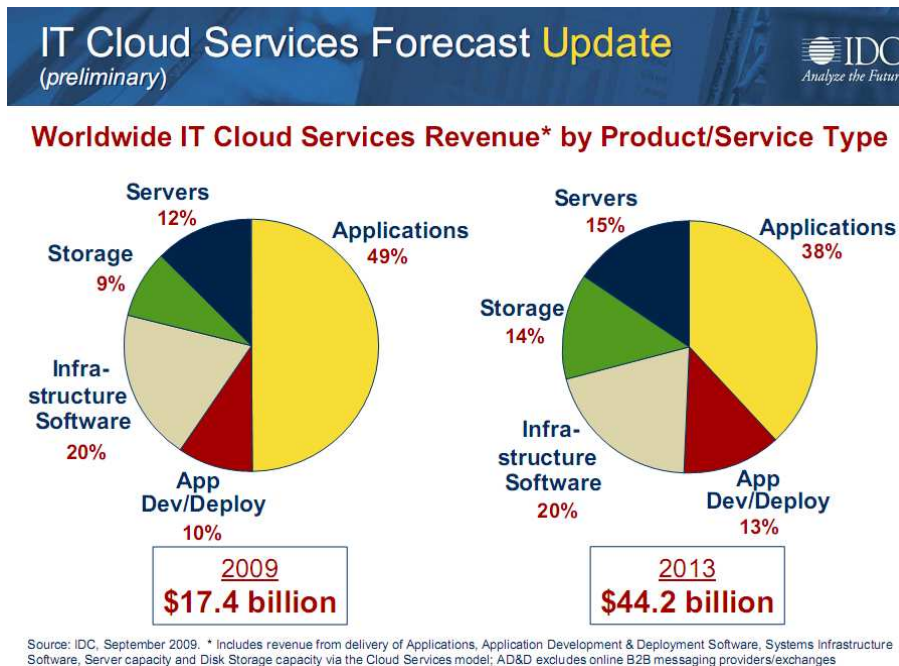
So when you combine the concepts of Cloud Computing and Managed Services, the result is an offering that provides access a specific technology AND the associated expertise to manage that technology WITHOUT having to actually purchase that technology or hire the employees to manage that technology, all while paying on a pre-scheduled basis for usage consumed during that period.

What does the future hold?

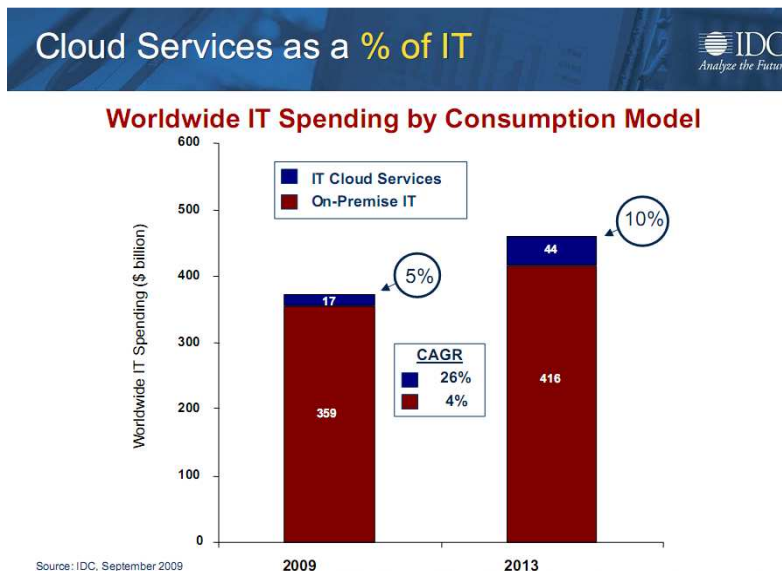
With the pain from the Global Recession still a common daily experience, it's no wonder this concept has taken off!

According to Canadian Business magazine in January 2009, "emerging technologies like those characterized as Web 2.0 or Cloud Computing will continue to find a market, in part because they don't cost much up front. In fact, the idea of paying for computing as it is used will be attractive."

Research organization IDC predicts that by 2013, customer spending on IT cloud services will grow almost threefold to \$44.2 billion:



As a % of an organization's IT budget, IDC expects the spending on Cloud Services to DOUBLE from 5% of the current budget to 10% of the IT budget by 2013:



2.0 WHAT ARE THE BENEFITS OF CLOUD COMPUTING?

Traditional Computing



Cloud Computing



VS.

