

Outlook: partly cloudy with sunny spells to follow

Discussing a **hybrid approach** to cloud computing

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INTRODUCTION

It is not easy to find organisations today that are not wholly reliant on their IT to function. With this reliance on IT there has, however, been a continual need to control enterprise IT costs. The bulk of IT costs now go towards supporting existing applications and services which mean organisations increasingly find it difficult to continue to innovate.

Cloud computing is emerging as a solution to some of these competing forces. It promises the vision of ubiquitous computing, available on-tap in a simple and cost effective manner. Cloud computing is quite a nebulous terms that encompasses a wide variety of software delivery models.

Challenges exist with this utopian vision. These include, amongst others, security and existing investments an organisation has made in on-premises based IT solutions. Misconceptions also exist, where some vendors are intimating that cloud and browser are one and the same and that data has to be stored off-premises. These misconceptions are seriously inhibiting the successful uptake of cloud based solutions.

A hybrid approach to cloud computing is now emerging as the best route for enterprises to consider cloud adoption. It offers the best-of-both-worlds approach where certain data, applications and services remain on-premises whilst others are either moved to, enhanced by or transformed into cloud solutions.

Taking this hybrid approach avoids organisations being made subject to technology ultimatums issued by vendors and means cloud computing is something available and ready to use here and now.

CURRENT ENTERPRISE IT LANDSCAPE

It is pretty hard to envisage an enterprise today, that is not wholly reliant on their IT to function, and this has been true for some considerable time. This is irrespective it seems of the size or age of the enterprise concerned. Until the recent economic downturn, IT investments have seen continual and sustained growth for many successive years; responding to new technology advancements (that themselves have the promise of saving money) and new business opportunities that technologies create. However, it is interesting to note that while reliance on IT has been on the increase, this has been in parallel to the continual need to control enterprise IT costs. It makes sense that as IT investments increase, so do its costs (although they may have a net money saving effect), but in many cases it appears that costs increase significantly faster, suffocating the ability to innovate and invest further, as IT spends more and more on managing and maintaining existing assets. The problem for many is clear; that the demand to respond to business change outstrips the ability for IT to manage the increase in complexity that results. The outcome is systems that are difficult and fragile to extend, that are hard to decouple from one another and that create a complex set of interdependencies in which one seemingly innocent change can have very unexpected consequences elsewhere. In response, many have turned to the promise of Service Oriented Architecture (SOA) only to find that it has failed to deliver a significant return on investment. This is not to say that SOA is intrinsically wrong, far from it, but by failing to consider SOA as an Enterprise wide investment it has proved limited in its ability to decouple the assets of the enterprise as a whole.

Macro and large-scale IT and Business process outsourcing, once seen as a way to rid the enterprise of the cost of IT, has also come under the microscope. With many of the original deals coming up for renewal, it is apparent that the outsourcing model has not reaped the returns that were promised, creating situations in which change incurs rather than saves costs. Many are now, if able to do so, actively re-insourcing but in so doing the smart ones are being selective over what they in-source and what remains outsourced. In addition, these enterprises are looking to partner more broadly, and the notion of having multiple suppliers (or multi-sourcing) is becoming more widespread. This is coupled with the emerging trend of differentiating IT assets between those that are core and those that are not. In so doing, the enterprise is considering what IT assets it needs to invest in and which it does not. By looking at these assets as being functions or capabilities, it is possible to provide a map of the enterprise and more easily understand the implications and value of developing an Enterprise wide SOA strategy, where some elements could remain in-house, on-premises and others sourced by someone else.

As a consequence, large ERP systems also come into view. Why would one invest heavily in bespokeing a business capability, that itself is not intrinsic to making the enterprise grow and succeed? By accepting that these are not central, it becomes easier to consider adopting simpler industry-based best practice solutions for delivering these capabilities, reversing the trend of mass-customisation to fit highly personalised business processes. This makes it far easier to select from a broader set of suppliers at a much reduced price. Furthermore, one can

start to unbundle these over-engineered and over-customised systems that lock the enterprise into a single supplier, increasing choice and agility over the longer term.

This move supports a much wider trend across enterprises, often referred to as the “consumerisation of IT”, where innovations in software in the consumer space are adopted in the work place. This is especially widespread in web technologies and the mobile space, doubling the disruptive influence on large enterprise-grade solutions and their providers.

