



CLOUD COMPUTING

MOVING TO THE CLOUD

A whitepaper on Cloud computing and emerging trends.

Sid Bhattacharya

sid@oneappcloud.com

CLOUD COMPUTING

MOVING TO THE CLOUD

INTRODUCTION

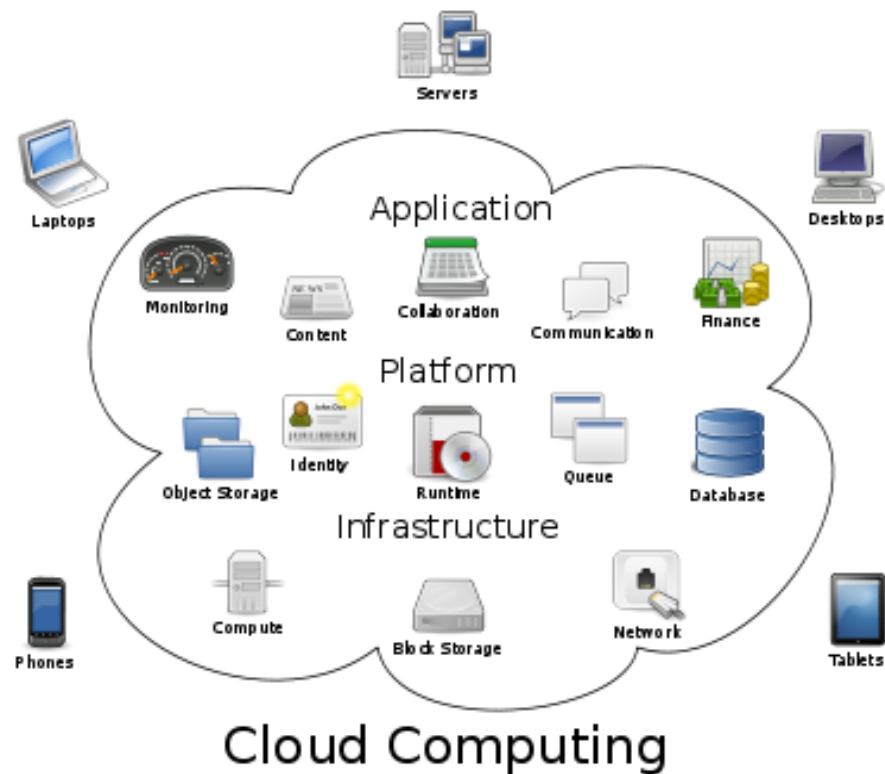
The cloud computing paradigm is revolutionary as it provides computation, software, data access and storage as services rather than products. Software as a service (SaaS) has become a popular delivery model for business applications including accounting, invoicing, collaboration, CRM, ERP, HR and Content Management. SaaS is a key segment of the cloud computing stack as it offers the applications for end users to interact with.

There are many factors in the evolution of this model contributing to the success of on-demand delivery model for the software including virtualization technology, Service Oriented Architecture (SOA) and the Application Service Providers (ASP) model. The evolution of these technologies as well as the increase in network speeds and reduced hardware costs have paved the success for the cloud computing model.

According to Gartner group estimate SaaS sales in 2010 have reached \$10B and are projected to grow to \$12.1B in 2011. CRM continues to be the largest market for SaaS with revenue projected at around \$3.8B in 2011. The second most profitable category after CRM is Content, Communication and Collaboration which Gartner predicts will be \$3.3B in 2011.

The most promising outlook on cloud computing as it relates to SaaS is that it is expected to double its revenue (in just four years) by 2015 to \$21.3B.

- INTRODUCTION
- BENEFITS
- CHARACTERISTICS
- SERVICE MODELS
- ISSUES AND RISKS
- IDENTIFYING APPLICATIONS
- ENTERPRISE CLOUD STRATEGY
- PRICING MODELS
- KEY TAKEAWAYS
- LIST OF PROVIDERS



Source: Wikipedia

To understand how cloud based applications offered as SaaS differ from some of the other offerings it's important to see the categories in which software is deployed and licensed:

- **On Premise** – Software is licensed by the customer and installed within the enterprise
- **On Demand** – Software is not licensed by the customer but offered as a service on the cloud
- **Hosted** – Software is licensed by the customer and installed on a dedicated or private instance.
- **Appliance** – Software is licensed by the customer and is available pre-packaged as a virtual image or physical server.

