

AWS Design and Automation

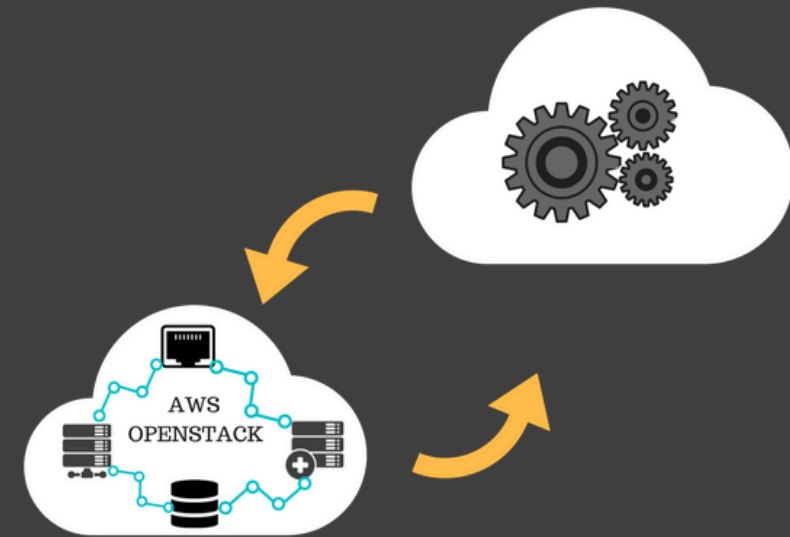
Module 1: Cloud Compute Basics

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Cloud Computing Basics

What is Cloud Computing?

- ❑ Cloud computing is a way to provide Information Technology to the business or customers.
- ❑ Information Technology Includes Infrastructure, Platform and Applications
- ❑ Infrastructure Includes Server, Storage, Network and other allied Infrastructure Services
- ❑ Platform Includes Data Storage environment and Data Execution Environment
- ❑ Application Includes Business Applications and Customer Applications



Why Cloud Computing

Why Learn about Cloud Computing?

- In today's world business and customer wants IT(Software, Platform and Infrastructure) to be available as and when they need it.
- As technology took higher leaps, business and users wanted IT as a service, so Cloud Computing changed the old business model to cloud model to provide IT as a service.
- Many analytical companies identifies cloud computing is the top 5 technologies trends now and in the near future. Gartner Predicted IT spending on Public cloud alone will be \$383+ Billion Dollar Market by 2020.

Cloud computing Market Size

Worldwide Public Cloud Services Forecast (Millions of Dollars)

	2016	2017	2018	2019	2020
Cloud Business Process Services (BPaaS)	40,812	43,772	47,556	51,652	56,176
Cloud Application Infrastructure Services (PaaS)	7,169	8,851	10,616	12,580	14,798
Cloud Application Services (SaaS)	38,567	46,331	55,143	64,870	75,734
Cloud Management and Security Services	7,150	8,768	10,427	12,159	14,004
Cloud System Infrastructure Services (IaaS)	25,290	34,603	45,559	57,897	71,552
Cloud Advertising	90,257	104,516	118,520	133,566	151,091
Total Market	209,244	246,841	287,820	332,723	383,355


- Cloud is already \$209+ Billion Market
- By 2020, it will be around \$383+ Billion.
- By further research in this particular area, we can conclude that enterprises started adopting cloud as compared to the previous years due to which the market has been increased ridiculously.
- Many enterprises have already started using cloud, these enterprises experimented, tested and adopted cloud in its early years
- we cannot find a single enterprise which says no to cloud.

Cloud Computing History

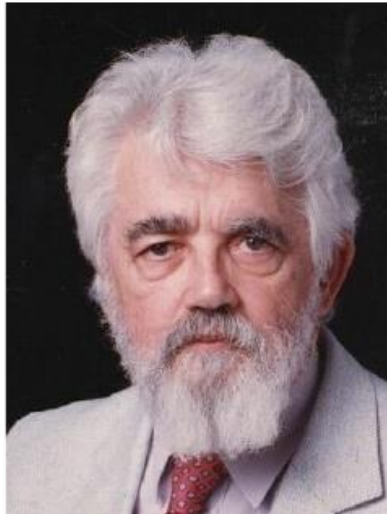
- The idea of computing in a "cloud" traces back to the origins of utility computing, a concept that computer scientist John McCarthy publicly proposed in 1961.

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"Computation may someday be organized as a public utility ... The computing utility could become the basis for a new and important industry."



John McCarthy
(1961)



- In 1969, Leonard Kleinrock, a chief scientist of the Advanced Research Projects Agency Network or ARPANET project that seeded the Internet, stated:

"As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of 'computer utilities' ...".

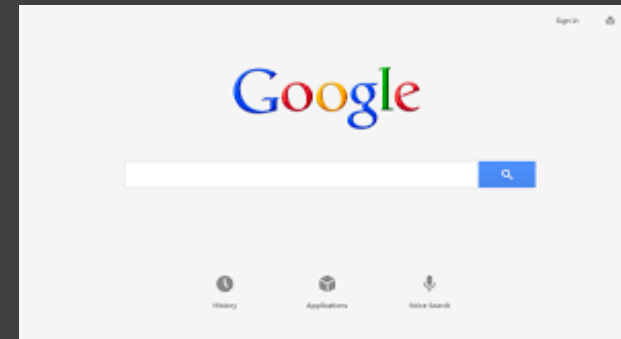
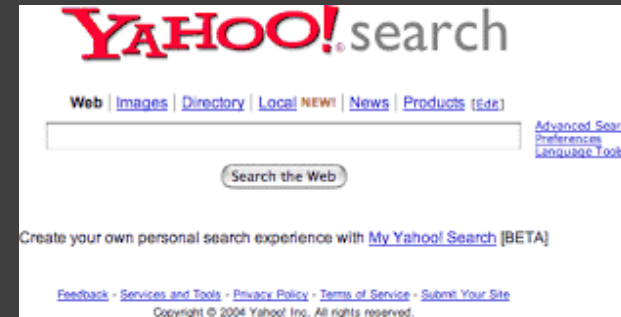


Cloud Computing History

- Early adapters of Utility Computing or form of cloud computing in 1990's

- *Yahoo and Google Search Engine*
- *Email Services(Hotmail, Gmail)*
- *Open Publishing (Myspace, Facebook, Youtube)*
- *Social Media like (Twitter , LinkedIn)*

Though consumer-centric, these services popularized and validated core concepts that form the basis of modern-day cloud computing.





- In the late 1990s, Salesforce.com pioneered the notion of bringing remotely provisioned services into the enterprise.
- In 2002, Amazon.com launched the Amazon Web Services (AWS) platform, a suite of enterprise-oriented services that provide remotely provisioned storage, computing resources, and business functionality.