Although, many enterprises are struggling under the weight of their existing IT investments, there are many emerging examples of enterprises that have made appropriate strategic architectural decisions and are now leading the way for others to follow. Maybe the most striking emergent trend in IT, and more broadly in the enterprise business model itself, is the concept of “innovation outsourcing”. First pioneered in manufacturing, enterprises are outsourcing R&D to cut costs, but more importantly to exploit new markets faster. There are many obvious concerns and risks with this approach around IP retention, but a more subtle variant is the creation of innovation or incubation centres within the safe harbour of the enterprise itself. These support the creation of new self-contained entities in response to new market opportunities that the enterprise seeks to exploit. Internally, they are allowed to operate with reasonable freedom, acting much the same way as a start-up but having seed funding, support and guidance from the parent entity. Longer term, in some cases these capabilities might be allowed to exploit other opportunities external to the parent in seeking new customers, eventually being set entirely free as the solution moves from an innovation to a market standard. This move has appeal on both sides; the innovators being free to continue to innovate and the parent benefiting first from early market access and secondly from continued innovation as the market opportunity matures.

This move to a market driven supply of business capabilities is perhaps the most exciting transition, starting to solve some of the major limitations faced with a traditional project or silo approach to SOA. Fully liberating new capabilities that are self-determining and self-sustaining is a major step towards realisation of a fully Service Oriented Enterprise and, with the emergence of a global cloud platform, this brings SOA even closer to reality. The result of new cloud capabilities is a rethinking of the enterprise itself and raises key questions. What, specifically, has to be done in-house anymore? How can you differentiate your business from another?

WHAT IS CLOUD COMPUTING?

There have not been many phenomena in the history of IT that have received so much attention or hype as cloud computing. It seems odd, therefore, that this term has become so misunderstood, misused and misapplied.

According to the NIST (National Institute of Standards and Technology) five common features of Cloud Computing are:

- On-demand self-service: users can set themselves up without the help of anyone else.
- Ubiquitous network access: available through standard Internet-enabled devices.
- Location independent resource pooling: processing and storage demands are balanced across a common infrastructure with no particular resource assigned to any individual user.
- Rapid elasticity: consumers can increase or decrease capacity at will.
- Pay per use: consumers are charged fees based on their usage of a combination of computing power, bandwidth use and/or storage.

To fully understand what cloud computing is, however, it is necessary to understand the business drivers behind it, where it has come from and some of the different implementations which are available.

Business drivers

In today's Internet-driven, hyper-competitive environment businesses have a continual need to improve efficiency, drive down costs and continue to deliver innovative products and services. Businesses have become reliant on the fabric of information technology within their organisation, but have also become burdened by the cost of it and are often beholden to it. There is recognition of the need to streamline and increase the power of computer systems but there is, simultaneously, a pressure to reduce the cost of delivering them.

To solve this dichotomy, businesses are increasingly demanding more flexible access to information technology as a service. Incurring the cost of maintaining a dedicated IT facility within each enterprise is starting to make less and less economic sense. By provisioning business applications, application platforms and raw infrastructure on-tap organisations can save significant sums of money. More importantly, it can allow them to focus on where they add value and are competitive in their marketplace, without worrying about the underlying fabric of IT they need to support them in their journey.

Enterprise organisations, however, face a number of tough challenges in this new world. Most application development is not green field. There is a plethora of legislative and security concerns that need to be addressed. Large enterprise organisations are able to exercise economies of scale internally, which can offset some of the benefits cloud providers can offer. What enterprise organisations need is an ability to have a best-of-both worlds approach – using cloud services as appropriate, whilst also maximising existing investments.

The technology behind cloud computing

As in fashion and music technology, design patterns often repeat themselves. In the 1960s and 1970s large, expensive servers were only economically viable if they were shared by many virtualised users. With the advent of cheap PCs and servers in the 80s and 90s the IT footprint exploded, and every organisation amassed a huge amount of on-premises hardware and software. In the last decade data centres have started to fill up, energy has become more expensive, and the increased reach of IT into every nook and cranny of the enterprise has seen an increased burden on internal IT management resources.

What started as the virtualisation revolution has now become the cloud revolution. The cloud revolution has taken the concept of virtualisation to new heights through enormous scale, self-service automation and a metered pay-as-you-go commercial model. In many ways IT is reinventing itself again.

What has truly unlocked the cloud for enterprise is the ability to take the best elements of what cloud offers and combine them with the best of the enterprise's on-premises investments. It creates the ability to move, enhance and/or transform IT piece by piece, bit by bit, at a speed that suits the rhythm of the business.