In the traditional model most companies already have on premise versions of software. Large enterprises (Revenues over \$500 million) are skeptical to move to the cloud compared to small and medium enterprises (Revenues less than \$500 million). This comes from the fear of security that sensitive financial and competitor data could be leaked to other companies if they move to the cloud. Large enterprises also perceive cloud based applications as a fit-for-all solution that cannot be customized to their unique business processes. Another fear is of reliability and availability of these SaaS services as compared to on premise applications.

Over the past year majority of these concerns have been addressed both by cloud providers as well as a number of third party companies that have come up with products and services to provide a tighter control for large enterprises on the SaaS model.

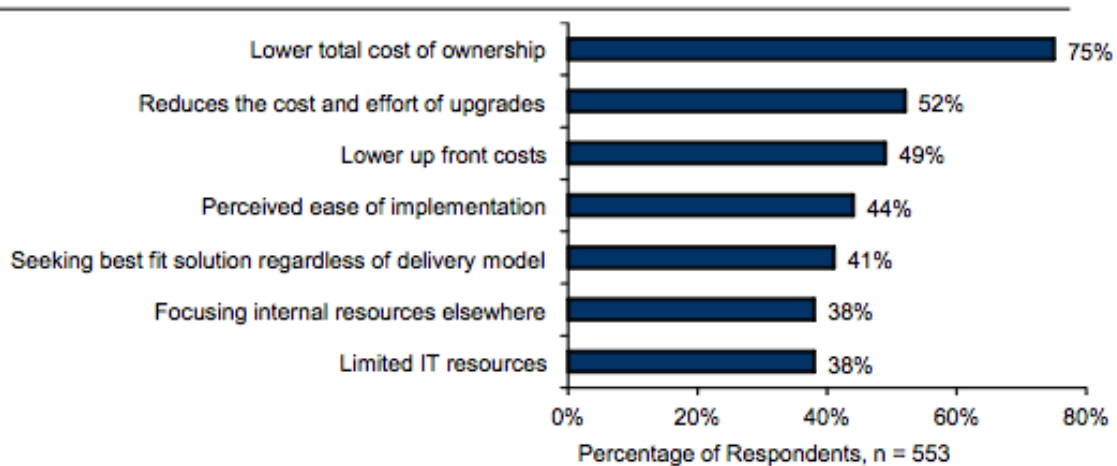
BENEFITS OF A SAAS MODEL

The key benefits of organizations moving to the cloud are

- **Reduced TCO** – The total costs of ownership including cost of procuring hardware and software licenses are reduced. Capital expenses are converted into operational expenses saving upfront costs to companies.
- **Easier Implementation and Rollout** – Most cloud applications offer baseline applications with best practice templates. The average time it takes to go-live on the cloud is significantly less than the traditional on premise model
- **Less IT involvement** – Cloud based applications need less IT involvement from companies than a traditional on premise model

The positive factors influencing SaaS decisions are shown below.

Figure 4: Positive Factors Influencing SaaS Decisions



Source: Aberdeen Group, October 2011

KEY CHARACTERISTICS

A variety of acronyms are used while defining a number of services that are available on the cloud. There are some broad and widely used categories that define the end to end view of cloud, from infrastructure providers to application services. These categories are provided below:

IaaS (Infrastructure as a Service)

- Resources provided as services
- Dynamic Scaling and Elasticity
- Pay per usage model
- Multi tenancy – Single instance serving multiple customers
- Enterprise grade infrastructure – Data center infrastructure, high availability and redundancy provided

PaaS (Platform as a Service)

- Services to develop, test and maintain applications
- UI Creation Tools
- Multi tenancy – Single instance serving multiple customers
- Open Integration Protocol – REST and SOAP Based APIs
- Others – Visualization tools, pay per usage apis etc