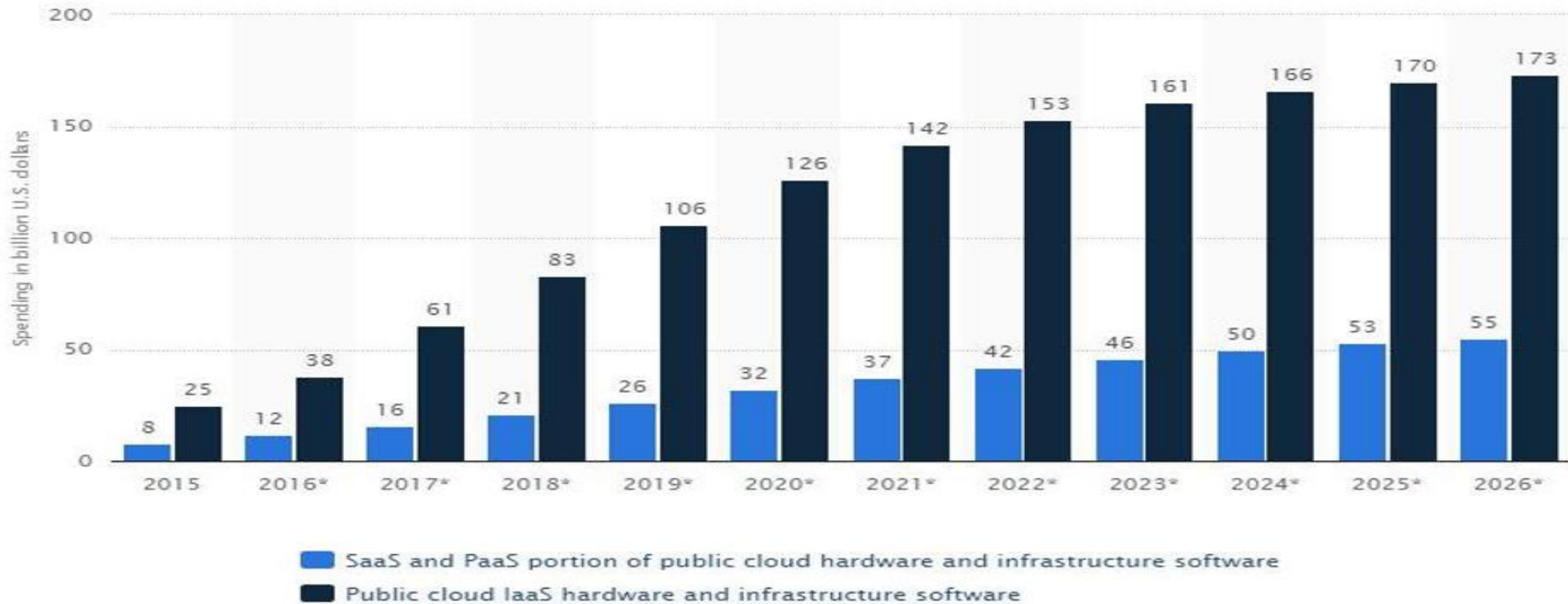
Cloud Computing History



- 2006 that the term "cloud computing" emerged in the commercial arena.
- Amazon launched its Elastic Compute Cloud (EC2) services that enabled organizations to "lease" computing capacity and processing power to run their enterprise applications.
- Google Apps also began providing browser-based enterprise applications in the same year, and three years later, the Google App Engine became another historic milestone.

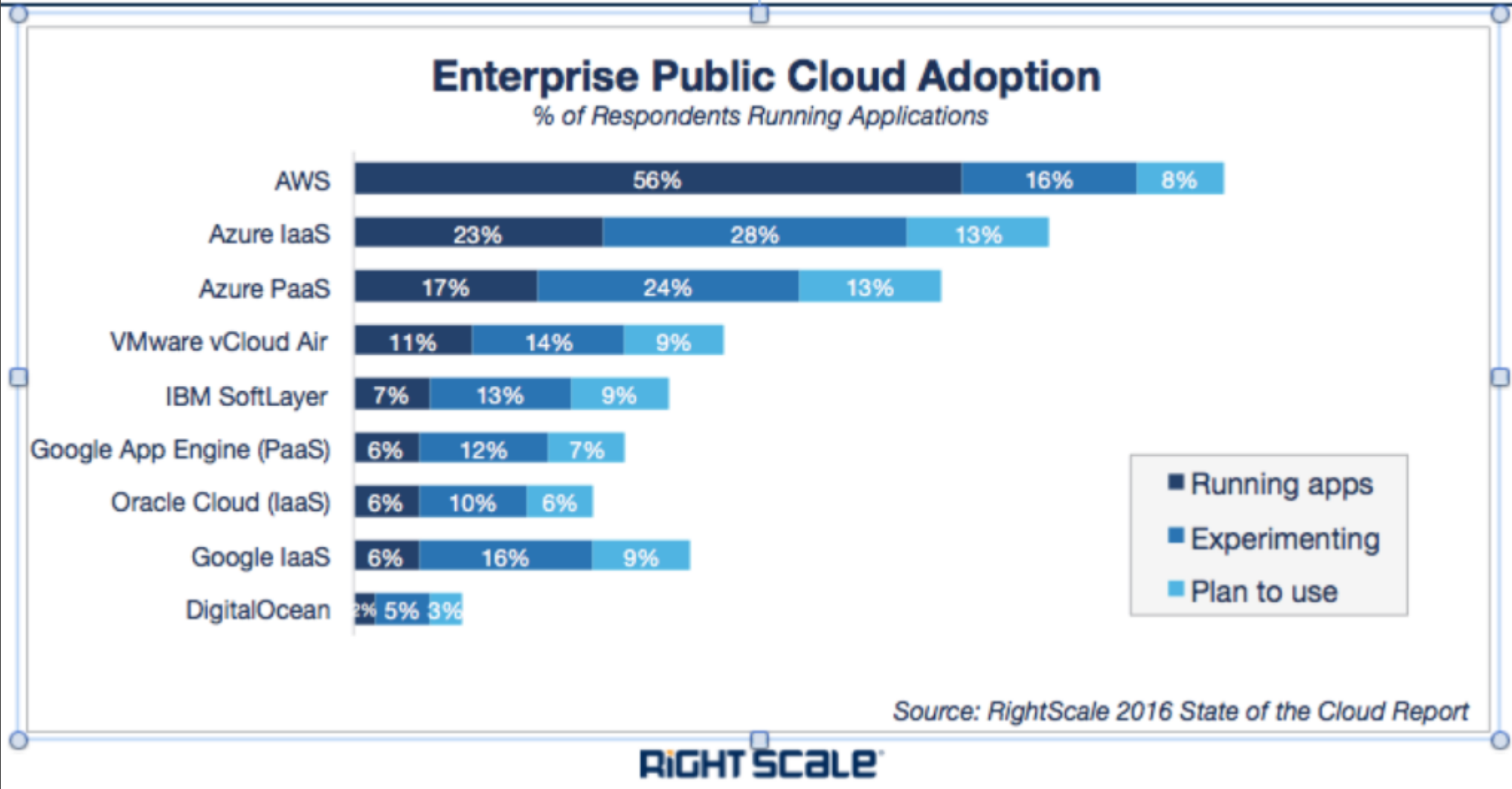
Cloud computing Market Size

Public cloud Infrastructure as a Service (IaaS) hardware and software spending from 2015 to 2026, by segment (in billion U.S. dollars)