In a nutshell, with cloud computing, customers do not own the infrastructure. They basically rent it, or pay as they use it. Although the loss of control may be seen as a negative, it is out-weighed by several positives.

Benefits of Cloud Hosting For SMBs

by Andy Burton on May 27, 2010 from www.bsminfo.com

Cloud hosting has been talked about a lot recently — some would argue its hype, others that it is confusing technical talk. So, what exactly do we mean by cloud hosting, and how will it impact the traditional model of solutions that have for decades been on-premise and based upon the advice and established relationships of VARs and systems integrators?

By way of definition, a cloud-based solution is online, dynamically scalable, agile, resilient of hardware failure, and, most important, paid for based on usage. This revolution in computing is changing the way software is developed, is redefining supply models, and truly offers end-user benefits of reduced costs and increased availability. What is more, unlike most technology advances that are often championed and funded by the enterprise, the cloud-based model of pay-for-what-you-use makes the benefits immediately real to SMBs and enables early adoption of technology.

Looking deeper, hosted cloud services are typically provided on a virtualized platform. This utilizes technology to offer virtual private servers (VPS) in a manner that works and operates in the same way as physical or dedicated servers. These servers still provide full control to the customer, allowing any application or software to be installed and managed, and can be networked and coupled with security solutions (such as firewalls and load balancing). The key difference for virtual servers over dedicated servers are that they share the hardware components (CPU and RAM) with other virtual servers and that their specification can easily be upgraded without reconfiguring the hardware or software already installed.

Cloud computing brings about a number of significant advantages to customers, which, in turn, provides excellent opportunity for VARs in terms of supporting customer adoption. Some key benefits of cloud are:

- **No significant upfront capital investments:** SMBs purchase the hosted services that they need to run their business on a subscription model, paying monthly or annually as needed. In a tight economy, freeing businesses

from having to make large CAPEX payments can enable them to free up resources and finances, and more effectively focus on new capabilities and projects (again, VARs can support and deliver).

- **Enhanced availability and security:** Cloud computing services are mostly managed by companies that run state-of-the-art data centres, with full 24/7 on-site engineers. These facilities have significant investment to reduce the risk of loss of operations through power failure or network outage, which can often be superior to servers hosted on-premise. The monitoring and technical services also ensure optimized operations and fix times.
- **Resilient infrastructure:** By utilizing the latest virtualization technology, some cloud computing services now offer virtual servers that will continue to function even when key components (such as CPU, RAM or disk drive) fail. In these circumstances, the hosted platform identifies the problem and switches the virtual server to another, fully functional component, typically without loss of data or service.
- **Least-cost operations:** With cloud computing services fully scalable at any time, businesses need only buy the server power they require now, and as their business grows they can simply upgrade their virtual servers at a click of a button, without having to reconfigure servers or copy data over. This provides the business with a flexible and agile platform to launch new services, or quickly expand existing services as required.

Since cloud computing enables SMBs to quickly move to a more reliable, flexible, and economical platform, what's stopping them? At the moment, it is largely an issue of education. Recent research of the UK SMB sector established that 58% of SMBs don't know what cloud computing actually is, and, of the few that do, some don't believe they are getting the benefits that they should be from the platform. Furthermore, fears over security of data, interoperability between vendors, and, commercial confidence in cloud suppliers can obscure clear decisions to adopt despite the compelling commercial benefits. These uncertainties provide a necessary and tangible role for the VAR to educate, select, and provide cloud based services to complement its on-premise portfolio and thereby continue to demonstrate value and relevance to its customer base.

SMBs will definitely move to hosted infrastructure — it is a matter of when, not if. The commercial, operational, and financial benefits are too attractive to resist, though we strongly believe it is not an all-or-nothing proposition but that a hybrid on-premise/online model will prevail. In what will become a demand led market, the supply chain will have to adapt to ensure its ongoing role and to ensure loyalty and protect and evolve revenue streams.