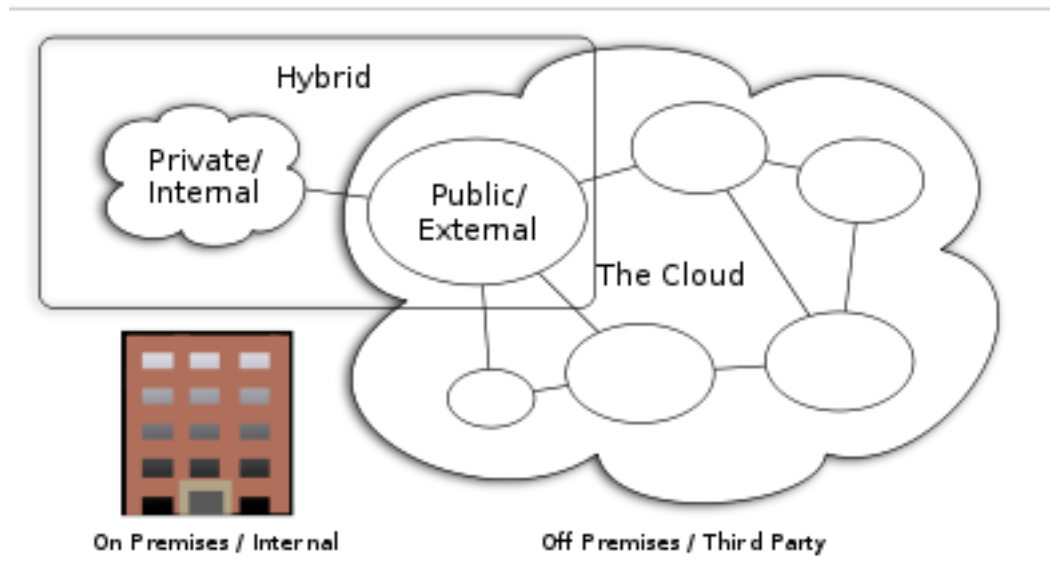
SaaS (Software as a Service)

- Accelerated Feature Delivery – Upgrades and fixes can be done rapidly and across all customer instances
- Configuration & Customization – Applications can be customized for look and feel with the ability to add custom fields, customer specific branding and custom workflows
- Collaboration – Applications provide collaboration capabilities with other platforms

Cloud Types

Although public cloud with multi-tenant applications are the most cost effective and popular choice, there are a few other options available for organizations who want to control the application and data that reside in the cloud. Cloud providers generally fall into one of the three categories

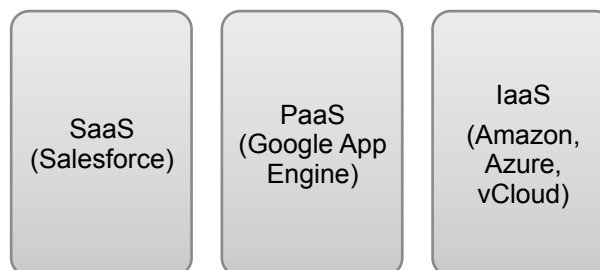
- **Public Cloud** - The cloud infrastructure is made available and shared by many organizations
- **Private Cloud** - The cloud infrastructure and applications are managed by a single organization
- **Hybrid Cloud** - Combination of the public and private cloud models that enable organizations to isolate proprietary information.



SERVICE MODELS

The service models defined by various cloud providers are

1. **Infrastructure as a service [IaaS]** - CPU, Storage, System software offered as a service (Amazon WS, Mosso)
2. **Platform as a service [PaaS]**- A development platform offered as a service (Salesforce's force.com, Google App Engine, Microsoft Azure)
3. **Software as a service [SaaS]** - Applications offered as a service (Salesforce.com, SAP sales on demand, iTunes etc)
4. **Others - Database as a service (DaaS)** (Amazon Simple DB, Database.com, CouchDB) and other acronyms like NAAS (Network as a service) etc.



With the provider managing datacenter servers, storage space the consumer pays for usage, just like electricity is consumed. This opens up avenues for companies of all sizes and individuals looking to build applications or assemble solutions.

One automatically gets the benefits of scalability, performance and redundancy in this cloud model. Applications can start small with tens of users and can potentially scale to millions in this model. Most cloud applications are also primarily geared to be self-service driven with a relatively easy setup and configuration + customization option.

SOA and Software as a Service

With SOA enabled cloud applications it becomes easy to import and export information from one cloud application to another therefore providing a tighter integration between applications.

