A view on
Cloud Computing

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Introduction

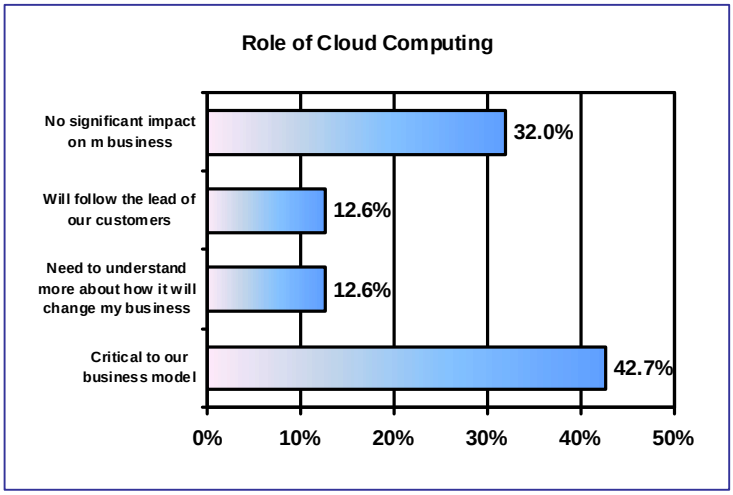
Cloud Computing is a way of structuring computing to enable on-demand network access to computing resources. Other key features include scalability, location independence, and use metering and use-based billing.

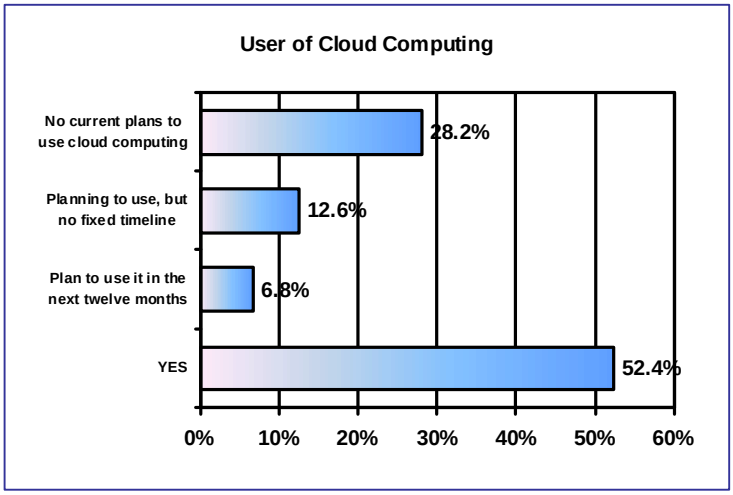
The key to understanding and using Cloud Computing effectively is to realize that it is ultimately a bi-directional service; valuable data, information and knowledge must flow easily and securely to and from the user and these valuable assets must be saved securely and be adequately backed up and protected from disasters.

There are several types of Cloud Computing. Software-as-a-Service (SaaS) is any application which is delivered over a networking platform such as the Web to users who access it, usually via browser. Examples of this would be Google Apps and Salesforce.com. Platform-as-a-Service (PaaS) casts a much wider net; this may incorporate application development and configuration management, interface development and tailoring, database structuring, storage and testing for, and by, the developer and/or business owner. This type allows users to define, build, deploy and run applications directly from remote servers. Rightscale and Amazon's EC2 are two companies which have grown in this space. Infrastructure-as-a-Service (IaaS) provides users with remote access to data centers. The difference between IaaS and the first two types is the fact that IaaS enables access to a "virtual world" of machinery and software residing either internally or external to the user's premises, which may themselves be distributed over a wide geographical area.