Other Benefits of Cloud Computing

Investing in Cloud Computing services will provide the following benefits:

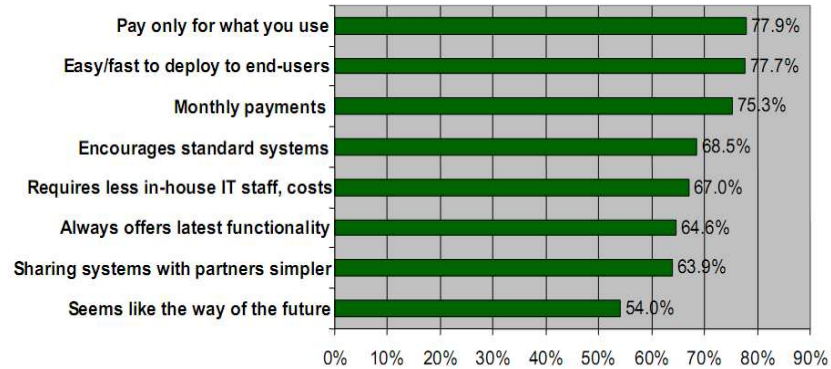
- Guaranteed service levels
- No up-front capital outlay
- Affordable, predictable budget with fixed monthly rate
- Scalability and flexibility to meet changing business requirements
- Instantaneous service deployment
- Best of breed technologies and methodologies
- Single point of accountability
- Assistance in meeting compliance policies and regulations
- Zero risk investment during economic uncertainty

Research firm IDC summarized the following benefits from a recent business survey:

Cloud User Surveys - Benefits



Q: Rate the **benefits** commonly ascribed to the 'cloud'/on-demand model



(Scale: 1 = Not at all important 5 = Very Important)

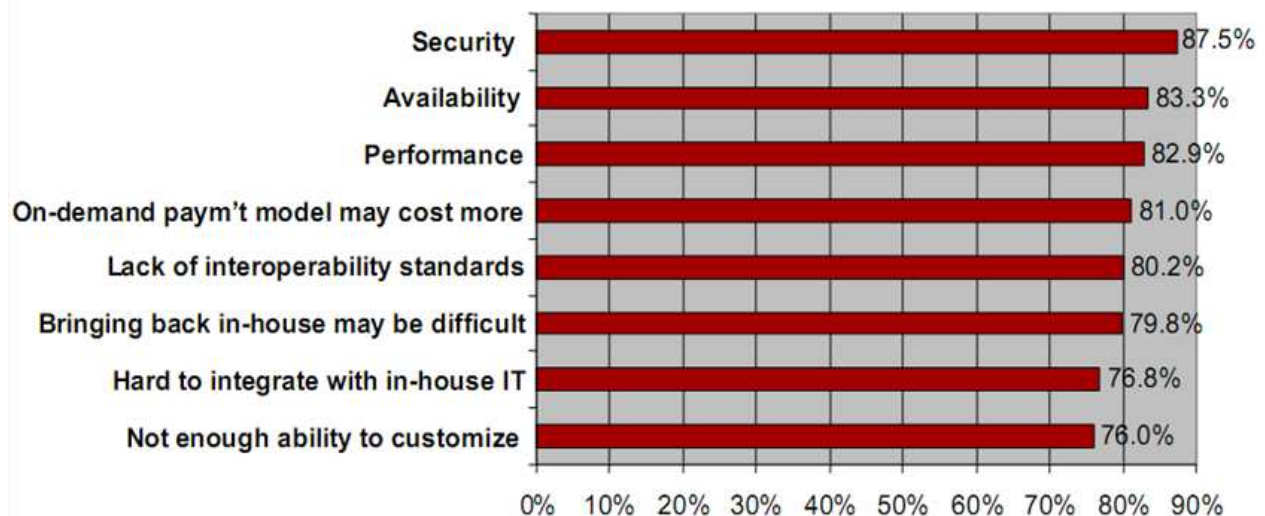
Source: IDC Enterprise Panel, 3Q09, n = 263, September 2009

IDC summarized the following concerns regarding business' concerns with adopting Cloud Services:

Cloud User Surveys - Challenges



Q: Rate the **challenges/issues** of the 'cloud'/on-demand model



(Scale: 1 = Not at all concerned 5 = Very concerned)

Source: IDC Enterprise Panel, 3Q09, n = 263, September 2009

3.0 WHAT ARE THE RISKS OF ADOPTING CLOUD COMPUTING?

As published by Gomez, Incorporated

Any business considering cloud computing to support its customer-facing Web applications must look beyond the cloud's cost savings and scalability and evaluate how cloud adoption will impact the end-user experience. This section addresses the Web experience challenges companies must address when adopting the cloud. It offers perspective and best practices to achieve world-class Web performance and assist in the evaluation of cloud providers and development of cloud performance SLAs.