The commercials behind cloud computing

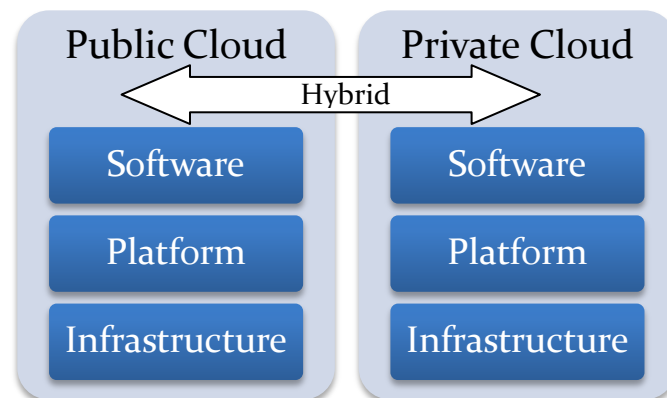
Fundamental to this paradigm shift from IT as an asset to IT as a service is achieving a disconnection between ownership and consumption. Cloud computing is, in essence, the ability to access a pool of computing resource which is owned and maintained by a third party. Because you don't need to buy hardware or software upfront, the cost of this can be transferred directly from capital expenditure into operational expenditure. Fixed costs of managing internal infrastructure become variable based on demand and use over time.

"The biggest financial benefit of cloud computing, particularly in these capital constrained times, is avoiding taking on debt and keeping cash in the company longer. If a project uses a cloud-based service provider, then the CFO avoids writing a big check upfront. Instead, checks are written monthly or quarterly, in alignment with the return."

(Forrester Research, "Talking To Your CFO About Cloud Computing" October 29, 2008)

Within enterprise organisations, however, it's not always possible to realise these savings. It takes five years to depreciate technology assets that are currently owned by the company. Paying on a consumption basis to access someone else's equipment doesn't sound like such a great idea if it means having your own equipment sitting idle and gathering dust. On the other hand, if hardware is near the end of its life, where there are new solutions being built or there is a large bill for management of this hardware, it still may make economic sense to consider cloud computing.

What is on offer?



Cloud computing offers three paradigms and three delivery models. These three paradigms offer differing levels of abstraction but all are delivered on a utility-based, pay-as-you-go basis. The three delivery models encompass public data centres, private data centres or a mixture of both.

Cloud computing paradigms

At its most basic level **Infrastructure-as-a-Service** (IaaS) delivers virtualisation and scaling of servers. Virtualised operating system images can be uploaded to a cloud provider who, in turn, provides placement and execution of these images on physical hardware within their data centres. In this model, application software is intrinsically linked to the underlying operating system. Customers are responsible for building their own software and the management of the underlying operating system on which it executes. This includes patch management of the operating system, but customers are not usually responsible for physical hardware, networking or storage. Payment models vary but are typically based on resource usage, such as compute, storage and ingress and egress transactions.

Platform-as-a-Service (PaaS) delivers virtualisation and scaling of abstracted software packages above the level of the operating system. Applications are typically uploaded to a cloud platform, although some models require full development on the cloud platform itself. The vendor provisions pre-baked operating systems images on to hardware within their data centres. The customer's software is then automatically installed on to these images. With this model there is a decoupling of software from the underlying operating system through an application development platform. Software is programmed against this platform and underlying servers have this platform pre-installed. Customers are responsible for building their own software but there is no requirement to manage the underlying operating system nor the physical hardware, networking or storage. Similar to IaaS, payment models vary but are typically based on resource usage, such as compute, storage and data input and output.

Software-as-a-Service (SaaS) is perhaps the oldest of the 'as-a-Service' terms, and refers to fully managed application software delivered as a service. Customers do not need to upload server images or software packages and, instead, rent access to the software which has been created and is maintained by the cloud provider. Rather than pay on a per server per hour

basis, charges are often per user, per month. In this paradigm the benefit is that customers are neither responsible for the software nor the hardware.

Cloud computing delivery methods

There are three models for the provision of cloud computing. Companies can make use of data centres, which are provided and managed by external vendors (public clouds). Companies can build their own virtualised, self-service data centres (private “clouds”). Finally, companies can mix and match between public and private (hybrid clouds).

When using public clouds, companies can eliminate up-front capital costs associated with building data centres along with buying and maintaining servers. It is possible to benefit from the economies of scale large vendors can exert when purchasing and managing hardware. On the downside, data is stored on hardware which is not owned or controlled by individual companies. This raises essential security and legislative issues (see more below).