Cloud Computing technology is still considered to be relatively new and in the early adopter phase for both providers and consumers. Some, like Lew Tucker, CTO of Cloud Computing at Sun Microsystems, see it as merely a service provider trend and not really a new breakthrough concept. Others, however, see it as a paradigm shift in how increasingly the world will use and value Information Technology. Nicholas Carr, author of "IT doesn't matter", likens the growth of Cloud Computing to energy generation a century ago. It used to be that manufacturers built and used their own dedicated power source. In the 20th century, that function is performed by an electric utility and companies pay per use. But that analogy may not be very strong; Cloud Computing is a two-way street with sensitive business data flowing in both directions and being stored in the Cloud. This is hardly the case in electricity provision.

Cloud Computing in Canadian Business





Cloud Computing has the business world divided on its importance to existing business models. The 2010 PwC Survey of Canadian Software Company CEOs shows that 42.7% of business leaders believe that Cloud Computing is critical to their model while 32% find the Cloud provides no significant impact on the way they operate or their bottom line. Those straddling the middle believe that there is a need for further understanding of the changes which Cloud Computing could bring, and if it will be a major attraction for their customers.

The Survey also indicates that in spite of the uncertainty, 52.4% of respondents are Cloud users.

Cloud users are, not unexpectedly, as diverse as the web landscape out of which it operates. Financial services firms have been testing and deploying CRM tools using public clouds such as Amazon's or Google's; Vivek Kundera, the now-CIO of the United States, switched 38,000 employees within the District of Columbia (while he was the incumbent CTO) to web-based apps, claiming to save millions of dollars in software licensing fees; the Treasury Board of Canada in February 2010 received endorsement for the Government of Canada Cloud Computing Roadmap, one that can be compared with countries such as the UK, the US, Australia and New Zealand.

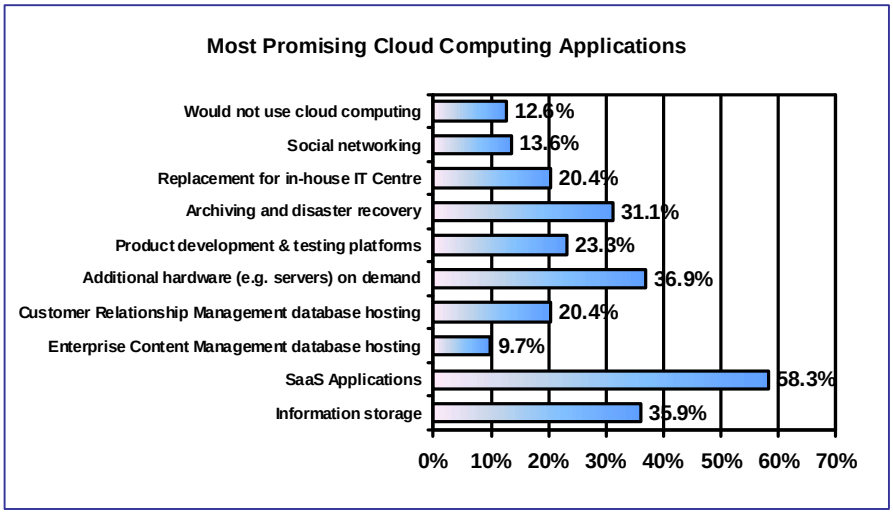
In Gartner's global annual CIO survey of 1,600 IT leaders, a noticeable trend was the modest increases in IT budget dollars. US respondents expected an increase of 2.5% from 2009 numbers (an average drop worldwide of 8.1% from the previous year). Because these financial challenges are likely continuing into 2010, CIOs are approaching priorities with caution. This stimulates a change in focus to Virtualization and Cloud Computing, as well as modifying IT departments into more agile, highly productive organizations. This involves, amongst other things, a change from owner-sourced technologies (which often require heavy initial investment) to lightweight, easy-to-implement, easy-to-use platforms, systems and services.

Consequently, IT professionals are experimenting with and piloting new technologies, seeking to gain experience of, and develop skills in, new Cloud Computing products, platforms and services to keep pace with the changing computing environment.