Web performance, the response time or speed at which services are delivered to an end-user, is a critical metric for any organization since today's end-users, whether business or consumer, expect ever-increasing speed and complex, media-rich web applications. Few cloud providers currently offer performance metrics from the end-user perspective, even fewer offer service level agreements based on Web performance. So while your cloud service control panel might indicate full availability, this is no guarantee your customers are having a quality Web experience. Tests conducted by Gomez to evaluate the performance of several major cloud services reveal certain performance gaps which best-in-class businesses would find unacceptable:

1. Cloud providers exhibited a wide variation in Website performance across geography, with some major cities delivering end-user response times as much as 10 times slower than others.
2. Elasticity, the ability of the cloud to scale up quickly, may not ramp at speeds that keep up with audience requests.
3. Numerous cloud services exhibited performance problems (e.g. slow and missing content and functionality) at the edge of the Internet — where your customers live — which would have an impact a visitor behavior and conversions.

To ensure your website visitors are consistently getting a quality experience, it is vital to regularly test and monitor your cloud-based Web applications from your users' perspective: from the outside-in. This is due to the inherent lack of control over cloud services, the absence of SLAs to guarantee performance levels, and the lack of detailed monitoring of the cloud's implicit or explicit benefits. Best-in-class companies take this outside-in approach to performance monitoring. They focus on the end-user, and also obtain SLA guarantees from cloud providers. The result: reaping the cloud's benefits while also providing a superior Web experience for their customers.

The Cloud and Today's Web Experience Challenges

Cloud computing has moved beyond the hype and into the mainstream, now gaining traction with enterprise customers after initial adoption by SMBs. It's hard to ignore the benefits: pay-per-use billing, scalability, flexibility, burstable capacity, agility, and hopefully fewer headaches for your IT team. Yet while the word itself – cloud – describes a model offering complex Web infrastructures as turnkey services, it also implies a lack of control which can be unnerving for a CIO or IT administrator.

Like any disruptive technology in its early stages, cloud computing is an evolving landscape. Providers are responding to customers' needs with varying degrees of success, resulting in movements such as the Cloud Computing Bill of Rights, which attempts to bring standards and principles to this fast-moving industry and answer initial concerns about security and portability. One of the most important concerns for many Web businesses is how cloud adoption will impact their customers, the end-user. This raises two critical questions for technology executives:

- How will adopting the cloud impact my end-users' Web experience?
- Will the cloud help me gain control or lose control over the performance of our web applications?

We already live in a world where many elements of your Web application delivery — third-party vendors, multiple data centres, external ad networks or CDNs — are outside your firewall and not under your direct control. Now IT managers are being asked to migrate entire web infrastructures to the cloud, furthering the distance between their team and its ability to monitor and directly respond to critical elements of the Web application delivery chain.

Relinquishing this control is risky given the Web experience challenges today's businesses face. This includes the increasingly complex, media-rich websites publishers must build to attract and hold audiences. The new breed of web browsers must also be considered as they can triple the number of parallel connections to the host, risking possible server overloads.

Finally there's the demanding end-user who, in addition to wanting rich Websites, also expects lightning-fast performance in today's real-time world. Polls consistently show that consumers will abandon a Web page if it doesn't load within four seconds.

Google recently stated that its pass-through traffic can drop 20 percent if a search results page doesn't fully render within a half-second. Amazon says it loses one percent of sales when page renders are slower than a tenth of a second¹. Of course, expectations vary based on the type of site but, like it or not, most of your end-users consider Google and Amazon the standards against which they'll judge the performance of a consumer or business Website or service. Given these challenges, you can imagine how reluctant any technology executive would be to give up any level of control by placing his Web assets in a virtualized server residing with other "servers" in the large pool of shared resources that is the cloud.

So how are cloud service providers responding to these Web performance challenges?

Web Performance Monitoring and Cloud Service Level Agreements

There are three main categories of cloud services: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

Levels of The Cloud

Most clouds are built upon layers of virtualization software that allow the underlying hardware to simulate processing and storage. There are three cloud classifications:

Infrastructure as a Service (IaaS)

This is a virtualized blank page upon which you may build the underlying platform and every element or application required in your infrastructure.

Platform as a Service (PaaS)

Here the underlying infrastructure is abstracted out, and you're given an on-demand development environment upon which to build your applications.

Software as a Service (SaaS)

This cloud option provides turnkey applications on-demand, usually accessible via a Web browser.

A CIO outsourcing portions or all of his infrastructure to the cloud needs assurances that the service will address his company's specific business needs and that every service in the delivery chain will have a responsible party, whether it's an internal team with its service level objectives (SLOs) or an outside vendor's SLAs. Most cloud providers do offer an SLA promising 99.9 percent uptime or other broad guarantees.