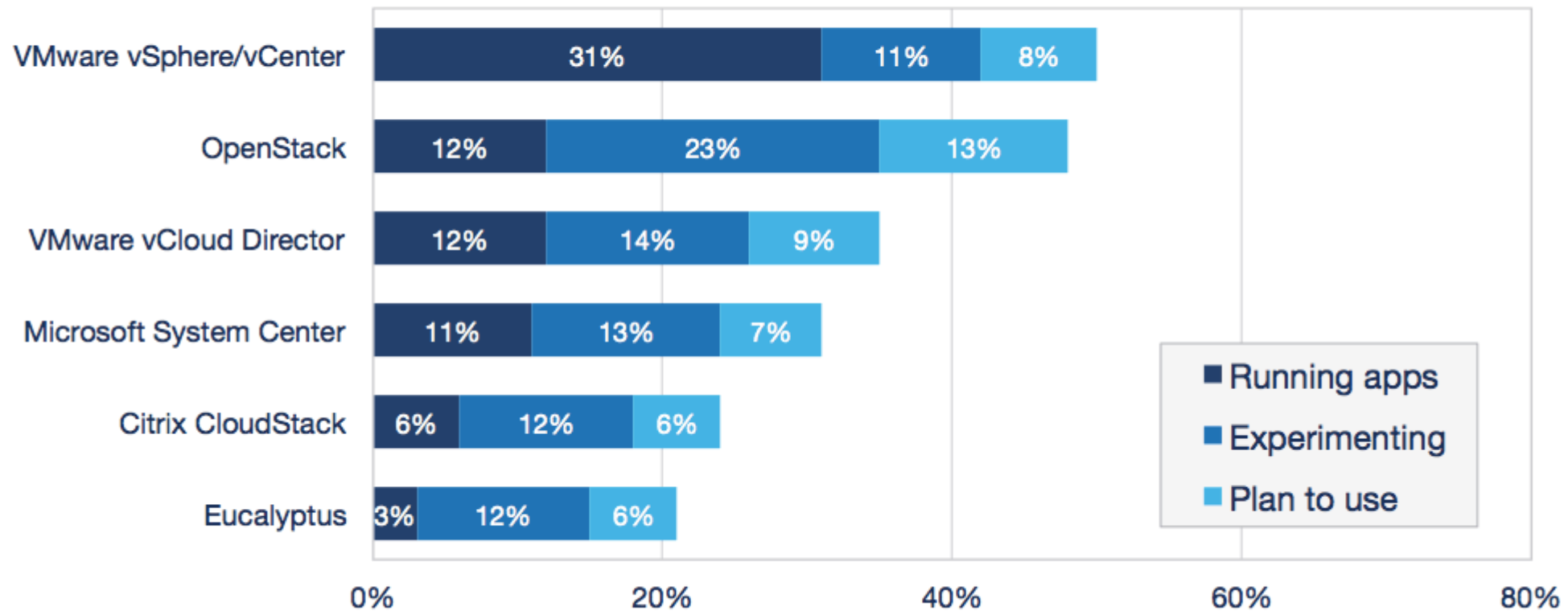
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Public Cloud Adoption – Enterprises



