AWS Solution Architect Associate Certification Training – Module 4

4. Cloud Computing

Introduction to Cloud Computing

What is computing? It has basic elements like compute, networking, storage

Cloud computing is Internet based computing where virtual shared servers provide

software, infrastructure, platform, devices and other resources and hosting to customers

on a pay-as-you-use basis. Users can access these services available on the "Internet cloud" without having any previous knowhow on managing the resources involved. Thus, users can concentrate more on their core business processes rather than spending time and gaining knowledge on resources needed to manage their business processes.

Cloud computing customers do not own the physical infrastructure; rather they rent the usage from a third-party provider. This helps them to avoid huge capital investments. They consume resources as a service and pay only for resources that they use. Most cloud computing infrastructures consist of services delivered through shared resources. This increases efficiency as servers are not unnecessarily left idle, which can reduce costs significantly while increasing the speed of application development.

What does the business worry about?

- ✓ Service availability
- ✓ Unpredictable user growth
- ✓ Multi datacenter management
- ✓ Provisioning latency
- ✓ Elasticity
- ✓ Redundancy
- ✓ Infrastructure shortage and refresh
- ✓ Confidentiality
- ✓ Audit trail
- ✓ Licensing Fee

Why Cloud Computing?

The best part of cloud computing is that it provides more flexibility than its previous counterparts. It has shown many benefits to enterprise IT world. Cost optimization among them is the frontrunner, since the principle of cloud is “pay as per use”. The other benefits are increased mobility, ease of use, utmost apt utilization of resources, portability of application, etc. This means users will be able to access information from anywhere at any time easily without wasting the underlying hardware resources ideal or unused. Due to its benefit, today’s computing technology has witnessed a vast migration of 5 organizations from their traditional IT infrastructure to cloud.

Benefits of Cloud Computing

- Reduction in upfront capital expenditure on hardware & software deployment. Consumption is usually billed on a utility (like phone bills) or subscription (like magazines) model.
- Location independence, so long as there is access to the Internet Increased flexibility and market agility - quick deployment model of cloud computing increases the ability to re-provision rapidly as required.
- Allows enterprise to focus on its core business.
- Increased competitive advantage

Benefits of Cloud Computing

- Easy to maintain as they don't have to be installed on each user's computer.
- Efficiency.
- Flexibility.
- Resilience without Redundancy.
- 24 X 7 Availability.
- Flexibility in Capacity.
- Automated Updates on Software.
- Easily Manageable.

Types of Cloud Computing

Cloud computing is usually described in one of two ways. Either based on the deployment model, or on the service that the cloud is offering.

Based on a deployment model, we can classify cloud as:

Public,

Private,

Hybrid,

Community cloud

Public Cloud

When we talk about public cloud, we mean that the whole computing infrastructure is located on the premises of a cloud computing company that offers the cloud service. The location remains, thus, separate from the customer and he has no physical control over the infrastructure.

As public clouds use shared resources, they do excel mostly in performance, but are also most vulnerable to various attacks.

Private Cloud

Private Cloud provides the same benefits of Public Cloud, but uses dedicated, private hardware. Private cloud means using a cloud infrastructure (network) solely by one customer/organization. It is not shared with others, yet it is remotely located. The companies have an option of choosing an on-premise private cloud as well, which is more expensive, but they do have a physical control over the infrastructure.

The security and control level is highest while using a private network. Yet, the cost reduction can be minimal, if the company needs to invest in an on-premise cloud infrastructure.

Hybrid Cloud

Hybrid cloud, of course, means, using both private and public clouds, depending on their purpose.

For example, public cloud can be used to interact with customers, while keeping their data secured through a private cloud.

Most people associate traditional public cloud service with elastic scalability and the ability to handle constant shifts in demand. However, performance issues can arise for certain data-intensive or high-availability workloads.

Community Cloud

Community cloud implies an infrastructure that is shared between organizations, usually with the shared data and data management concerns. For example, a community cloud can belong to a government of a single country. Community clouds can be located both on and off the premises.

Differences between Public, Private and Hybrid Cloud Platforms

Delivery or Service models of Cloud Computing

Based on a service the cloud model is offering, we are speaking of either:

IaaS (Infrastructure-as-a-Service)

PaaS (Platform-as-a-Service)

SaaS (Software-as-a-Service)

or, Storage, Database, Information, Process, Application, Integration, Security, Management, Testing-as-a-service

Iaas

The most common cloud service is that one offering data storage disks and virtual servers, i.e. infrastructure. Examples of Infrastructure-as-a-Service (IaaS) companies are Amazon, Rackspace, Flexiscale.

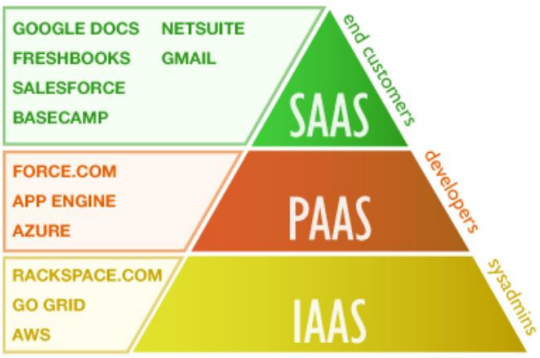
Paas

If the cloud offers a development platform, and this includes operating system, programming language execution environment, database, and web server, the model is known as Platform-as-a-Service (PaaS), examples of which are Google App Engine, Microsoft Azure, Salesforce. Operating system can be frequently upgraded and developed with PaaS, services can be obtained from diverse sources, and programming can be worked in teams (geographically distributed).