With an open API based model applications / solutions that are available on the cloud become available for consumption in a variety of formats. One big challenge in the traditional software deployment model before SOA was the ability to decouple business functionality from the frontend. SOA promised the ability to decouple these two and provide an API or Web Services based access to business functions while decoupling the consumer or frontend for the application.

With cloud computing the SOA model opens up new avenues for consumption of data via different form factors devices and applications. Platforms like facebook and salesforce.com are examples of providing these web services that have been used in a variety of formats including the possibility of combining or mashing them with other solutions.

ISSUES AND RISKS

The benefits of automatic scalability, high availability and optimizing computing resources to manage costs do lead to certain challenges for applications built for the cloud.

Multi-tenant applications that share the same database has a potential security issue of accidental or hack to access data from other customers. The cost v/s risk factors are inversely proportional and as companies want tighter control they have to pay more to get dedicated and isolated instances. With compliance and SOX issue the hybrid cloud model alleviate these inherent risk by storing any sensitive data onto the company servers while still access applications from the cloud.

Reliability - With all information residing on remote data centers the other risk that companies face are with respect to high availability and redundancy. An outage in North America data center should not bring the application down for users in Europe and Asia. Many Infrastructure providers have zones in which their data centers reside thus eliminating complete outage of an application.

Security - With enterprise application, a large portion of the data or content resides within the enterprise landscape. Companies moving to provide certain applications via the cloud model will need to get to the source of the data that is sitting within the enterprises.

For companies that have moved to a SOA based approach this is relatively streamlined and cloud application can access these services via a traditional web service call with the authentication model defined.

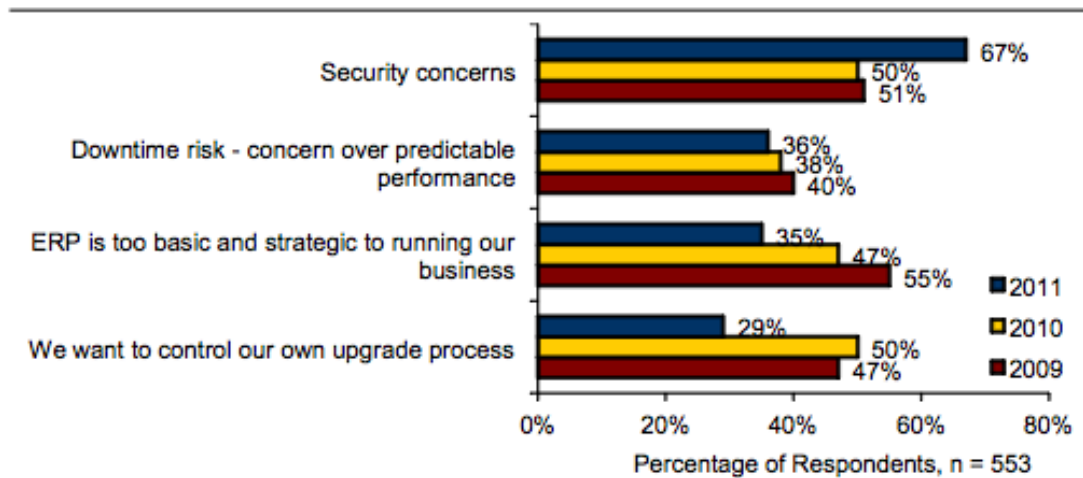
For others that do not have their business application and data exposed via a SOA layer it becomes a two step approach to first enable these applications or data as services and then interface the cloud application to consume these.

A number of integration products are available that can consolidate and expose data available in traditional formats into a consistent REST API. It also becomes important for cloud application exposing a web service interface to ensure security around data encryption, authentication, authorization, fraud detection.

Audit & Compliance- In order to comply with regulations and standard like PCI, FISMA, HIPAA and SOX companies have to use the hybrid cloud model with certain sensitive information residing on-premise. This model, however is more expensive and difficult to manage for IT groups. It does provide some benefits to enterprise users who can work on applications and access information from a variety of devices while away from their office.

Authentication - With mash-up applications providing richness to the traditional applications authentication across different cloud applications become a challenge. For companies planning to create enterprise application that mash-up information from different sources a single sign on solution is needed.

The image presented below shows the concerns of large enterprises over the years to move to ERP solutions on cloud. Security of cloud based ERP and other applications in general are still a concern for large enterprises.