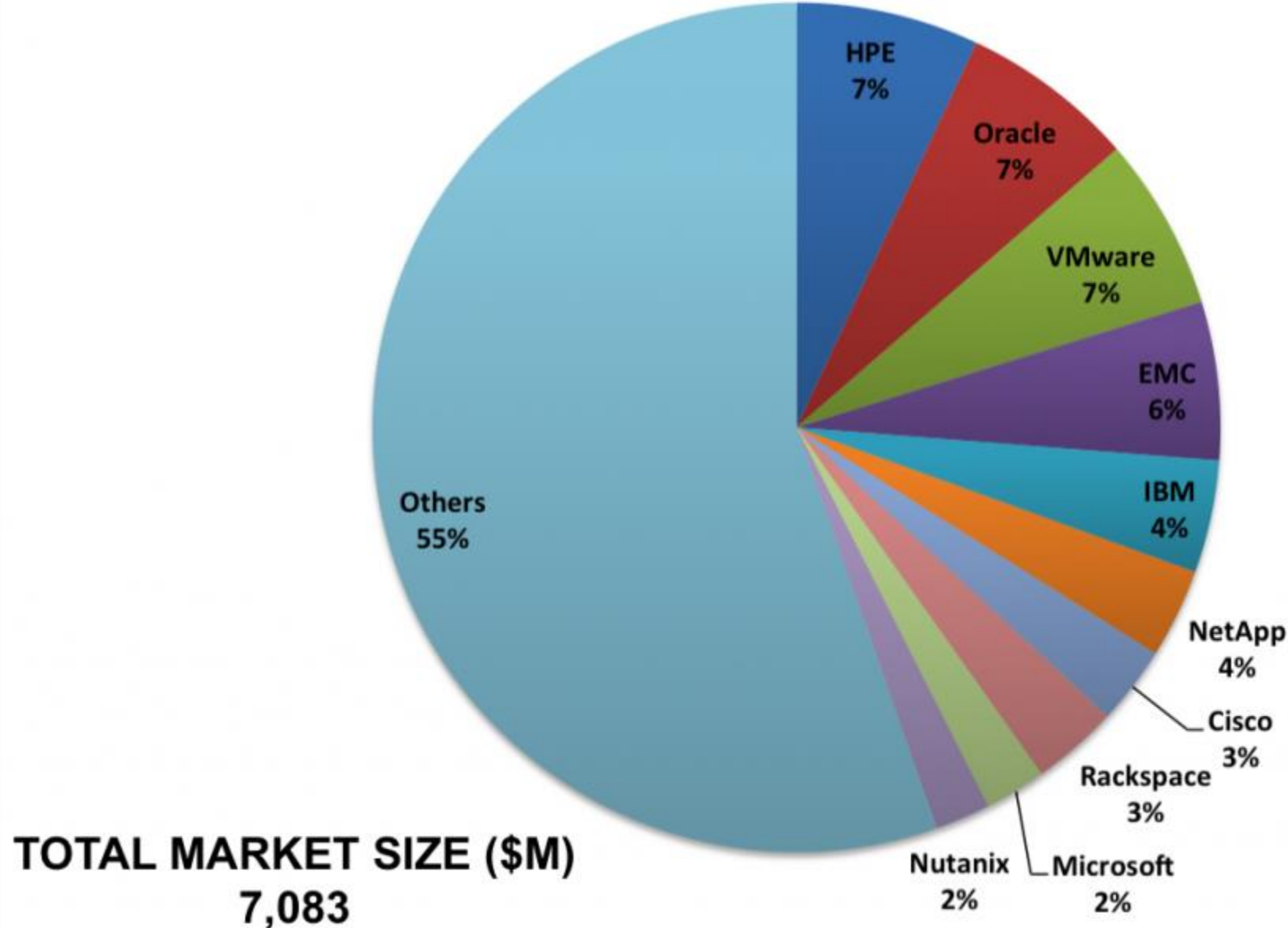
Private Cloud Usage

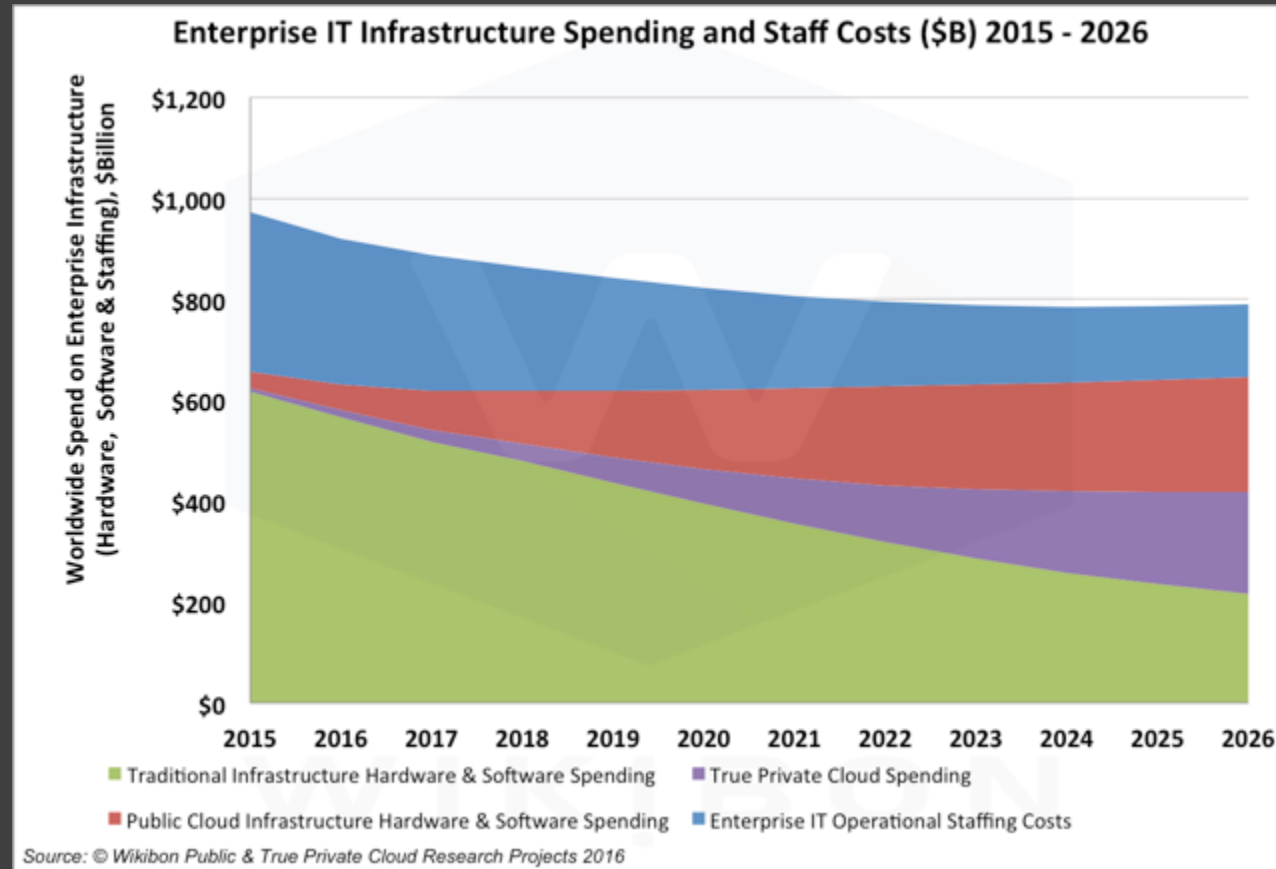
% of Respondents Running Applications



Source: RightScale 2014 State of the Cloud Report

WIKIBON – TRUE PRIVATE CLOUD – 2015 MARKET SHARES



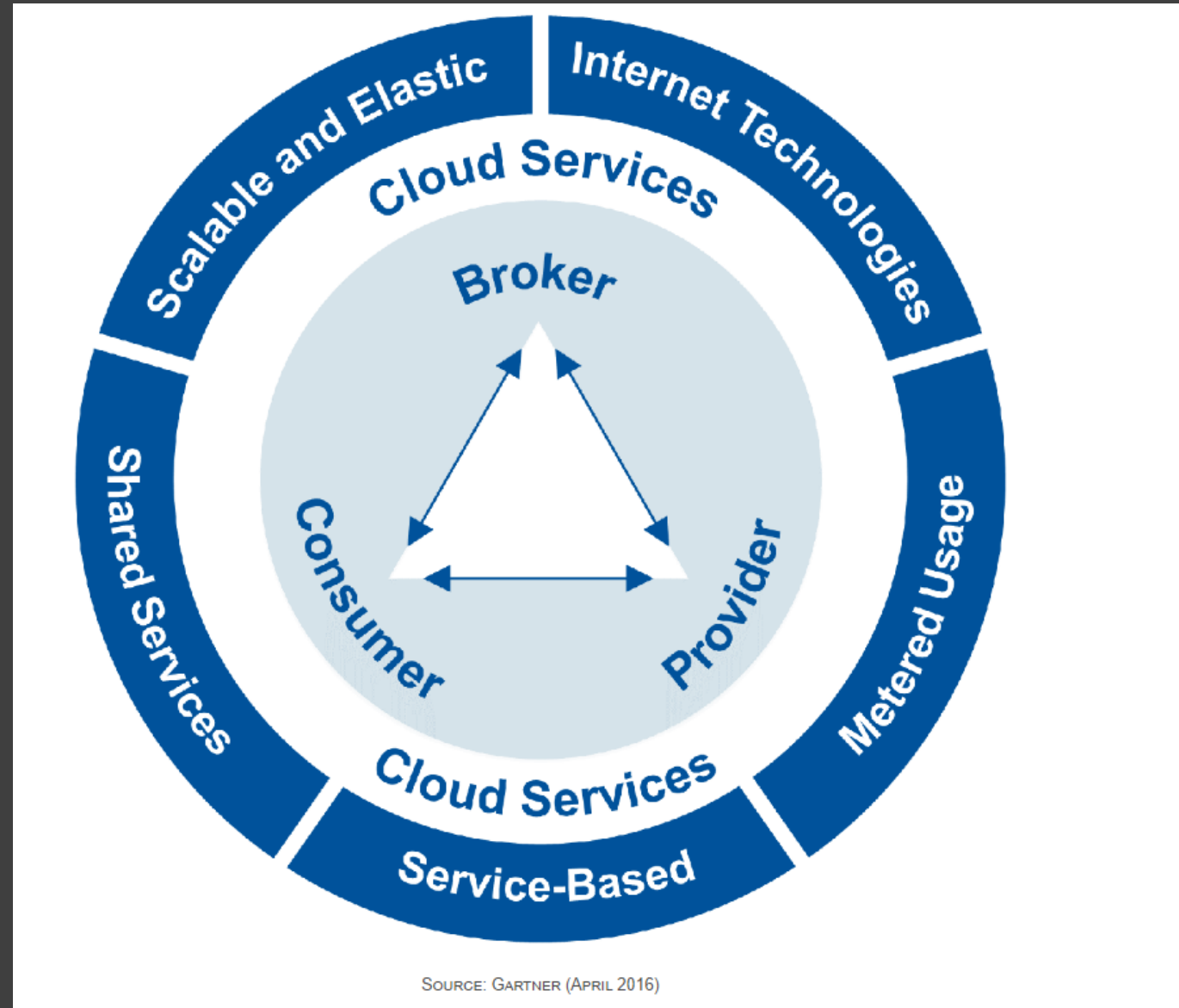


Cloud Computing Definition

Cloud Computing Definition



“A style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service to external customers using Internet technologies.”

