Introduction to cloud

Cloud computing consists of three distinct types of computing services delivered remotely to clients via the internet. Clients typically pay a monthly or annual service fee to providers, to gain access to systems that deliver software as a service, platforms as a service and infrastructure as a service to subscribers.

Clients who subscribe to cloud computing services can reap a variety of benefits, depending on their business needs at a given point in time. The days of large capital investments in software and IT infrastructure are now a thing of the past for any enterprise that chooses to adopt the cloud computing model for procurement of IT services.

The ability to access powerful IT resources on an incremental basis is leveling the playing field for small and medium sized organizations, providing them with the necessary tools and technology to compete in the global marketplace, without the previously requisite investment in on premise IT resources. Clients who subscribe to computing services delivered via the **cloud** can greatly reduce the IT service expenditures for their organizations; and gain access to more agile and flexible enterprise level computing services, in the process.

SAAS

Saas (Software as a Service) provides clients with the ability to use software applications on a remote basis via an internet web browser. Software as a service is also referred to as **"software on demand"**.

Clients can access SaaS applications from anywhere via the web because service providers host applications and their associated data at their location. The primary benefit of SaaS, is a lower cost of use, since subscriber fees require a much smaller investment than what is typically encountered under the traditional model of software delivery. Licensing fees, installation costs, maintenance fees and support fees that are routinely associated with the traditional model of software delivery can be virtually eliminated by subscribing to the SaaS model of software delivery.

Examples of SaaS include: Google Applications and internet based email applications like Yahoo! Mail, Hotmail and Gmail.

Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring and office tools (such as Microsoft Office 365).

SaaS provides a complete software solution which you purchase on a pay-as-you-go basis from a [cloud service provider](). You rent the use of an app for your organisation and your users connect to it over the Internet, usually with a web browser. All the underlying infrastructure, middleware, app software and app data are located in the service provider's data center. The service provider manages the hardware and software and with the appropriate service agreement, will ensure the availability and the security of the app and your data as well. SaaS allows your organisation to get quickly up and running with an app at minimal upfront cost.

Common SaaS scenarios

If you have used a web-based email service such as Outlook, Hotmail or Yahoo! Mail, then you have already used a form of SaaS. With these services, you log into your account over the Internet, often from a web browser. The email software is located on the service provider's network and your messages are stored there as well. You can access your email and stored messages from a web browser on any computer or Internet-connected device.

The previous examples are free services for personal use. For organisational use, you can rent productivity apps, such as email, collaboration and calendaring; and sophisticated business applications such as customer relationship management (CRM), enterprise resource planning (ERP) and document management. You pay for the use of these apps by subscription or according to the level of use.

Advantages of SaaS

Gain access to sophisticated applications. To provide SaaS apps to users, you don't need to purchase, install, update or maintain any hardware, middleware or software. SaaS makes even sophisticated enterprise applications, such as ERP and CRM, affordable for organisations that lack the resources to buy, deploy and manage the required infrastructure and software themselves.

Pay only for what you use. You also save money because the SaaS service automatically scales up and down according to the level of usage.

Use free client software. Users can run most SaaS apps directly from their web browser without needing to download and install any software, although some apps require plugins. This means that you don't need to purchase and install special software for your users.

Mobilise your workforce easily. SaaS makes it easy to "mobilise" your workforce because users can access SaaS apps and data from any Internet-connected computer or mobile device. You don't need to worry about developing apps to run on different types of computers and devices because the service provider has already done so. In addition, you don't need to bring special expertise onboard to manage the security issues inherent in mobile computing. A carefully chosen service provider will ensure the security of your data, regardless of the type of device consuming it.

Access app data from anywhere. With data stored in the cloud, users can access their information from any Internet-connected computer or mobile device. And when app data is stored in the cloud, no data is lost if a user's computer or device fails.

PAAS

PaaS (Platform as a Service) provides clients with the ability to develop and publish customized applications in a hosted environment via the web. It represents a new model for software development that is rapidly increasing in its popularity.

An example of PaaS is Salesforce.com. PaaS provides a framework for agile software development, testing, deployment and maintenance in an integrated environment.

Like SaaS, the primary benefit of PaaS, is a lower cost of use, since subscriber fees require a much smaller investment than what is typically encountered when implementing traditional tools for software development, testing and deployment. PaaS providers handle platform maintenance and system upgrades, resulting in a more efficient and cost effective solution for enterprise software development.

Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. You purchase the resources you need from a cloud service provider on a pay-as-you-go basis and access them over a secure Internet connection.