So even if all your cloud dashboard lights are signaling green, it doesn't guarantee your customers are having the Web experience your business demands. This is evident in the status dashboard of a major cloud provider (Chart A) which shows little detail and none relating to Web performance. There are also implicit assumptions for cloud services, among them fast servers with redundant Internet connectivity in multi-homed data centers with good peering relationships to major networks nationally and internationally. But where is this measured? Bottom line: It's the buyer's responsibility to evaluate the implicit and explicit assumptions of cloud computing and balance them against the needs of the business and, specifically, the needs of its end-users.

Testing and Monitoring the Cloud

Here are some examples of how Web performance problems might play out and, potentially go unnoticed if you were relying only on the cloud provider's status dashboard.

Geography

One potential gap in web performance involves geography. A test was performed for the purpose of measuring the performance of three major cloud services across nine U.S. cities over a 24-hour time period. This test was performed using the Gomez backbone testing and monitoring network.

Testing procedure: We created a small web application to mimic the series of click-throughs and transactions an end-user might typically perform. We cloned the application and deployed it with three different cloud providers. The test is considered successful only if the required click-throughs caused the correct pages to load successfully and all transactions completed without error.

The average response times for all three services nationally is within a tight four to four-and-a-half second range, but the results by city tell a different story. While Cloud Provider 1 (IaaS), shows a response time of under two seconds in most cities, it lags significantly in western cities like Denver, San Jose and Seattle, with response times as slow as eight seconds. Its fastest response time is Washington, D.C. at under one second. As this provider's cloud installation is in Virginia, this clearly shows the role server location plays in Web performance. Most cloud providers won't guarantee geographic placement of servers.

Only by drilling down to this level will you see the wide range of true site performance being delivered to end-users, which in this case falls within a range of 1,000 percent! As you won't find geographic monitoring in cloud provider dashboards or in their SLAs, this underscores the need to conduct your own performance measurements and track them across all geographies.

The Velocity of Elasticity

Each business has its peak load periods. This is where elasticity, a core benefit of the cloud, comes into play. Elasticity equals speed plus capacity: a quick ramp-up during peak customer usage periods, and only those periods, with all the capacity you need.

Will this ramp-up be fast enough at all times of the day and across all geographies? Just how much capacity can you get? Will an additional hundred instances be there if you need them? Amazon recently "ran out" of instances during a period of peak Internet traffic, so this is a valid question. If you're using the cloud for archiving or behind-the-scenes data crunching, this won't be a concern, but it certainly is when you're serving a worldwide base of users.

Also remember that the cloud places your instance in a shared environment. So in addition to the vagaries of the Internet, you must also consider the other instances competing with yours for resources which are not easily virtualized, such as I/O.

Elasticity: The Last Mile View

For the next test, we measured the performance of the same three cloud providers with a test from Last Mile, a Gomez service that provides end-user monitoring directly from the consumer-grade personal computers of real people in homes, offices, etc. This test monitored site performance only in Mid Atlantic states and only for end-users with broadband service at a minimum 2Mbps bandwidth.

Cloud Provider 3 had slowdowns between 5:00pm and 11:00pm. The other two services had slowdowns then also, but only slightly. So the concern here is: will the promise of elasticity truly offer both the speed and capacity my business requires to be competitive? This test shows there's a big difference between a site being simply "up" and being fully available at the response times your customers expect.

Similar speed considerations apply to SaaS. How quickly can your end-users complete their multi-step workflow, regardless of the time of day, time of the business quarter or geographic location? Some SaaS status dashboards provide system-wide average speed data, but these numbers will not reflect the experience of your end-users from their desktop, laptop or mobile device. This is critical because the Last Mile is where your customers live.

Content Delivery Networks

Content delivery network (CDN) services are now being offered by cloud providers to bring them closer to their clients' customers. Gomez conducted a test of two cloud and one traditional CDN vendor from network backbones in every U.S. region. The results (Chart D) are average performance numbers over one day taken from the backbone. One of the cloud

CDN providers had an average response time of almost three seconds; the other two were under one second. Yet another test of the same CDN providers, this one taken from the Last Mile, shows almost identical performance for the three providers.

The lesson to be learned from this exercise: Testing from the backbone is a good starting point, but it's not enough. Testing from the end-user perspective is mandatory as it mirrors the real world of your customers. Note: This test also shows that average performance figures taken over time, typically used to market such services, can obscure real-world performance.