In keeping with the growing interest in Cloud Computing by the private and public sectors, to respond to requirements for skilled Cloud Computing professionals, and to encourage cross-organizational cooperation, the IBM Cloud Academy was launched in November 2009. This was described as a “global forum for educators, researchers and IT personnel from the education industry to pursue Cloud Computing initiatives, develop skills and share best practices for reducing operating costs while improving quality and access to education.” Furthermore, CompTIA, a global IT association, is now working towards “building certification programs to release in 2010 and get in front of growing demand.”

According to a survey of Wall Street IT leaders conducted by SIFMA and IBM in June 2009, the number of respondents predicting that Cloud Computing would bring significant business change more than doubled from 21% in 2008 to 46% in 2009, implying it to be the top disruptive computing technology.

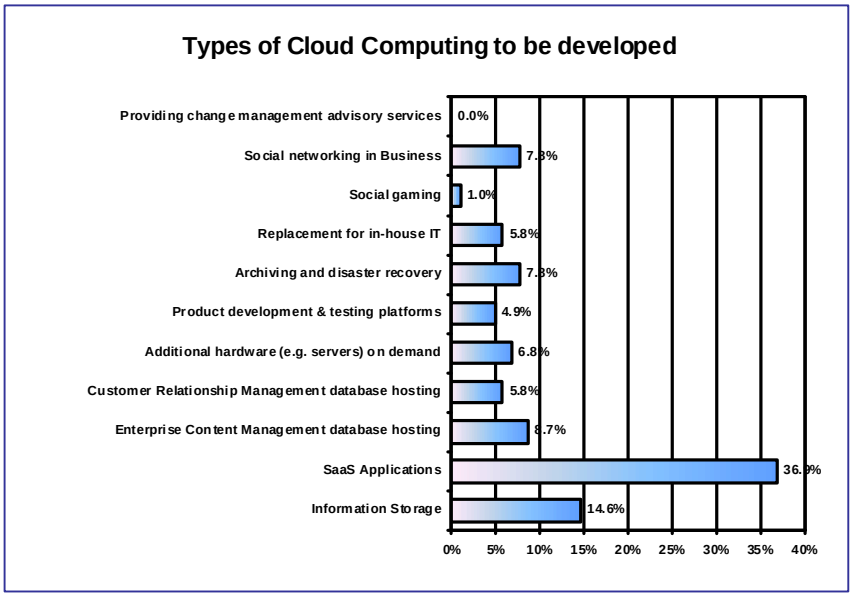
Cloud Computing Applications



Some 58.3% of the Survey respondees believe that SaaS is the most promising application for the cloud due in part to the savings it offers to both providers and consumers. From a consumer standpoint, less money is likely to be spent on servers and licensing. From a provider standpoint, costs are lower compared to conventional hosting, because resources can be utilized more fully.

At 36.9%, respondents agree that additional hardware on demand (e.g. servers) is a service that also makes the Cloud promising. Amazon.com’s EC2 now provides increased hardware on demand, making it easier for IT professionals to increase computing power and storage capacity as required. According to Geir Ramleth, CIO of Bechtel, a cloud services provider, the savings while using a pay-per-use service such as EC2 will enable a company spending from $800 to $1000 monthly to reduce its costs through time-of-use charges of only 10 to 15 cents per hour. More organizations are moving their computing from their own data centres to the Cloud as this provides greater flexibility, allowing IT Managers to dispense with tedious approval processes.

Quite simply, the Cloud requires and enables an IT organization to be agile and adaptable to changing technology and business circumstances. According to Charles Babcock of InformationWeek Analytics, faster approvals, increased collaboration, advanced architecture planning and building vendor relationships are key skills for success in the Cloud.