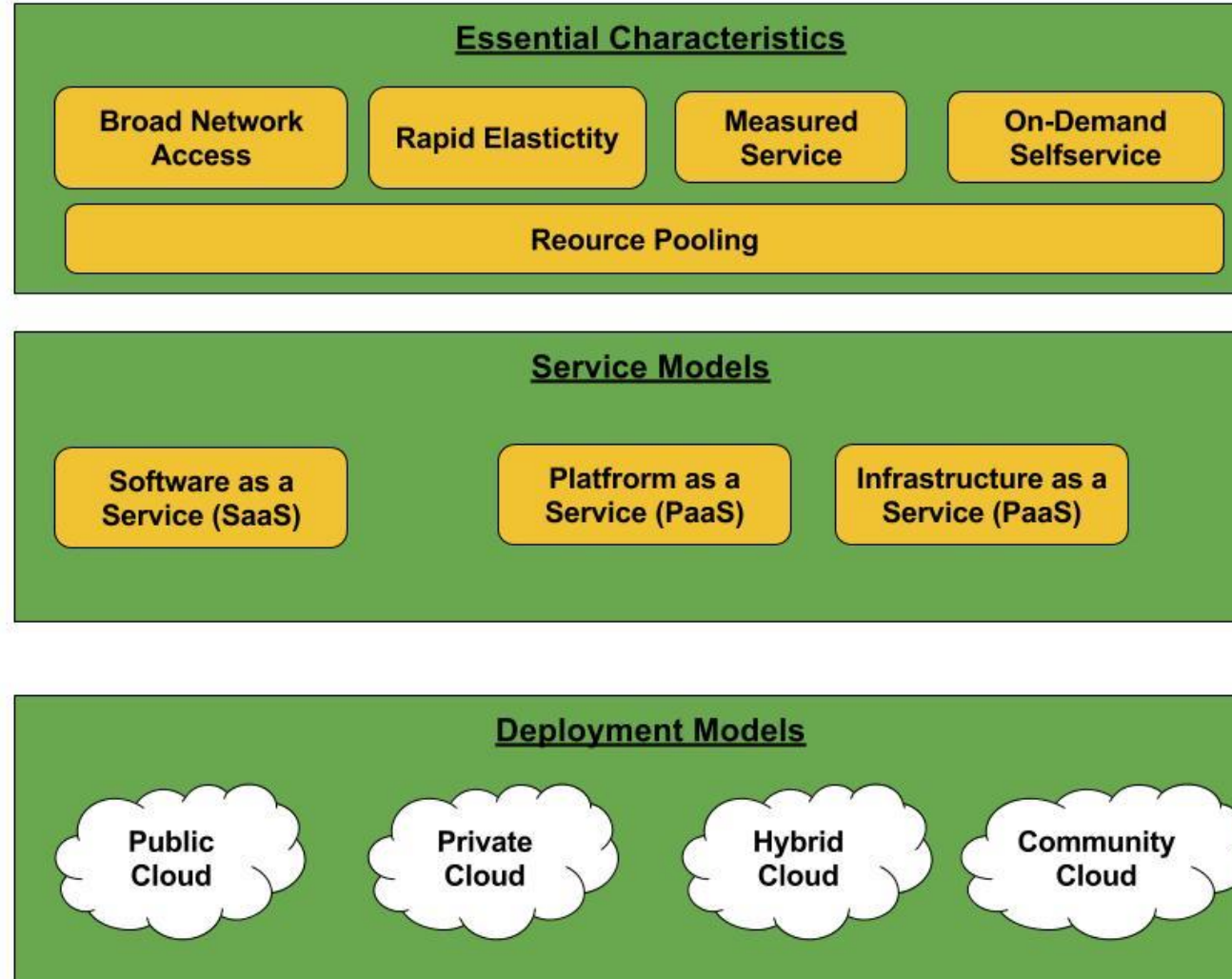


Cloud Computing Definition **Course and Labs**

- *Cloud computing is a model for enabling*
 - *Ubiquitous (Universal),*
 - *Convenient ,*
 - *on-demand network access*
- *to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services)*
- *that can be rapidly provisioned and released with minimal management effort or service provider interaction.*



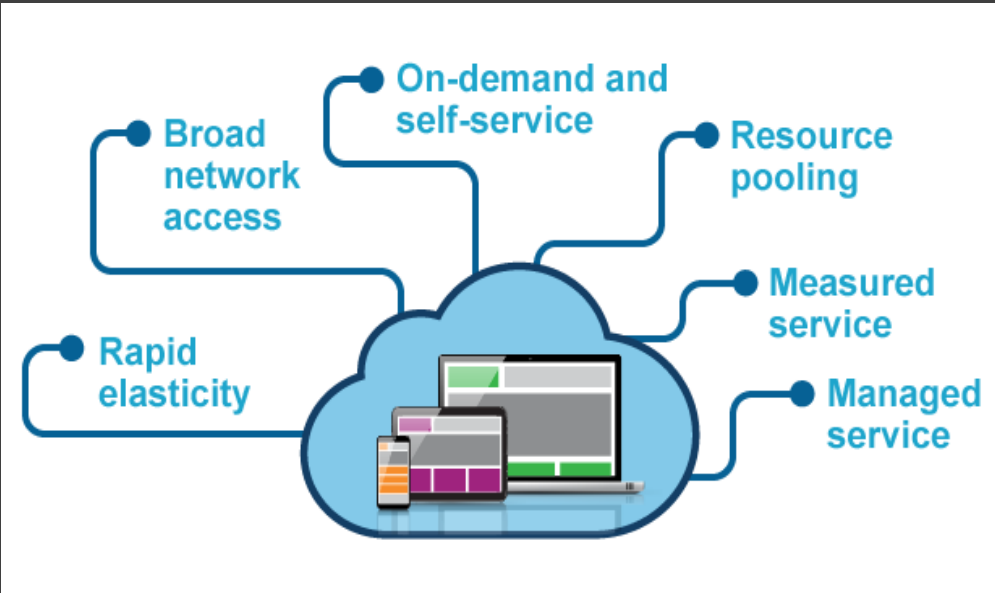
Cloud Computing Definition



Cloud Computing Five Essential Characteristics

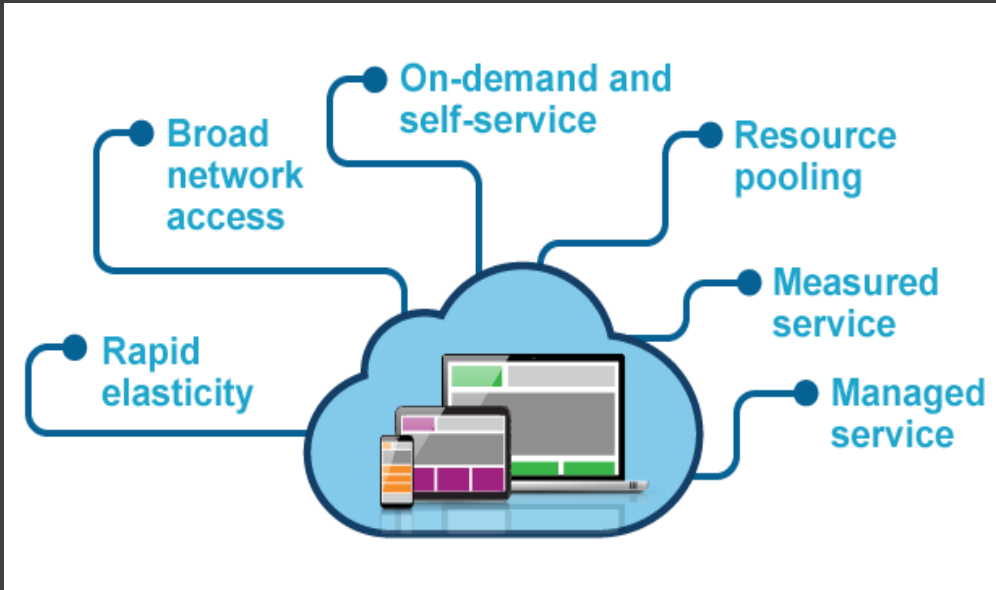
- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Cloud Computing Essential Characteristics

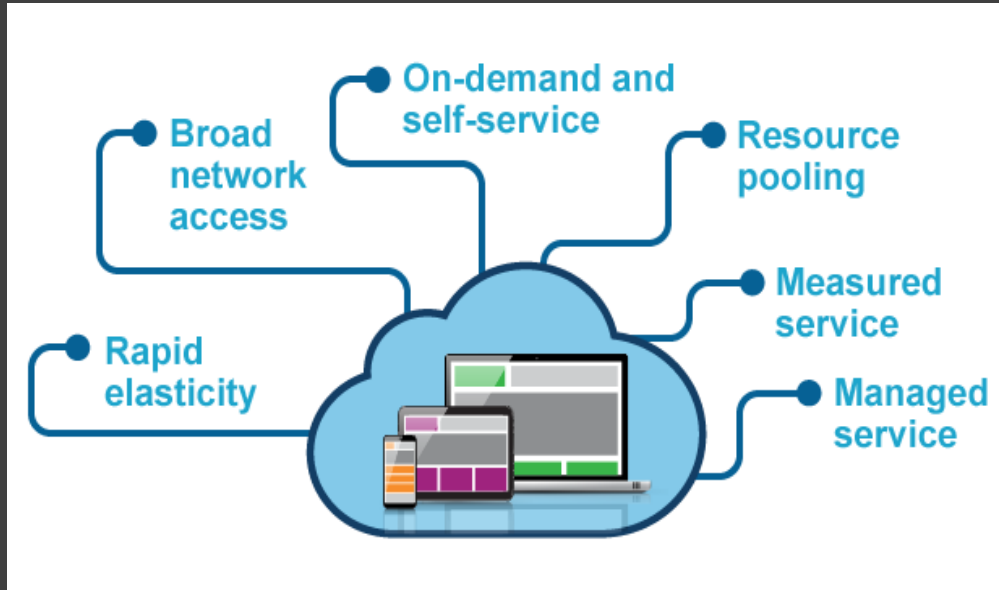


- On-demand self-service
 - A consumer can unilaterally provision computing capabilities, such as server, Storage and network ,
 - As needed automatically without requiring human interaction with each service provider.