Taking Back Control of the Cloud

Cloud computing will change the way many businesses engage Web resources. However widespread adoption faces a number of stumbling blocks, among them Web performance guarantees. Gomez offers two perspectives on how to address this challenge today:

Perspective 1

While it offers many benefits, the cloud does not relieve a business of the responsibility of testing and monitoring the performance of its Web applications. In fact, ongoing web experience testing and monitoring is even more critical for businesses using cloud services given:

- the lack of control inherent in the cloud,
- the absence of SLAs to guarantee performance levels,
- the lack of detailed monitoring of implicit and explicit benefits.

Perspective 2

Since a Web application isn't what a developer builds, but what the end-user sees and experiences, Web performance metrics must be obtained from the end-user point of view. Only detailed Last Mile measurements, tuned to the needs of your business, can form the basis of your assessment of cloud services.

Best Practices

The Aberdeen Group's November 2008 report, "The Performance of Web Applications: Customers are Won or Lost in One Second," said that best-in-class companies have web application availability of 99.8 percent compared to 86.3 percent for the laggards. A strategic Web performance monitoring program can help put your company in the former group and provide a clear business advantage over your competition.

Web performance monitoring also helps reduce operating costs. Aberdeen adds that by adopting best-in-class approaches, organizations can reduce the mean time to repair performance problems and the labor costs associated with those repairs. These efficiencies, combined with the cloud's cost savings, provide another compelling reason to measure the performance of the cloud.

Some of the practices adopted by best-in-class companies using cloud services include:

1. **Get clear on your organization's reasons for engaging the cloud.** Each company has its own specific reasons for using the cloud. This might include reducing total cost of ownership, streamlining IT management, or maintaining a cloud bursting solution to handle spikes in demand. Before you test, know the metrics that are most important to your business and monitor those parameters. What you discover will help you properly evaluate the cloud providers under consideration. It will also help you uncover inefficiencies or bottlenecks in your Web architecture.
2. **Know your customers.** Where are your customers located? What times of day do they visit your site? What are their peak traffic times seasonally? Which ISPs do they engage? What device do they use to connect to the Internet? What browser and OS combination do they use? Once you've answered these questions and others you'll have a clear sense of the kind of web experience your customers expect and how to deliver on those expectations. For example, a small but meaningful percentage of your customers might still be on dial-up or low broadband. Understanding this will help you address their needs.

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3. **Take an outside-in customer point-of-view approach to Web performance monitoring and testing.** How the end-user sees and experiences your Website may be the most important aspect of your business. So once you know your customers and their tendencies, measure from their perspective. Also take the outside-in approach when you're evaluating cloud providers and when you're building your applications. Leading organizations can predict application performance from the outside-in while in development to minimize or eliminate problems when live. These companies continue to monitor and test throughout the lifecycle of a Web application to improve response times, enhance the end-user experience, and preempt surprise availability issues.
 4. **Understand your business' capacity requirements.** As we've seen, the elasticity benefit of the cloud carries many implied performance promises. Testing to ensure that these benefits apply to the real-world demands of your organization is vital. "With the cloud computing era arriving and more and more applications being delivered as remotely hosted and managed services, demand for Web performance management and testing services like Gomez's should soar." Dennis Callaghan, The 451 Group
 5. **Demand Web performance SLAs based on your needs.** Organizations that have engaged or are considering the cloud, whether public, private or hybrid clouds, are the early adopters. They are in a strong position to dictate the future of cloud offerings and the guarantees that will accompany them. If more clients demand Web performance SLAs, vendors will be compelled to include them. So ask for guarantees that apply to your company's specific needs. If elasticity is your primary reason to use cloud services, then get guarantees on capacity and velocity. Of course, the larger the client, the more responsiveness you'll get from a provider, but always ask for an SLA with teeth, one that matches your company's needs.