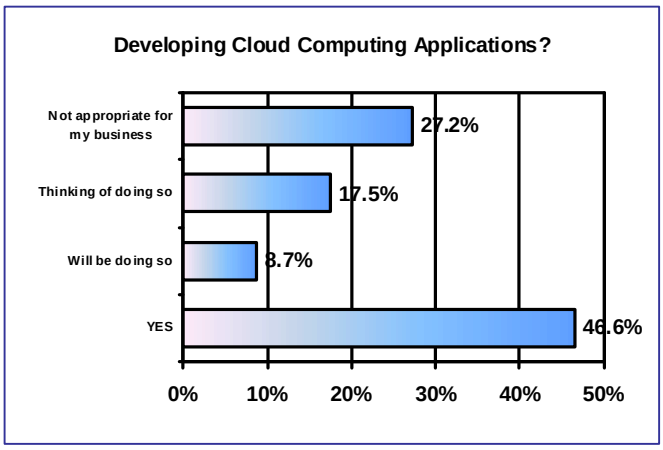


Cloud storage accounts for 35.9% of respondents' votes. Hardware for data storage has become increasingly cheaper but vastly greater storage requirements, both concentrated and distributed, make storing information in the cloud attractive.

In spite of indications that only 9.7% of the Survey respondents feel that Enterprise Content Management (ECM) database hosting will thrive in the Cloud, we believe that this trend will likely increase. The successes of Salesforce.com and SugarCRM, point in this direction.

Social networking is low in the Survey respondents' priorities, garnering only 13.6% of the votes. This is not surprising as social networking has up until now been primarily a priority on the consumer side with relatively low use in business. However, PwC has observed that *consumers and employees alike want to play a participative online role both at work and in leisure time. And the tools of social networking are becoming increasingly powerful, easy and fun to use. So social networking is now a business strategic issue. Social networking needs to be coupled into the thinking and operations of the entire organization; it is not merely a passing fad.* Not only will businesses increasingly embrace social networking as a part of their communications strategy and in their day-to-day operations, but also they will gain greater skills in marketing to, and collaborating with, customers and partners.

Current Developments in the Cloud



Some 46% of Survey participants are already developing cloud computing applications for their clients' use, while another 8.7% are planning to do so. Of those in this sphere, 36.9% are developing SaaS applications while in far second place, at 14.6%, some will use it for information storage.

None of the respondents, however, are planning to provide Change Management services to assist their customers to shift to Cloud Computing.

Currently, some firms are using the cloud selectively and with a little hesitation. According to wallstreetandtech.com, some financial giants have been using public clouds for application testing and for basic applications such as CRM tools. They have been reluctant in transferring sensitive data to the cloud,

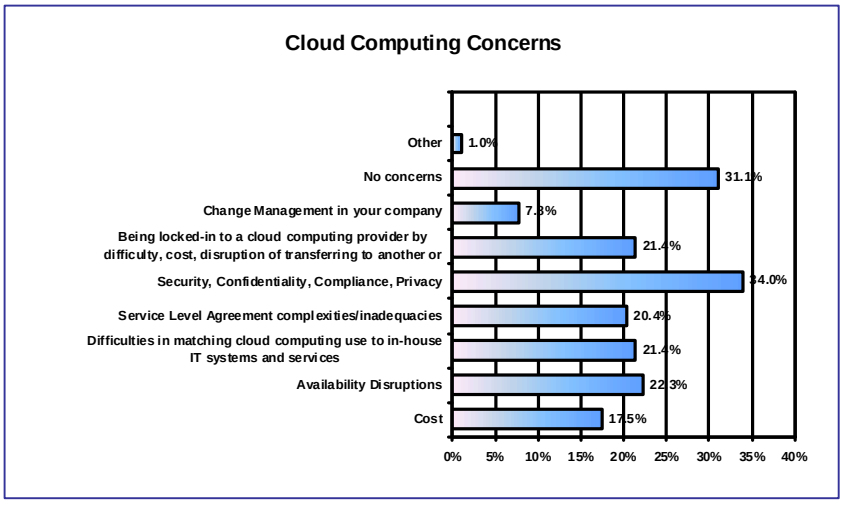
fearing security breaches and limited privacy, due in part to the Cloud's inherent multi-tenancy nature.

In spite of the fact that productivity tools such as Google Apps and Zoho Office are gaining momentum and popularity in the SaaS space, worries over reliability, availability and security still keep them from being fully used. Some unplanned outages of Google's Gmail and Workday's human resource apps ended up as being perceived to be a significant performance problem, with no quick solution, due to the fact that the hardware was remote and controlled by the service provider.