Private “clouds” are slightly more intriguing. With this approach companies still need to purchase and manage physical hardware and virtualisation software, and also manage deployment of both operating systems and software on to the virtualised infrastructure. One of the challenges of private “clouds” is they don’t actually fall in to the definition of cloud computing provided by the NIST because they are not charged on a “pay-per-use basis”. An organisation would need to anticipate the maximum peak load it would expect if equipment was fully utilised and provision for this. Unfortunately, at times when this peak load was not being achieved hardware, would simply sit idle. Private “clouds” are really just a virtualised on-premises infrastructure and don’t really provide the true benefits of cloud computing.

The best approach can be to combine the best features of public clouds with the advantages a virtualised on-premises infrastructure can provide. This combined approach provides the ability to move to the cloud in a stepwise, controlled manner. These so-called hybrid clouds look set to be the best solution for those enterprises that are looking to make cost savings and increase agility, but without relocating sensitive data or mothballing existing infrastructure.

Dispelling the myths

As has been outlined, there are a variety of different kinds of cloud computing and it is possible to provision and deliver them in a number of different ways. The challenge the IT industry has is that the term cloud computing is constantly misused, causing widespread confusion.

As we will seek to demonstrate in this white paper, there are a number of options and solutions and it is not a “one size fits all”. Migration to cloud computing can be done in a structured, piece-by-piece manner and does not require you become the subject of a technology ultimatum. A hybrid approach can blend all the advantages of an existing on-premises infrastructure with the simplicity of cloud computing. It can free enterprises from further capital investment and the headache of managing unpredictable service spikes, whilst keeping sensitive intellectual property and data under direct control.

BARRIERS AND CHALLENGES TO ENTRY

In considering options, in whatever capacity, it is important to fully evaluate those options and understand the key challenges when entering into an agreement with a cloud provider. There are an increasing number of cloud providers emerging on a regular basis, so it is important to understand the key questions you need to ask.

Data governance

With cloud, or at least the variants that are off-premises, it is essential to realise that your data will reside off-premises too. This is fairly obvious, but is often cited as a key barrier to cloud adoption. Why is this the case? In considering storing information outside of one's own data centre a number of factors need to be considered, including:

Location of data – where is it being stored? Is this within your control? Is it within your own jurisdiction? Is it potentially located in areas where data privacy is different (E.g. US and Patriot Act)? Are there regulations that control where your data can be stored?

Access – how easy is it to access your data? What is the cost of bulk data upload and bulk retrieval? How long would it take? What format is your data available in and how transferrable and how complete is it, especially if it is being maintained within a SaaS provider.

Security – how is your data being protected? Remember that security includes people and processes in addition to physical security models.

Data loss – how exposed is your data to being lost? What is the cloud provider policy on ensuring full resilience, fail-over and redundancy?

Lock-in

This is an immediate concern to users of any type of cloud scenario. As with all software solutions lock-in strategies are very similar; with SaaS the provider is ready to tempt the user with easy customisation tools that allow bespokeing of the base solution to their needs. This is great as long as you remain with the one provider. There is a clear need to understand their interoperability and portability commitments. In the case of PaaS and IaaS you need to be open to explore the development tools of your choice, and ensure links with data resources are easy to isolate and redefine if a new provider is opted for.

Security and virtualisation security

A key issue that is squarely in the minds of cloud adopters is security. But how do you verify that your information and applications are secure? How do you verify that your cloud provider has processes in place that can both prevent data leaking across virtual instances and avoid data being accessed by operating staff? Is the data centre management policy open and documented? Have they sufficient accreditation to run your services?

Identity management

The enterprise and its users have suffered for many years from an overload of password management, leading to one of the most significant security threats where password weaknesses are easily exploited. The cloud has the potential to make things worse, with services exposed to the public Internet for all to see. Clearly security protocols have a role to play, but for the enterprise who has invested in identity management systems, the need to be able to federate and manage identities in a platform neutral way is a significant consideration for adopters.

Interoperability and portability

Closely related to data governance is that of integration, interoperability and portability. What open standards does your cloud provider use? This is especially prevalent in SaaS implementations. How do you ensure you can get at your data easily in order to exchange information with the systems that you decide to retain on-premises or maybe in another cloud? How portable is your data?