Cloud Computing Essential Characteristics

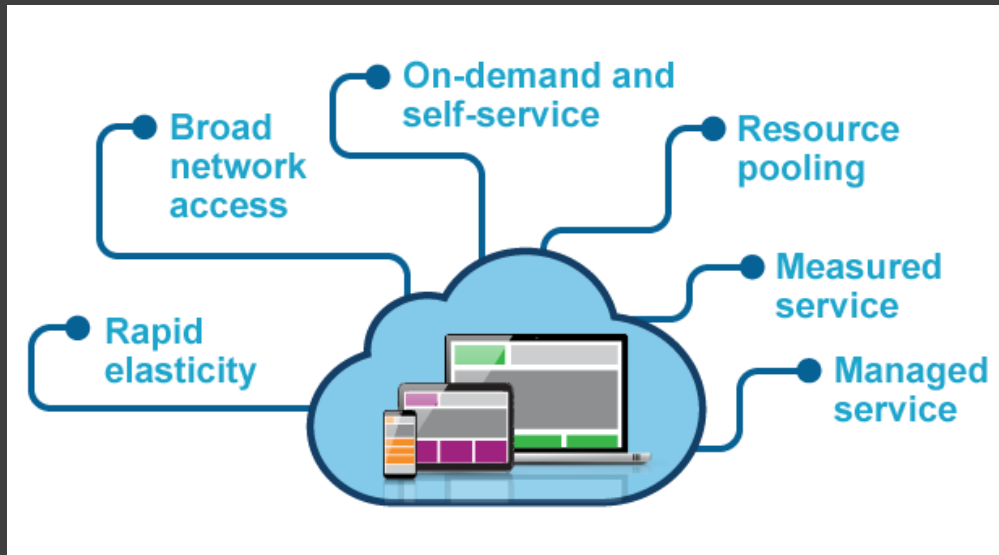


- Broad network access
 - Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms
 - (e.g. mobile phones, tablets, laptops, and workstations).

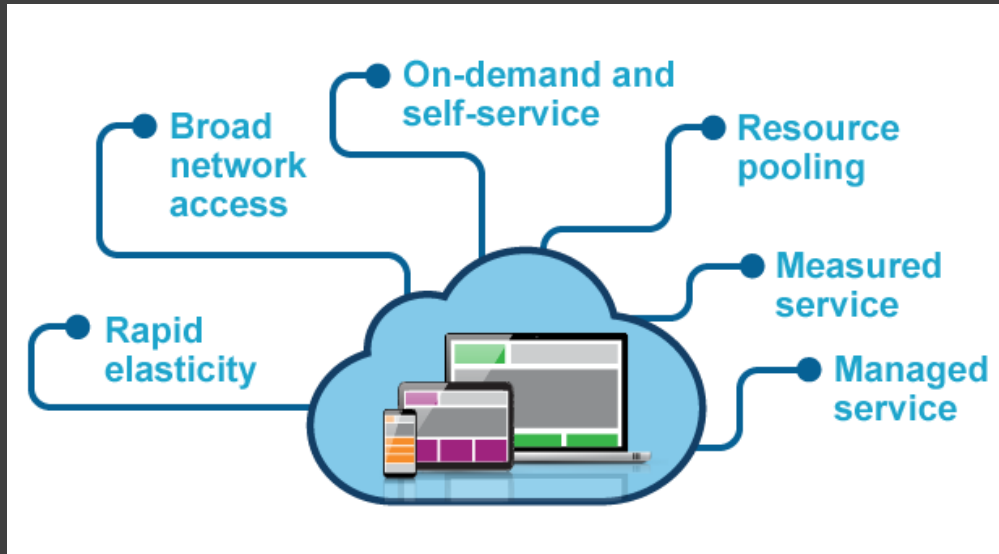


- Resource pooling
 - The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
 - There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter).
 - Examples of resources include storage, processing, memory, and network bandwidth.

Cloud Computing Essential Characteristics



- Rapid elasticity
 - Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand.
 - To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.



- Measured service

- Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g. storage, processing, bandwidth, and active user accounts).
- Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Cloud Computing Three Service Models

- Service Model is What are IT services provided by the Cloud
- There are three Service Models:
 - Infrastructure as a Service
 - Platform as a Service
 - Software as a Service



- Infrastructure as a Service (IaaS)
 - Providing Compute, Storage, Networking and Associated Infra Applications as a Service.
 - Where the consumer is able to deploy and run Platform and software.

Cloud Service Models



- Platform as a Service (PaaS)
 - Providing Data Execution Environment or Data Storage Environment as a Service is called Platform as a Service
 - The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.



- Software as a Service (SaaS)
 - The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure.
 - The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface.
 - The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings

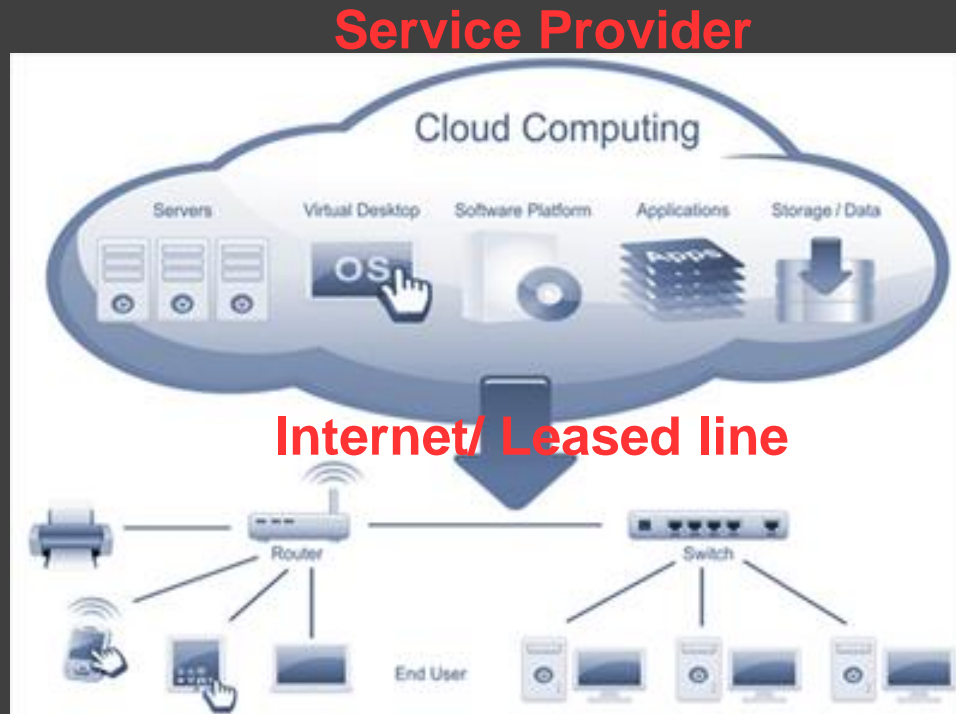
Cloud Computing Four Delivery Model

Cloud Delivery Model is how Cloud services is delivered to the End users

There are Delivery Model Models:

- Public Cloud
- Private Cloud
- Hybrid Cloud
- Community Cloud

Cloud Computing Delivery Models



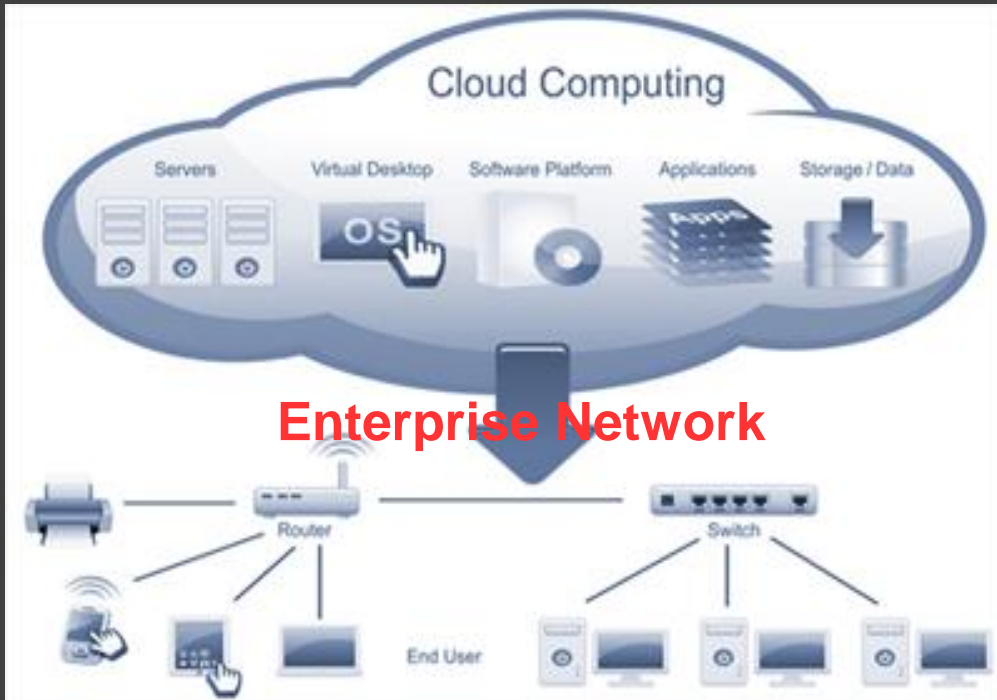
- Public Cloud
 - The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.
- Example:
 - Amazon AWS
 - Microsoft AZURE
 - Google Cloud

Cloud Computing Deployment Models

- Benefits of Public Cloud Computing:
 - Increase speed and agility
 - In a cloud computing environment, new IT resources are only ever a click away, which means you reduce the time it takes to make those resources available to your developers from weeks to just minutes. This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower.
 - Stop spending money on running and maintaining data centers
 - Focus on projects that differentiate your business, not the infrastructure. Cloud computing lets you focus on your own customers, rather than on the heavy lifting of racking, stacking and powering servers.
 - Go global in minutes
 - Easily deploy your application in multiple regions around the world with just a few clicks. This means you can provide a lower latency and better experience for your customers simply and at minimal cost.

Cloud Computing Delivery Models

Enterprise IT



- Private Cloud
 - The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.
- Example
 - Openstack Private Cloud
 - Microsoft Private cloud
 - VMWare Private cloud

Cloud Computing Deployment Models

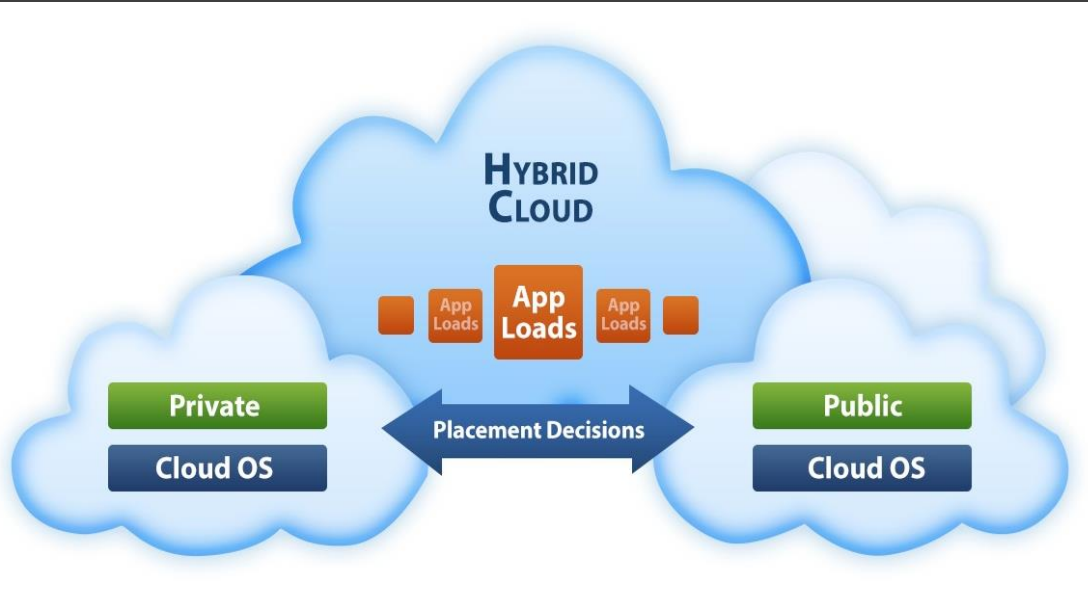
- Benefits of Private Cloud Computing:
 - Security
 - since the organization's data is tightly secured and controlled on servers that no other company has access too.
 - The servers can either sit within the network boundaries of the organization using them, with those servers managed and maintained by internal IT staff, or they can be located within the data center of a cloud service provider, with an organization accessing the data stored on the servers via private and secure network links.
 - If the servers that form part of private cloud infrastructure are located in company premises though, an organization does not have to worry about the physical security of servers situated in the external data centers of third party cloud providers
 - Flexibility
 - Provide any kind of Platform or software as a service which enterprise uses

Cloud Computing Delivery Models

- Hybrid Cloud
 - The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

Example

- Openstack based hybrid cloud with AWS
- Microsoft Hybrid cloud with AZURE and Microsoft Private Cloud
- EMC Hybrid Cloud



Use Cases of Hybrid Cloud

- For example, an enterprise can deploy an on-premises private cloud to host sensitive or critical workloads, but use a third-party public cloud provider, such as Google Compute Engine, to host less-critical resources, such as test and development workloads.
- Hybrid cloud is particularly valuable for dynamic or highly changeable workloads. For example, a transactional order entry system that experiences significant demand spikes around the holiday season is a good hybrid cloud candidate.
- The application could run in private cloud, but use cloud bursting to access additional computing resources from a public cloud when computing demands spike. To connect private and public cloud resources, this model requires a hybrid cloud environment.