Source: Aberdeen Group, October 2011

FOCUS ON THE SOLUTION NOT SOFTWARE

Organizations looking to move to the cloud will be able to utilize cloud services already available in a subscription model. The cloud paradigm will let companies move from building software to assembling solutions. This will enable them to focus on their core businesses while leveraging best of breed solutions available on the cloud.

No longer is a traditional 6-12 month implementation cycle is required to procure licenses and implement the software. The SAAS providers will reduce the effort to rollout applications to end users in a cheaper and faster way.

IDENTIFYING APPLICATIONS

As companies evaluate and decide on pushing content out to the cloud these applications generally fit into the following categories

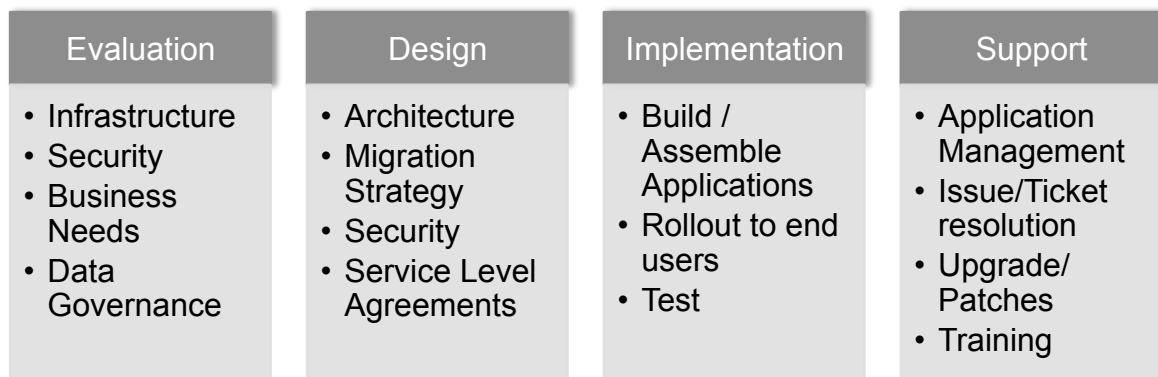
1. **Internal** – Time, Expense, Approvals and other core functions that are specific to an organization
2. **External** – Vendor, Partners and Customer accessible information
3. **Public** – General content that is publicly available

Certain groups of users such as executive and sales personnel who are away from their desks need an easy way to access company data without having to run through elaborate VPN procedures. The hybrid cloud model makes this possible by pushing limited content out for such groups of users.

ENTERPRISE CLOUD STRATEGY

For companies and individuals thinking of moving to the cloud the fundamental question has to be about the problem they are solving. With the technology stacks available and the best of breed cloud applications already live it is more about assembling components and solving the problem and less about application building and ground up development. It is more solution oriented and less development focused unlike traditional models.

The process of moving to the cloud for organization has to be carefully planned out while managing any security and compliance requirements. A four phase approach is recommended as shown below. Rather than a full blown rollout, an initial pilot project approach with accelerated Evaluation, Design and Build phases will help organizations try out the cloud model, validate business needs and address any security or data governance concerns before doing a full scale implementation and rollout.



Pricing Models

The pricing of cloud providers, especially when it comes to infrastructure varies across different providers. While looking across different service models and comparing providers it become apparent that the infrastructure costs (IaaS) is the most complex to calculate.

1. **PaaS** - Development platforms offered as a service. Since they are targeted for individual developers these are generally free with limited services to get started, example Google App Engine, Heroku (now part of Salesforce), Force.com. Most providers charge in a tiered model for value added services, hosting support and other premium features.

2. **SaaS** - Depending on the application provider the price varies but can be generally categorized under a tiered model or a freemium model.

- Tiered Model – Allows consumers to select from a set of tiers at a progressively increasing price to receive the services that meet their needs
- Freemium Model – Allows consumers to access limited functionality free of charge while paying more for advanced features and support
- Free trials (Time bound and / or Functionality bound) – Allow consumers to try out the service for of cost, with limited functionality and for a limited period of time. For application providers this model works best as they can get immediate feedback on their products by looking at the conversion rate for people moving from free to a paid version of the service. For consumers a free offering seems like a good way to evaluate a product without locking down into a contract or having to deal with elaborate installation and configuration options. Consumers generally do not count the dollar value of their time spent on the free application so its virtually free for them.