Reliability and availability

Another illusion of cloud is that it is “forever on”? In many ways this is true, but how is your application behaving? If you are using IaaS or PaaS then the application is your responsibility. A poorly designed application can still scale on a cloud, but is that scaling due to the number of users or due to poor application design? Remember that with cloud you get billed regardless.

Management

It is often thought that, with cloud, management overhead in terms of IT operations magically disappears. However, that is not the case on closer inspection. Often management and maintenance can increase with cloud, depending on the variety of cloud chosen. Many IaaS providers, for example, may provide virtual machines but do nothing to support the operating systems on top of them. Patch-management in these cases does not disappear. While the role of IT Management may have moved away from the physical hardware, the need for continued operational management often still remains essential.

Monitoring

Is my service running? Closely related to this issue, many wrongly believe that with the cloud they have access to a world of infinite resources and, in some ways they have, but as a result they can end up paying for them too. Monitoring of cloud systems may or may not be eased depending on the monitoring instrumentation they provide and the ease of integrating them into existing on-premises management tools.

Cost

Cost is not the first issue raised by non cloud users but, interestingly, it is by those that have adopted cloud solutions. In the case of SaaS, the pay-per user model is initially attractive but overtime and significant usage can cause costs to spiral considerably. Also, the ease of adoption often leads to a viral effect of many instances being purchased across the

organisation. Flexibility in payment models needs to be considered up front. Where the provider also provides other solutions then combining licensing models is essential.

IT bypass

Often seen as a positive point, especially by many SaaS vendors, is the ability to bypass IT and purchase solutions directly within departmental budget allowances. The result of by-passing IT is a problem in itself that often comes back to haunt users, with their investment growing out of control or issues with corporate compliance etc. In addition, as alluded to above, there is a tendency for viral growth of such systems. This doesn't just create problems in terms of needless expense and duplication of effort, but also of data creating a far more significant issue that IT departments are then asked to resolve. In the vast majority of successful adoption of cloud solutions, they are driven by and managed through direct involvement and leadership within IT. Cloud represents a very clear opportunity for IT to move on to the front foot and to act as an essential enabler of business agility.

Service level agreements

Is the SLA from your cloud provider worth the paper it's written on? What does the SLA actually entitle you to? What is the remuneration model when the cloud is unavailable? Free hours may not be any use to you if your customer leaves you in the middle of the night. SLAs are notoriously difficult to understand, and working out if they have sufficient teeth and value to rely on can be a significant challenge. Taking advice and treating these with the level of due diligence given to any other corporate activity is essential.

A HYBRID APPROACH

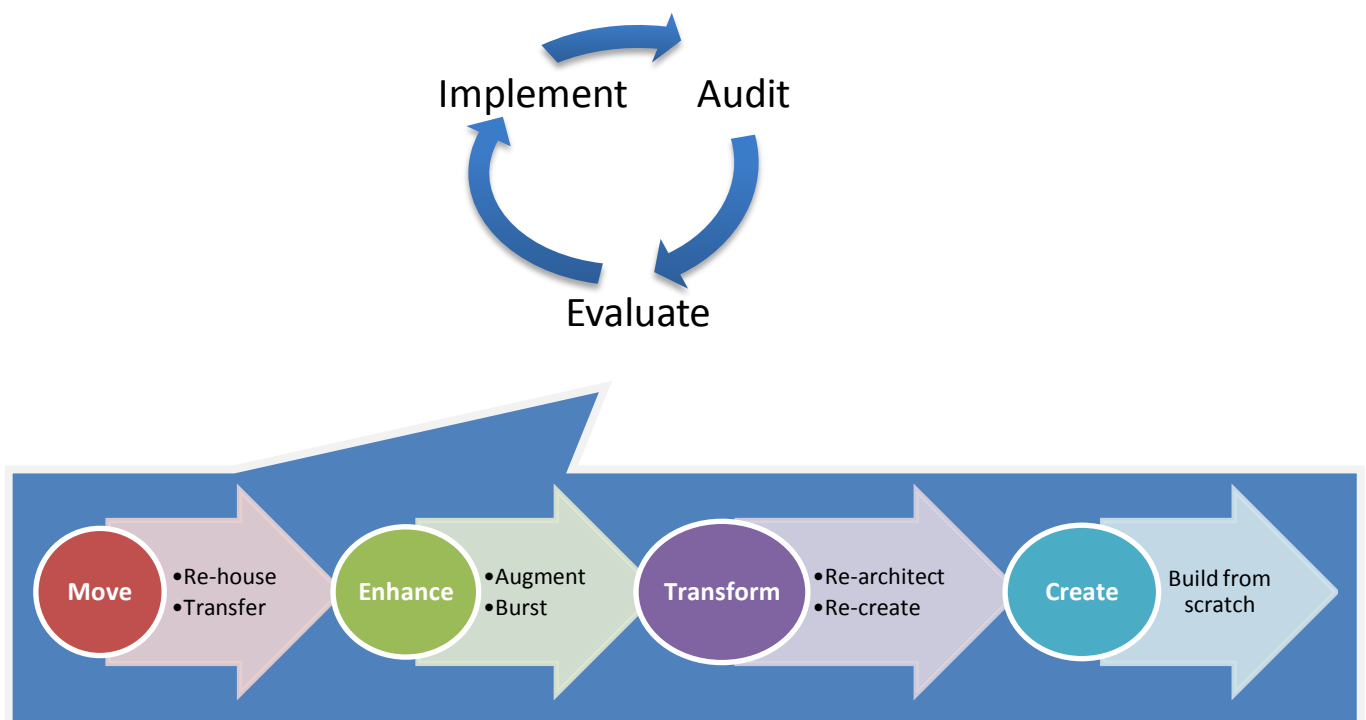
A move to the cloud can be a daunting, yet exhilarating and highly beneficial proposition. It is vital, however, that any transition is undertaken in a staged and controlled manner. This ensures that service levels to the business are maintained, and that the business really sees and understands the benefits of moving to the cloud.