Use Cases of Hybrid Cloud

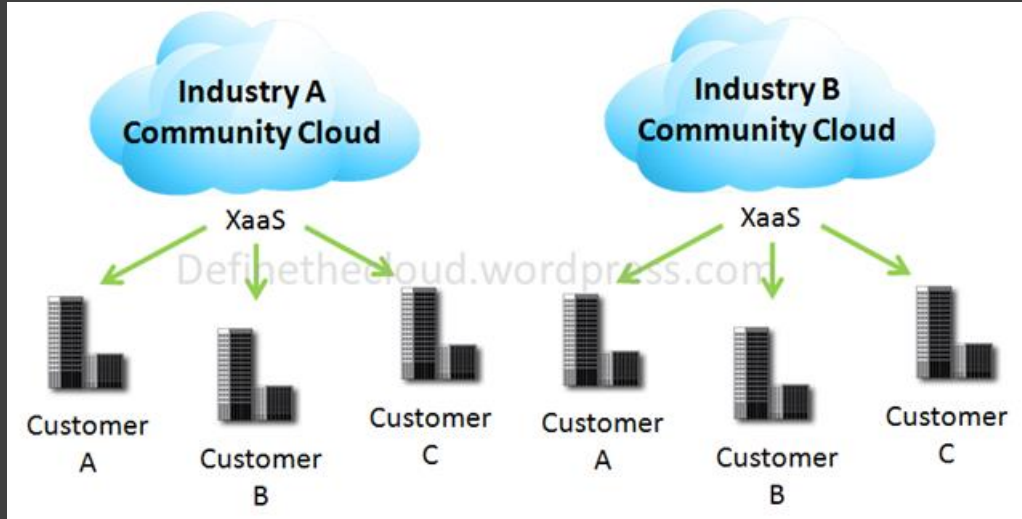
- Another hybrid cloud use case is big data processing. A company, for example, could use hybrid cloud storage to retain its accumulated business, sales, test and other data, and then run analytical queries in the public cloud, which can scale to support demanding distributed computing tasks

Hybrid Cloud Pros and Cons

- Public cloud's flexibility and scalability eliminates the need for a company to make massive capital expenditures to accommodate short-term spikes in demand. The public cloud provider supplies compute resources, and the company only pays for the resources it consumes.
- Despite its benefits, hybrid cloud can present technical, business and management challenges. Private cloud workloads must access and interact with public cloud providers, so hybrid cloud requires API compatibility and solid network connectivity.

Cloud Computing Delivery Models

- Community Cloud
 - The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.
- Government organizations within the state of California may share computing infrastructure on the cloud to manage data related to citizens residing in California.



Cloud Computing Advantage

Cloud Computing Advantage



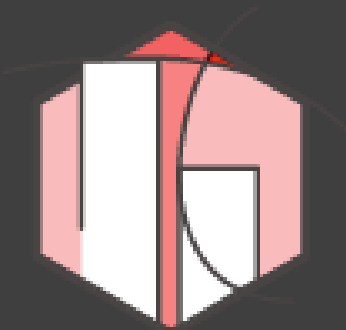
- Flexibility
 - Cloud-based services are ideal for businesses with growing or fluctuating bandwidth demands.
 - If your needs increase it's easy to scale up your cloud capacity, drawing on the service's remote servers.
 - Likewise, if you need to scale down again, the flexibility is baked into the service.
 - This level of agility can give businesses using cloud computing a real advantage over competitors



Capital-expenditure Free

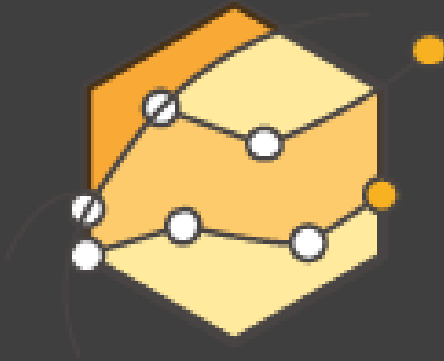
- Cloud computing cuts out the high cost of hardware.
- You simply pay as you go and enjoy a subscription-based model that's kind to your cash flow.
- Instead of having to invest heavily in data centers and servers before you know how you're going to use them, you can only pay when you consume computing resources, and only pay for how much you consume.
- Add to that the ease of setup and management and suddenly your scary, hairy IT project looks a lot friendlier.

Cloud Computing Advantage



Massive economies of scale

- By using cloud computing, you can achieve a lower variable cost than you can get on your own.
- Because usage from hundreds of thousands of customers are aggregated in the cloud, providers such as Amazon Web Services can achieve higher economies of scale which translates into lower pay as you go prices.



capacity

- Eliminate guessing on your infrastructure capacity needs.
- When you make a capacity decision prior to deploying an application, you often either end up sitting on expensive idle resources or dealing with limited capacity.
- With Cloud Computing, these problems go away. You can access as much or as little as you need, and scale up and down as required with only a few minutes notice.

Cloud Computing Advantage



Increase speed and agility

- In a cloud computing environment, new IT resources are only ever a click away, which means you reduce the time it takes to make those resources available to your developers from weeks to just minutes.
- This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower.



Stop spending money on running and maintaining data centers

- Focus on projects that differentiate your business, not the infrastructure. Cloud computing lets you focus on your own customers, rather than on the heavy lifting of racking, stacking and powering servers.



Go global in minutes

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Cloud Computing Advantage

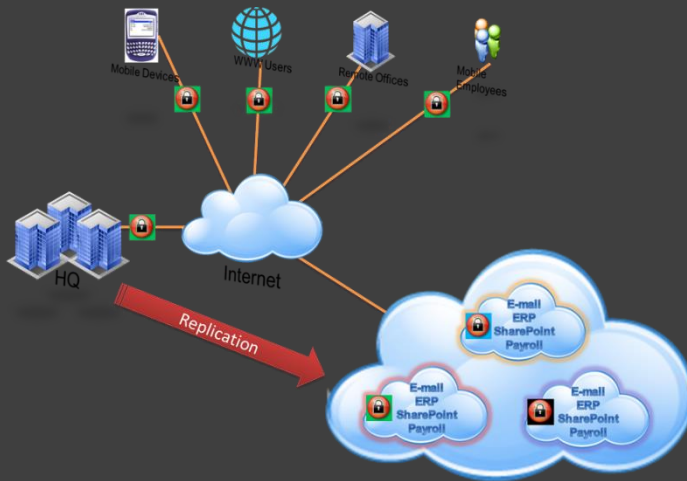


Automatic software updates

- The beauty of cloud computing is that the servers are off-premise, out of sight and out of your hair.
- Suppliers take care of them for you and roll out regular software updates – including security updates – so you don't have to worry about wasting time maintaining the system yourself.
- Leaving you free to focus on the things that matter, like growing your business.

Disaster recovery

- Businesses of all sizes should be investing in robust disaster recovery, but for smaller businesses that lack the required cash and expertise, this is often more an ideal than the reality.
- Cloud is now helping more organizations buck that trend.
- According to Aberdeen Group, small businesses are twice as likely as larger companies to have implemented cloud-based backup and recovery solutions that save time, avoid large up-front investment and roll up third-party expertise as part of the deal.



Cloud Computing Advantage



Increased collaboration

- When your teams can access, edit and share documents anytime, from anywhere, they're able to do more together, and do it better.
- Cloud-based workflow and file sharing apps help them make updates in real time and gives them full visibility of their collaborations.



Work from anywhere

- With cloud computing, if you've got an internet connection you can be at work.
- And with most serious cloud services offering mobile apps, you're not restricted by which device you've got to hand.
- The result? Businesses can offer more flexible working perks to employees so they can enjoy the work-life balance that suits them – without productivity taking a hit.
- One study reported that 42% of workers would swap a portion of their pay for the ability to telecommute. On average they'd be willing to take a 6% pay cut.

Cloud Computing Advantage



Security

- Lost laptops are a billion dollar business problem.
- And potentially greater than the loss of an expensive piece of kit is the loss of the sensitive data inside it.
- Cloud computing gives you greater security when this happens. Because your data is stored in the cloud, you can access it no matter what happens to your machine.
- And you can even remotely wipe data from lost laptops so it doesn't get into the wrong hands.



Competitiveness

- Wish there was a simple step you could take to become more competitive? Moving to the cloud gives access to enterprise-class technology, for everyone.
- It also allows smaller businesses to act faster than big, established competitors. Pay-as-you-go service and cloud business applications mean small outfits can run with the big boys, and disrupt the market, while remaining lean and nimble.