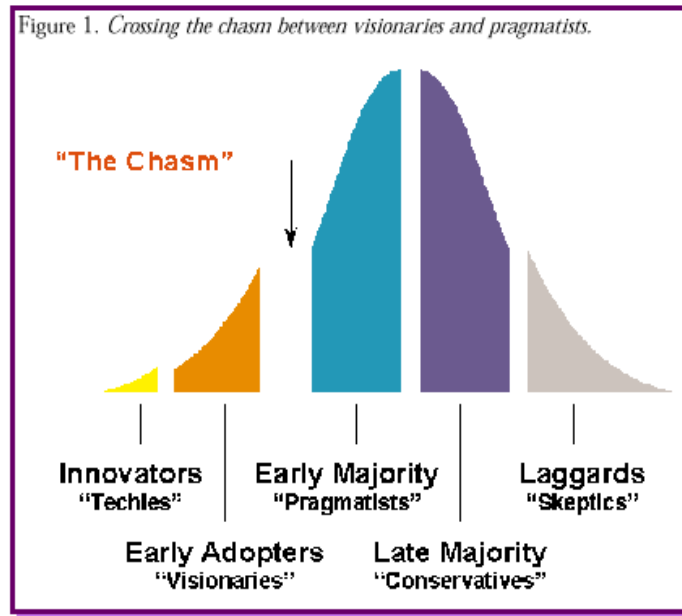
About Gomez

Gomez, the Web performance division of Compuware, provides the industry's leading platform of Web application experience management solutions used by organizations to optimize the performance, availability, and quality of their Web and mobile applications and proactively identify business-impacting issues. The on-demand Gomez platform integrates solutions for Web load testing, Web performance management, cross-browser testing, and Web performance business analysis that test and measure Web and mobile applications from the "outside-in" — across all users, browsers, devices, and geographies — using a global network of over 100,000 locations. Over 2,500 customers worldwide, ranging from small companies to large enterprises — including 12 of the top 20 most visited US Web sites — use Gomez solutions to increase revenue, build brand loyalty, and decrease costs.

4.0 IS NOW THE RIGHT TIME TO ADOPT CLOUD COMPUTING?

As originally identified in the opening section of this document, Cloud Computing has finally reached “mainstream.” It has definitely progressed from a few early innovators to widespread adoption, but let’s take a look at the classic Technology Adoption Model to understand this a little more closely.

Geoffrey A. Moore, in his book entitled “Crossing the Chasm”, divided the market into the following categories in its adoption of new technologies:



New technologies are first embraced by a small group called **Innovators**, who appreciate the technology for its inherent “bells and whistles.” Business value is secondary to this group.

The next group is called the **Early Adopters**, and these are visionaries who recognize the business value of a new technology and are willing to take some risk to reap the benefits.

The **Early Majority** is a large group who are ready to adopt the new technology because the bugs have been worked out, the early risk takers have taken their lumps, many companies have introduced products and services so there are many options to choose from, and this new venture is now a safer decision. This group now enjoys the added benefit of an infusion of competitors which in turn drives down pricing.

The **Late Majority** has sat on the sidelines, seen the benefits their peers have enjoyed, are jealous and now want the same great benefits for themselves.

The **Laggards** are those people that are always the last to adopt, are extremely conservative, and want to make sure ALL risks have been removed.

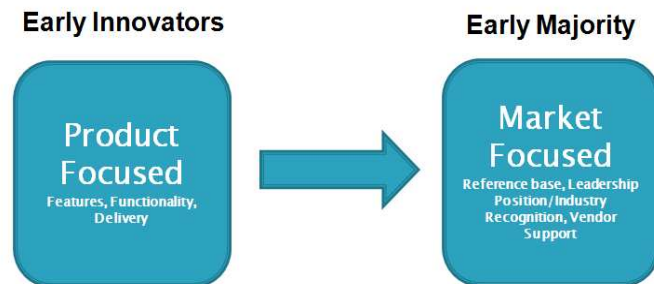
Cloud Computing has now crossed that threshold into the Early Majority.

Cloud Computing and the Early Majority

Because of the options that exist today, the mass flood of vendors in the market, and the maturity of the offerings, Cloud Computing is enjoying mainstream success.