To embark upon this controlled migration to the cloud the first thing any organisation needs to do is to take a look at and **audit** the broad range of IT applications and services currently being used. This includes existing assets, but also all IT projects which are planned and upcoming.

Once this audit has been performed, each element needs to be evaluated against a series of technical and business considerations. These considerations will encompass build or buy decisions, along with looking at the extent to which the cloud is applicable for each and what options are available. These include **moving** to the cloud, using the cloud to augment and **enhance** existing functionality, **transforming** the application by architecting or recreating within the cloud and, finally, **creating** brand new functionality from scratch.

There will be a different series of trade-offs for each application or service. It may be possible to simply move some, whereas some of the barriers to entry discussed above may apply to others. Each instance will likely have a different end solution and a different timescale for **implementation**. It is this requirement in particular which makes a hybrid approach to cloud computing most appealing.

This paper does not seek to examine in-depth these complex trade-offs but, instead, offers some common scenarios where different patterns can be appropriate.





Move

You should start with opportunities to **move** existing functionality into the cloud, including moving physical hosting and moving to a Cloud service.

Email systems

Utilising cloud based email solutions can offer great cost savings when compared to on-premises equivalents. It's possible to get some fantastic economies of scale when dealing with a commodity service such as email. This is translated into the low cost providers are able to achieve:

A cloud-based email administrator handles 10,000 mailboxes, about five times more than an enterprise email administrator" (Forrester Research, "Talking To Your CFO About Cloud Computing" October 29, 2008)

With large numbers of users it is also possible to introduce much higher levels of availability and redundancy.

Publically available web sites and applications

Most large organisations have existing web presences. These can include the main corporate site or other applications which are published through the web.

The speed and experience users receive from public-facing properties are often used as a representation of the organisation delivering them. It's vital they convey the best message. By using a cloud computing provider it's possible to deliver the best possible experience to users by delivering applications and sites from a global network of data centres.

Computationally intensive scenarios

Many organisations make use of advanced computing scenarios. This might include complex financial calculations, risk models, data analysis and manipulation along with a wealth of others. Very often this computation is performed in batches, at the end of a day, week or month. Having a bulk of computing resource sitting idle 23 out of 24 hours a day, or 364 out of 365 days a year, doesn't make much commercial or operational sense. By making use of a pool of computational resource, capacity can be rented just for the period in time when it is required, significantly reducing cost.



Enhance

Systems which can't easily be directly moved to the cloud can still be **enhanced** by making use of cloud services.

Records management and data retention

Many organisations are subject to strict legislative rules governing the retention of corporate data. There are often high volumes of data which need to be retained for long periods of time. Traditional retention methods can mean historic data is difficult to gain access to without complicated or time consuming, and therefore expensive recall procedures.

Making use of cloud storage can be attractive for these scenarios. Cloud storage provides resilient storage which scales as volumes of data increase. This means archival and storage solutions do not need to be architected and specified to deal with peak data usage requirements. Instead, they can be procured on a just-in-time basis.