Like IaaS, PaaS includes infrastructure—servers, storage and networking—but also middleware, development tools, business intelligence (BI) services, database management systems and more. PaaS is designed to support the complete web application lifecycle: building, testing, deploying, managing and updating.

PaaS allows you to avoid the expense and complexity of buying and managing software licenses, the underlying application infrastructure and middleware or the development tools and other resources. You manage the applications and services you develop and the cloud service provider typically manages everything else.

Common PaaS scenarios

Organisations typically use PaaS for these scenarios:

Development framework. PaaS provides a framework that developers can build upon to develop or customise cloud-based applications. Similar to the way you create an Excel macro, PaaS lets developers create applications using built-in software components. Cloud features such as scalability, high-availability and multi-tenant capability are included, reducing the amount of coding that developers must do.

Analytics or business intelligence. Tools provided as a service with PaaS allow organisations to analyse and mine their data, finding insights and patterns and predicting outcomes to improve forecasting, product design decisions, investment returns and other business decisions.

Additional services. PaaS providers may offer other services that enhance applications, such as workflow, directory, security and scheduling.

Advantages of PaaS

By delivering infrastructure as a service, PaaS offers the same advantages as IaaS. But its additional features—middleware, development tools and other business tools—give you more advantages:

Cut coding time. PaaS development tools can cut the time it takes to code new apps with pre-coded application components built into the platform, such as workflow, directory services, security features, search and so on.

Add development capabilities without adding staff. Platform as a Service components can give your development team new capabilities without your needing to add staff having the required skills.

Develop for multiple platforms—including mobile—more easily. Some service providers give you development options for multiple platforms, such as computers, mobile devices and browsers making cross-platform apps quicker and easier to develop.

Use sophisticated tools affordably. A pay-as-you-go model makes it possible for individuals or organisations to use sophisticated development software and business intelligence and analytics tools that they could not afford to purchase outright.

Support geographically distributed development teams. Because the development environment is accessed over the Internet, development teams can work together on projects even when team members are in remote locations.

Efficiently manage the application lifecycle. PaaS provides all of the capabilities that you need to support the complete web application lifecycle: building, testing, deploying, managing and updating within the same integrated environment.

IAAS

IaaS (Infrastructure as a Service) allows clients to remotely use IT hardware and resources on **a "pay-as-you-go"** basis. It is also referred to as HaaS (hardware as a service). Major IaaS players include companies like IBM, Google and Amazon.com.

IaaS employs virtualization, a method of creating and managing infrastructure resources in the "cloud". IaaS provides small start up firms with a major advantage, since it allows them to gradually expand their IT infrastructure without the need for large capital investments in hardware and peripheral systems.

Infrastructure as a service (IaaS) is an instant computing infrastructure, provisioned and managed over the Internet. Quickly scale up and down with demand and pay only for what you use.

IaaS helps you avoid the expense and complexity of buying and managing your own physical servers and other datacenter infrastructure. Each resource is offered as a separate service component and you only need to rent a particular one for as long as you need it. The cloud computing service provider manages the infrastructure, while you purchase, install, configure and manage your own software—operating systems, middleware and applications.

Common IaaS business scenarios

Typical things businesses do with IaaS include:

Test and development. Teams can quickly set up and dismantle test and development environments, bringing new applications to market faster. IaaS makes it quick and economical to scale up dev-test environments up and down.

Website hosting. Running websites using IaaS can be less expensive than traditional web hosting.

Storage, backup and recovery. Organisations avoid the capital outlay for storage and complexity of storage management, which typically requires a skilled staff to manage data and meet legal and compliance requirements. IaaS is useful for handling unpredictable demand and steadily growing storage needs. It can also simplify planning and management of backup and recovery systems.

Web apps. IaaS provides all the infrastructure to support web apps, including storage, web and application servers and networking resources. Organisations can quickly deploy web apps on IaaS and easily scale infrastructure up and down when demand for the apps is unpredictable.

High-performance computing. High-performance computing (HPC) on supercomputers, computer grids or computer clusters helps solve complex problems involving millions of variables or calculations. Examples include earthquake and protein folding simulations, climate and weather predictions, financial modeling and evaluating product designs.

Big data analysis. Big data is a popular term for massive data sets that contain potentially valuable patterns, trends and associations. Mining data sets to locate or tease out these hidden patterns requires a huge amount of processing power, which IaaS economically provides.

Advantages of IaaS

Eliminates capital expense and reduces ongoing cost. IaaS sidesteps the upfront expense of setting up and managing an on-site datacenter, making it an economical option for start-ups and businesses testing new ideas.