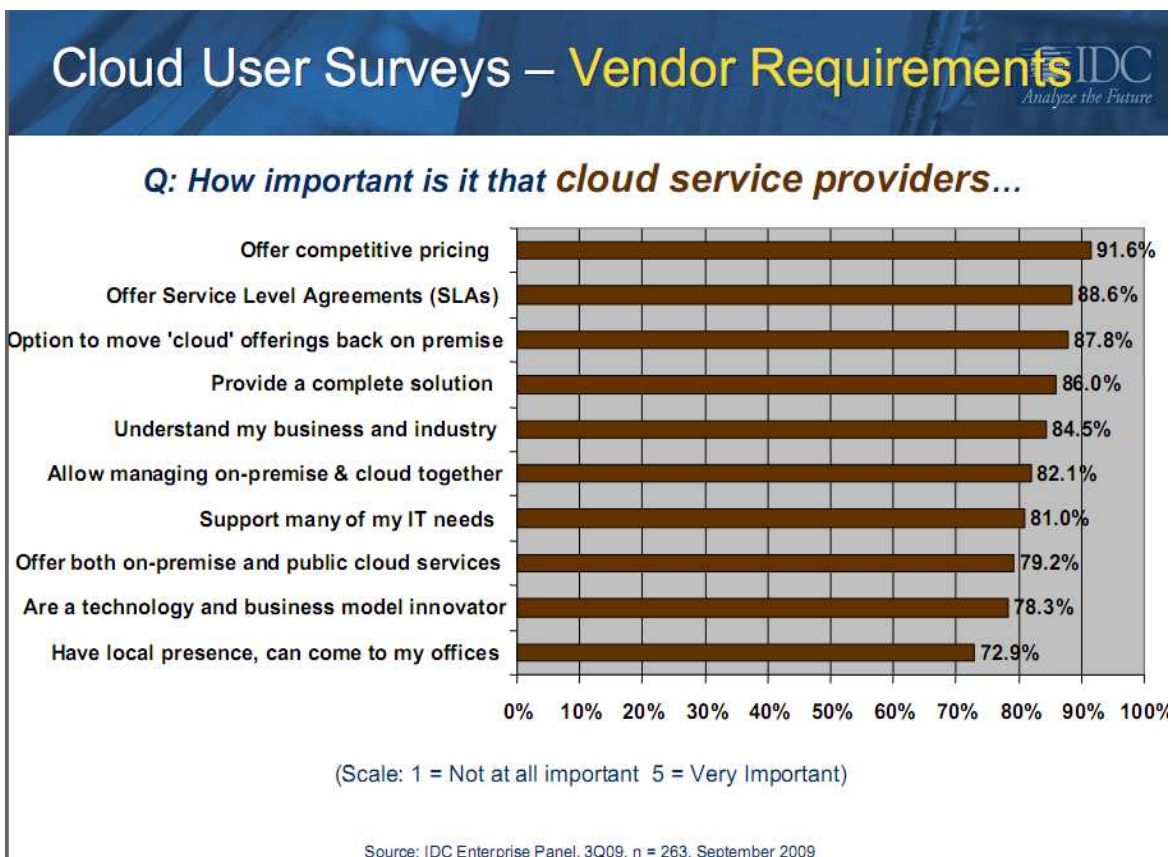
Up to this point, the **Early Innovators** were the primary consumers of Cloud Services. This group was primary interested in the features and functionality and less concerned about market adoption:

Evolution During Chasm Period



Because of the sheer size of the market opportunity that the Early Majority represents, Cloud Computing has now been flooded with thousands of vendors both large and small to capitalize on this spending wave. In recent months, big firms such as Google, IBM, Microsoft, EMC, HP, Dell, and others have introduced their own brand of Cloud Services.

When choosing a Cloud Vendor, IDC summarized the criteria and importance in the following chart:



For those organizations that are interested in leveraging new technology to gain a competitive advantage but need a certain comfort level before doing so, many vendors are rich with Customer Case Studies, Testimonials, and various endorsements all designed to provide that decision safety. Most importantly, with the introduction of many new players, the price points for Cloud Services are at an all-time low.

5.0 ABOUT THE AUTHOR



Greg Onoprijenko

President and Managing Director
e-ternity Business Continuity Consultants Inc.

Greg is a co-founder of *e-ternity* and his strength of leadership is a critical factor to its success. Greg has a Bachelor of Arts Degree in Administrative and Commercial Studies from the *University of Western Ontario* and with over sixteen years of business and sales experience in the high tech sector, Greg's background is extensive and his track record is impressive.

As a highly decorated *Senior Executive* running the largest region in Canada for **Ricoh** (then Lanier), Greg's achievements include District Manager of the Year, Sales Manager of the Year, President's Club, Century Club, and other Top Performer awards. While in a *Sales* role with Enterprise Storage leader **EMC Corporation**, Greg successfully penetrated the Mid Market space securing a significant number of net-new customers by providing them with frictionless access to their business-critical information. And as a *Business Continuity Specialist* with **TELUS**, Greg co-developed that organization's Business Continuity program as it exists today resulting in a respectable increase in revenue for this portfolio at TELUS overall.

Greg's primary responsibilities with *e-ternity* are to drive revenues from a sales perspective, run the day-to-day business operations, manage partner relationships, and provide overall strategic direction for the organization.

Greg is an accomplished industry veteran who has spoken at numerous industry events, published articles in various business publications, and presently sits on Ingram Micro's Services Advisory Council for Managed Services for North America.