According to an InformationWeek Analytics survey, 46% of companies interviewed said that they would use Cloud CPU, storage or other infrastructure services in 2009, an increase from 31% in 2008. In addition, 56% of respondents indicated that they would use, or would likely use, SaaS in 2009.

For those organizations contemplating moving some or all of their computing to the Cloud, it is important to note that this requires significant planning and understanding of the organization's business and architectural computing requirements. Increased collaboration at the outset between the company's C-suite, system administrators, network managers, developers and information security officers will help eliminate potential strategic and operational errors surfacing after implementation and will mitigate missteps in contracting services from Cloud providers.

Cloud Concerns



Security remains the main concern for those contemplating a move to the Cloud (34.0% of respondents). As Cloud Computing is still in the early adopter phase for providers and users, best practices and guidelines have not yet been set. Security and reliability issues will have to be resolved in order to capture more users.

Users are warned to read the fine print when signing provider contracts. The Cloud Security Alliance (CSA) especially has indicated that it is prudent for businesses to perform a risk assessment before signing a Service Level Agreement (SLA) so that both parties are aware of, and agree to, their own responsibilities with regard to the information exchanged with and in the Cloud.

In the United States, electronic data has been governed by the Electronic Communications Privacy Act (ECPA) since 1986. The Digital Due Process Coalition is lobbying for an update to the privacy rules. The coalition, made up of tech companies such as Google and Microsoft, and special interest groups, has expressed concern that the current regulations don't protect personal data

sufficiently and this could prevent companies from adopting the cloud computing model.

Indeed, the Digital Due Process website (www.digitaldueprocess.org) states that the "ECPA is a patchwork of confusing standards that have been interpreted inconsistently by the courts, creating uncertainty for both service providers and law enforcement agencies." The coalition therefore warns the public to be aware of the limitations of the ECPA in relation to cloud migration, especially in the realm of email storage.

Reliability and availability disruptions are also concerns top of mind with respondents to PwC's Survey (22.3%). Owing to the fact that users work on virtual machines, the causes of outages may be hard to diagnose. This likely puts the users fully in the hands of their service providers who may or may not be able to fix problems in a timely manner. There is a risk of significant revenue loss, productivity decline and loss of data, as a result of even one hiccup in availability of the service.

Another concern around the use of Cloud Computing is its limited portability. Depending on the amount of a company's data and number and complexity of applications already in the Cloud, it may be difficult and costly to transfer to a new Cloud provider, should the need arise.

Planning and implementing a move to the Cloud and putting in place appropriate new procedures and backup plans to mitigate unwanted disruptions of services requires an organization to adapt itself to new ideas, network architectures and responsibilities. This requires significant re-education and training of its workforce at all levels. The Survey results show, however, that Change Management is low on the list when it comes to concerns regarding the Cloud. But in fact there is no doubt that Cloud Computing brings with it new ways of working, new risk profiles, new IT Centre structures and requirements for new IT skills and experience and that companies and organizations will have to adapt to accommodate these new things. This requires Change Management at all levels of the organization and more often than not, the C-Suite will have to seek the assistance of outside Advisory Services to guide their Change Management plans and train the personnel who will be handling their move to the Cloud and its use. Joel Cawley, IBM's vice president of corporate strategy, suggests that because all "disruptive" technology is fast moving and risky, best practice "is to develop business processes and strategies along with a business culture that takes massive change as a given."