Disaster recovery

Large organisations often have a requirement for a number of fail-over, disaster recovery centres. Maintaining these facilities can be a complicated and expensive exercise. A true disaster recovery centre is an exact image of the live, production facility.

Cloud computing could offer the perfect solution. Whilst idle, capacity can be scaled back to nearly zero. However, organisations can be safe in the knowledge the capability is available to scale-up instantly and on-the-fly should it be required.

Cloud bursting

Often organisations face challenges around how to deal with large spikes in demand. At present servers may be on standby to deal with this increasing load or alternatively, user experience may suffer as servers struggle to deal with this surge in demand. Neither option is particularly attractive.

One scenario which is particularly attractive, however, is to use the cloud to provide peak usage or "burst" requirements. Computing power can be 'dialled-up' at very short notice and only paid for during these increased periods of usage.

Build new functionality or services

Customers continually challenge organisations to deliver new, innovative functionality and services. Typically this technology will be developed and deployed through the same mechanism as existing functionality. However, this doesn't have to be the case.

With a hybrid approach to cloud computing it is simple to deliver different aspects of an application using different methods. Existing applications can remain on-premises or with a traditional hosting company, whilst new modules can be delivered directly from the cloud.



Transform

Over the longer term it is necessary to understand what opportunities the cloud presents to **transform** your applications and services.

Whilst legacy investments can hamper adoption in the short-term, over a longer period of time many of these issues will disappear and barriers to entry will be removed.

In the future users and customers will demand richer and richer experiences as both employees and consumers. Users will increasingly demand access to information and services regardless of the device they are using, be it using a desktop, netbook, phone or television. Functionality and data will need to be delivered seamlessly to all these devices. Users will expect everything to both talk to and 'know about' everything else.

Users and consumers will push companies to adopt a more service-oriented approach to IT delivery. This is not because they will understand the technology behind it, but rather there will be pressure for engaging experiences and things that 'just work' together. Experiences which were the work of science fiction, including films such as *Minority Report*, are not that many years away now. The cloud presents the perfect platform to deliver this new vision of computing.



Create

If you have plans to **create** new internal technology solutions, or you're looking to deliver new products and services, the cloud can provide the perfect platform.

Start-ups are often banded as one of the best scenarios for the use of the cloud. Start-ups, however, don't just include start-up companies, they also include internal start-ups.

Whenever you are looking to launch a new product or service there are two competing forces at play. One force compels an organisation to be as cost conscious as possible. Even with huge amounts of market research it's impossible to tell whether something will be a hit or not. The second force is a worry about what will actually happen if something is successful. There's no worse fear than having a hit on your hands, but having not made sufficient investment to deal with an overnight success.

Cloud computing can neatly solve this common dichotomy. The scale-out ideology is built firmly on a fail-fast or scale-fast model. It's possible to deploy applications quickly and cheaply without the need to make capital investments. By using a cloud computing platform there is an inherent safety net. If the product or service is a success it's easy to scale it out. If it's not then it can quickly be turned off.

The other issue cloud computing can address is helping to reduce time to market for these new products and services. With a cloud computing based solution time to market can be significantly reduced, providing significant competitive advantage over other organisations that are yet to embrace the benefits the cloud has to offer.

CONCLUSION

Love it or hate it, the cloud has clearly become a well-established but slightly misunderstood term in computing today, which promises to remain for some time to come. For some it is all about internet-based resources, whether they are infrastructure or full-blown business applications. Others have extended cloud to take their on-premises environment into account, reflecting the maturing world of virtualisation. To many this definition is too broad, but it is the reality of where the computing industry is today. To assume that we can, or should, move the entirety of existing IT investments to an internet-hosted cloud model today is clearly impractical on many levels. However, when cloud is considered in the context of a hybrid model of combining both the on-premise with Internet-services, then the value of the cloud in its broadest definition becomes incredibly empowering. It allows for a much richer set of scenarios than just one paradigm alone would allow and, furthermore, it brings the cloud much closer to a practical reality for organisations to consider using, rather than waiting for some future time when all things will be “simple”.

The cloud creates new and enhanced existing IT and business scenarios which, given due consideration and sufficient diligence, can result in immediate, impactful results for both IT and the business it supports. These can be agile, lightweight investments that bring the enterprise and cloud much closer together without one winning out at the expense of the other.

In reality the cloud is more reflective of a broader transition that both IT and society as a whole has been undergoing for a much longer period of time, perhaps since the PC first became networked, and maybe even before. We are at a period in time when we transition from the industrial to the information age, and this is something that has still to fully play out. The cloud is a significant step on this path that is both tangible and real and is ready for the mainstream now, not just for the domain of the early adopter.