Improves business continuity and disaster recovery. Achieving high availability, business continuity and disaster recovery is expensive, since it requires a significant amount of technology and staff. But with the right service level agreement (SLA) in place, IaaS can reduce this cost and access applications and data as usual during a disaster or outage.

Innovate rapidly. As soon as you have decided to launch a new product or initiative, the necessary computing infrastructure can be ready in minutes or hours, rather than the days or weeks—and sometimes months—it could take to set up internally.

Respond quicker to shifting business conditions. IaaS enables you to quickly scale up resources to accommodate spikes in demand for your application— during the holidays, for example—then scale resources back down again when activity decreases to save money.

Focus on your core business. IaaS frees up your team to focus on your organisation's core business rather than on IT infrastructure.

Increase stability, reliability and supportability. With IaaS there is no need to maintain and upgrade software and hardware or troubleshoot equipment problems. With the appropriate agreement in place, the service provider assures that your infrastructure is reliable and meets SLAs.

Better security. With the appropriate service agreement, a cloud service provider can provide security for your applications and data that may be better than what you can attain in-house.

Gets new apps to users faster. Because you don't need to first set up the infrastructure before you can develop and deliver apps, you can get them to users faster with IaaS.

Cloud Architecture

An Enterprise Cloud is a hosted computing environment that delivers software, platform or infrastructure services to business users via a network. Enterprise Cloud Computing provides organizations with the ability to deliver computing services in a controlled and secure manner, since a cloud for the enterprise makes use of a network firewall.

Entities that store, mange or process sensitive data, including government agencies and health care organizations, are likely to use enterprise cloud computing services, as opposed to using public cloud computing services.

Many businesses who own on-premise IT systems can maximize their IT investment through Enterprise Cloud Computing. A Cloud for the Enterprise promises to deliver an extremely agile computing environment for client users within private organizations. These organizations can gain many of the same operational benefits available within a public cloud computing environment. Extending a private cloud that incorporates methods such as virtualization, automation and service management; can result in increased operational efficiency within an organization.

IMPLEMENTING AN ENTERPRISE CLOUD

Enterprise Cloud Computing can be implemented in one of two ways:

as a **private cloud** that is **hosted on the premises of an organization**; or

as a private cloud that is **hosted externally by a third party provider**.

Organizations that use externally hosted enterprise cloud computing services often experience the benefits of lower IT infrastructure and maintenance costs. Another frequent benefit of externally hosted enterprise cloud computing services is lower IT operational expenses, due to a decreased need for internal IT support staff.

Some organizations gain the benefits of both an internally hosted and an externally hosted enterprise cloud computing environment, by implementing hybrid enterprise cloud computing services for their businesses. Under such a configuration, organizations internally host their more sensitive applications that require a highly secure computing environment and move applications with less stringent security requirements to an externally hosted cloud for the enterprise.

A hybrid enterprise cloud computing environment typically uses a cloud management interface, to provide a coherent platform for enterprise cloud service delivery. Cloud management methods require the establishment of a cloud as a platform, where an enterprise can provide hybrid cloud computing services on demand from existing IT systems and processes. Cloud management software provides a platform to easily register users, create work group services profiles, manage virtual resources and more.

Types of cloud deployments: public, private, hybrid

Not all clouds are the same. There are three different ways to deploy cloud computing resources:

public cloud, **private cloud** and **hybrid cloud**.

Public cloud

Public clouds are owned and operated by a third-party cloud service provider, which deliver their computing resources like servers and storage over the Internet. Microsoft Azure, AWS, Google Cloud are an example of a public cloud. With a public cloud, all hardware, software and other supporting infrastructure is owned and managed by the cloud provider. You access these services and manage your account using a web browser.

Private cloud

A private cloud refers to cloud computing resources used exclusively by a single business or organisation. A private cloud can be physically located on the company's on-site datacenter. Some companies also pay third-party service providers to host their private cloud. A private cloud is one in which the services and infrastructure are maintained on a private network.

Hybrid cloud

Hybrid clouds combine public and private clouds, bound together by technology that allows data and applications to be shared between them. By allowing data and applications to move between private and public clouds, hybrid cloud gives businesses greater flexibility and more deployment options.

How cloud computing works

Cloud computing services all work a little differently, depending on the provider. But many provide a friendly, browser-based dashboard that makes it easier for IT professionals and developers to order resources and manage their accounts. Some cloud computing services are also designed to work with REST APIs and a command-line interface (CLI), giving developers multiple options.