3. **IaaS** -

The most variables in the pricing model are where the Infrastructure providers offer since there are a variety of options available. Pricing for the infrastructure generally depends on a few factors

a. Software Licensed - Is the host software licensed open source or proprietary

b. Data Transfer - Amount of data transferred in and out of the instance

c. Uptime - A fee for keeping the instances up and running

d. Others - many other add-on services add up to the total cost of running an instance from the IaaS provider. These include

1. Fixed or Static IP for the instance
2. Redundant locations for failover
3. Disk Space
4. Load Balancers
5. Add-on for monitoring, backup and recovery, auditing and connecting back to enterprises.

Companies looking to move to the cloud, need to carefully evaluate the cost involved in an IaaS model.

While most IaaS providers provide the basic infrastructure and technology stacks to run applications on the cloud, this is an evolving area and there are some aspects that need to be looked into to ensure a smooth running cloud instance

1. **Monitoring and Alert** - Companies like Cloudkick provide tools to monitor and alert
2. **Building Hybrid Clouds** - Enterprise systems sitting within the confines of the firewall cannot be easily accessible from the cloud. To make this easier companies like Boomi and Altor Networks provide solutions that enable companies to create private clouds.
3. **Packaged Solutions** - With the virtualization technology it has become easier to recreate or repackage complete technology stacks including OS, App Servers, Databases and Applications so the entire process of setting up a cloud instance with some preconfigured software becomes easy. Companies like Bitnami provide a variety of options to choose stacks that can be deployed across different cloud providers and even used for on-premise installations.
4. **Consolidators** - With many success stories like Facebook, Twitter, Google Apps, Salesforce CRM, Amazon WS it becomes important to not reinvent the wheel and leverage these services which are all on cloud. Companies such as Appirio provide products and services to integrate these platforms and services in customer environment.

KEY TAKEAWAYS

With cloud-based applications now mainstream, organizations looking to innovate while keeping their costs low should look at the cloud-based model. There are a number of options available from vendors providing IaaS, PaaS and SaaS on the cloud and with a healthy ecosystem of partner solutions that fill the gaps not addressed by the vendors. Consider the following questions while evaluating a cloud-based solution

- Will business users use the solution from the cloud?
- What is the total cost to do the business including the variable Infrastructure as a Service costs?
- Does the solution need to be built or assembled?
- Can the IT department support and manage the solution?
- Can the solution be licensed as a SaaS only or is there a need to look at Infrastructure and Development as Service providers also?
- Does the vendor meet regulatory and compliance needs?

By answering these questions companies will be better informed as they decide to move to the cloud.

LIST OF CLOUD PROVIDERS

Companies looking to evaluation cloud providers now have an ever increasing list of solution providers available to choose from. Consumers are getting more features for same or reduced prices often in a freemium model. The following table has a breakdown (partial list) of the providers by Infrastructure, Platform and Application offering types.

Service Model	Type	Providers
PaaS	Development Platforms	Microsoft Azure, Google App Engine, Force.com, Heroku, GoGrid
IaaS	Infrastructure	Amazon EC2, Rackspace, VMWare vCloud, IBM Cloudburst, Verizon, Joyent
SaaS	CRM	Salesforce.com, Microsoft Dynamics, Oracle CRM, Sugar CRM, SAP Sales on Demand, Netsuite CRM, Zoho CRM, webCRM
SaaS	ERP	SAP Business by design, NetSuite, Rootstock, Infor, Workday, Zoho, Acumatica
SaaS	Virtual Desktop	Wyse
SaaS	Collaboration	Salesforce chatter, SAP Streamworks, IGLOO, Zoho Meeting, Google Apps, Office 365, Facebook, Twitter, LinkedIn
SaaS	Billing and Invoicing	Zoho Invoice, PaySimple, Intacct
SaaS	Finance and Accounting	Zoho Books, Intacct, FinancialForce, Xero, Intuit
SaaS	Human Resources	Intuit, TribeHR
SaaS	Content	Amazon Cloud Drive, Apple iCloud, Dropbox, Box.net, Microsoft SkyDrive