MICROSOFT'S VIEW OF THE CLOUD

Microsoft firmly supports a hybrid vision of cloud computing. It recognises that technology architectures rarely exhibit a one-size-fits-all approach. Each organisation has a competing set of challenges and trade-offs that it needs to address.

For this reason, Microsoft is committed to a vision of software plus services. It recognises that different solutions are applicable to different organisations, or that different solutions are applicable to different parts of each organisation.

Microsoft has continued to invest across the complete technology landscape. It continues to deliver best-in-market on-premises and private cloud solutions. It is now possible to mesh these with public cloud-based solutions to deliver a 'best-of-both-worlds' solution.

At the base of the technology stack Microsoft delivers world-class operating systems and management tools in the form of **Windows Server** and **System Center**. These form the core of its on-premises and cloud-based environments. **Hyper-V** delivers world-leading virtualisation. **System Center Virtual Machine Manager** and the addition of the **Dynamic Datacentre Toolkit** make private clouds and dynamic infrastructure management a reality.

The **Windows Azure Platform** represents Microsoft's cloud computing platform, providing the ability to deploy, manage and scale business applications on the web through Microsoft data centres. Windows Azure is built on top of Microsoft's Windows Server Hyper-V and provides a platform and scale-out fabric to host .NET based applications and other development platforms such as Java, PHP and Ruby, giving the widest choice possible to developers.

The Windows Azure Platform contains a number of key services which enable internet-scale business applications to be rapidly built, together with connecting these to existing on-premises solutions.

These services include the **Windows Azure Platform AppFabric**, which includes functionality for publishing and securing services which traditionally have only been accessible on-premises over the Internet. Partner easyJet has utilised this to underpin its new HALO platform – providing hand-held wireless devices access deep into airports systems.

The Windows Azure Platform also includes **SQL Azure**, which is a fully managed relational database, built on SQL Server, in the cloud. Data can be kept up-to-date in the cloud through the use of the **Sync Framework**. Identity and security can be managed through the use of **Windows Identity Foundation** which provides the ability to combine and reuse logins between systems, providers and organisations.

At the top of the stack Microsoft provides a number of application services. On-premises these include collaboration and productivity tools such as **Microsoft Exchange** and **SharePoint**. In the SaaS world the Microsoft Business Productivity Online Suite (**BPOS**) includes a range of email, and messaging applications. This suite has been used successfully by enterprises such as GlaxoSmithKline to dramatically reduce costs.

Private

Public

Microsoft SharePoint Server
Microsoft Exchange
Microsoft Dynamics

Software as a Service (SaaS)

Microsoft Online Services
Microsoft Exchange Online
Microsoft SharePoint Services
Microsoft Office Communications Online
Microsoft Office Live

Microsoft SQL Server
Microsoft .NET

Platform as a Service (PaaS)

Windows Azure
Microsoft SQL Azure
Live Services
Microsoft .NET AppFabric

Microsoft System Center
Windows Server

Infrastructure as a Service (IaaS)

Microsoft System Center
Windows Server

Microsoft | Dynamic Data Center Toolkit For Enterprises

Microsoft | Dynamic Data Center Toolkit For Hosters

Dan Scarfe

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Co-founder & CEO of Dot Net Solutions Ltd – a Microsoft Gold Certified & managed systems integrator partner based in Windsor, UK. Dan has more than ten years of technical & consulting experience in a variety of sectors and industries. His particular passion is software plus services and evangelising how rich user experience can provide real additional value to software development projects. He often presents at Microsoft conferences and events and has of late been engaged with the teams in Redmond and the UK on Azure.

Matt Deacon

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Matt Deacon is the Chief Architectural Advisor for the Developer and Platform Group at Microsoft UK. His primary role is to serve as an advisor to Microsoft's customers and partners on all matters relating to the field and profession of IT Architecture. He works within the emerging technology team delivering landmark solutions based on Microsoft's Windows Azure Platform and is widely regarded as an authority on cloud computing and emergent trends within the enterprise. He chairs the Microsoft UK Partner Architect Advisory Council, a body of 30 senior industry Architects who provide feedback and advice to Microsoft on matters of product direction and strategy. As founder and chair of the UK region of the International Association of Software Architects (IASA), he is successfully building an active and informed community of IT architect professionals within the IT industry in the UK and across Europe.

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