Change Management

Flexibility is vital in an era of rapid change. Christine Wallis of Hitachi Data Systems (HDS) talking to PwC about data storage explained, "The data storage industry changed dramatically and it's still changing. So for us, one of the greatest challenges is helping individuals throughout the organization, the culture, to be more accepting, more willing to change." This is change management in action.
– PricewaterhouseCoopers

The block-and-tackle strategy for dealing with change that may have worked in a simpler past just won't cut it today. To achieve sustainable success, today and in the future, you must take advantage of change — whether planned or unexpected — without ever letting it sideline you. This means embracing a new core competency: **agility**.
– PricewaterhouseCoopers

Conclusion

As the world economies and their technology industries continue to recover, major tech companies are reporting improving financials and forecasts. But a number of analysts are predicting that only modest increases in consumer and enterprise IT spending will occur during the period 2010 - 2011. Accordingly, companies are looking further than cost cutting and containment to new projects to enhance their competitive advantages. Very high-speed wireline and wireless services are greatly enabling the use of software as a service (SaaS) and, more generally, the use of participative rather than mere passive digital media services available in the Cloud. Indeed, the use of digital media is a C-suite priority and a

better understanding of the collection and use in the Cloud of “unstructured information and knowledge” is being seen as a new competitive advantage in several industries.

In February 2010, the PwC Technology Sector Cloud Computing team met in the US to discuss Cloud Computing trends and the advisory services that the firm provides to clients.

The consensus was that large companies were moving cautiously and likely to move to private Clouds (those created by the client and containing only the client's data) before moving to public Clouds (created and managed by others such as Amazon, Google, AT&T and so on). Many companies have already started down the path with virtualization and SaaS but they have done so without a broader Cloud strategy - they have not defined why they need to move to the/a Cloud; they are perhaps thinking of this too narrowly solely as an IT event rather than what it truly is, a platform for business transformation, higher productivity and innovation. PwC views this disconnect as likely to reduce quickly – but only if company C-Suites put their minds to adopting appropriate Cloud strategies in the next year or two. Such Cloud strategies must be driven by business requirements rather than purely by technology. Increasing emphasis will have to fall on security and governance issues but most companies have not yet come to terms with these quite complex matters. The “re-platforming” of applications into appropriately stable and dependable Cloud structures will be an important challenge and opportunity for large, medium-sized and small companies alike.

Greater use could likely be made of “Hybrid Clouds”, i.e., the combination of internal Enterprise Clouds and Public Cloud offerings. Not only could this enable the Enterprise to make best use of, and achieve highest flexibility in linking, internal and external Clouds, but also this could even enable Enterprise IT Services to contribute revenue to the Enterprise by providing innovative off-peak Cloud services to external clients.

“Cloud Brokers” could stitch together disparate Cloud service offerings thereby enabling greater ease of delivery to, and use of Cloud applications by, clients.

On the Cloud provider side, partnerships with clients rather than merely supplying loosely-structured services will likely have to receive high attention, especially in terms of on-going services innovations and adaptations to meet changing circumstances. Contractual, availability and reliability terms of reference will become more dynamic and will depart from the “once and for all contract” of the past.

The Cloud and Mobile Applications

According to ABI Research, mobile device use will increase 14-fold by 2014. A significant portion of the increase will come from Cloud Computing applications. Utility software (maps, barcode scanners etc) and productivity tools (data sharing, collaboration software) will lead, followed closely by social networking and searches.

A recent Juniper Research report found that enterprise applications would account for the majority of revenues over the next five years, with businesses increasingly seeking to capitalize on the ability of Platform as a Service (PaaS) providers to offer scalable, flexible data storage solutions allied to device agnostic, synchronized office services.

However, consumer-oriented apps will comprise an ever-larger proportion of total revenues, derived both from time-based subscriptions to services such as mobile online gaming and advertising from cloud-based social networks.

Q: What's next? A: The Mobile Cloud

Developments in technology and customer and consumer demand have led the IT industry to cater more toward the mobile audience. The 2010 Mobile World Congress (MWC, formerly 3GSM) in Barcelona (February 2010) discussed the trends in mobile computing and identified the increasing usefulness of mobile use of the Cloud as one of the telecom industry's top topics.

Worldwide, the rapidly increasing use of mobile/smart phones for internet browsing as well as business and leisure applications hosting has made companies such as Google and Microsoft focus increasingly on a "mobile first" philosophy.

Google's chairman Eric Schmidt, during his keynote address, encouraged the use of the Cloud for mobile data storage as well as for using its processing power and versatility.

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