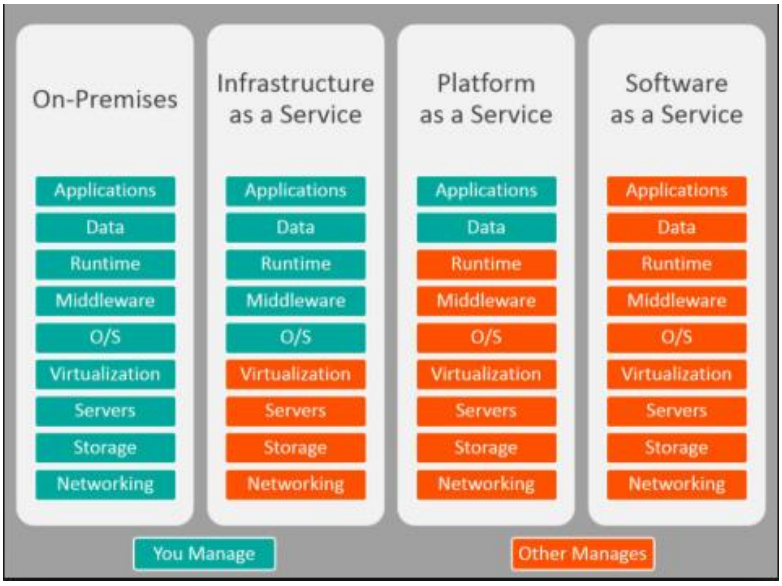
Saas

Software-as-a-Service (SaaS), finally, means that users can access various software

applications on a pay-per-use basis. As opposed to buying licensed programs, often very expensive. Examples of such services include widely used GMail, or Google Docs.



Comparison for IaaS, PaaS, SaaS



Vertical Scaling

Vertical scaling refers to adding more resources (CPU/RAM/DISK) to your server (database or application server is still remains one) as on demand.

Vertical Scaling is most commonly used in applications and products of middle-range as well as small and middle-sized companies. One of the most common examples of Virtual Scaling is to buy an expensive hardware and use it as a Virtual Machine hypervisor (VMWare ESX).

Vertical Scaling usually means upgrade of server hardware. Some of the reasons to scale vertically includes increasing IOPS (Input / Ouput Operations), amplifying CPU/RAM capacity, as well as disk capacity.

However, even after using virtualization, whenever an improved performance is targeted, the risk for downtimes with it is much higher than using horizontal scaling.

Horizontal Scaling

Horizontal Scaling is a must use technology – whenever a high availability of (server) services are required

Scaling horizontally involves adding more processing units or phyiscal machines to your server or database. It involves growing the number of nodes in the cluster, reducing the responsibilities of each member node by spreading the key space wider and providing additional end-points for client connections. Horizontal Scaling has been historically much more used for high level of computing and for application and services.

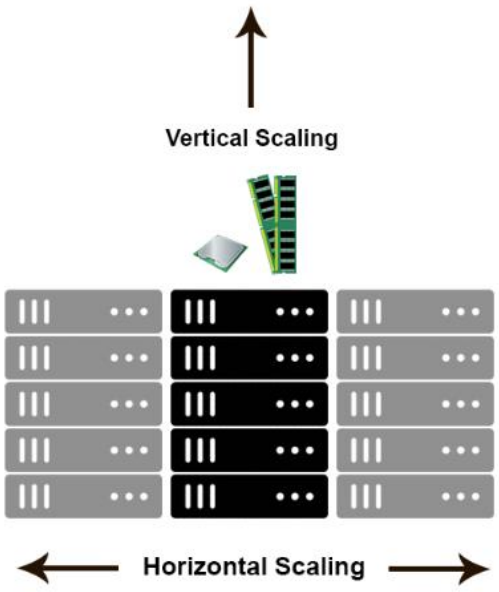
Although this does not alter the capacity of each individual node, the load is decreased due to the distribution between separate server nodes. Some of the reasons why organizations should choose to scale horizontally include increasing I/O concurrency, reducing the load on existing nodes, and increasing disk capacity.

The Internet and particular web services have boosted the use of Horizontal Scaling. Most giant companies that provide well known web services like Google (Gmail, YouTube), Yahoo, Facebook, EBay, Amazon etc. are using heavily horizontal scaling.

Vertical Scaling Vs Horizontal Scaling

Horizontal-scaling is often based on partitioning of the data in which each node contains only part of the data. In the case of vertical-scaling, the data resides on a single node. Scaling here is done through multi-core by spreading the load between the CPU and RAM resources.

Vertical Scaling Vs Horizontal Scaling



Security

Cloud computing and storage provides users with capabilities to store and process their data in third-party data centers. Organizations use the cloud in a variety of different service models (with acronyms such as SaaS, PaaS, and IaaS) and deployment models (private, public, hybrid, and community. Security concerns associated with cloud computing fall into two broad categories: security issues faced by cloud providers (organizations providing software-, platform-, or infrastructure-as-a-service via the cloud) and security issues faced by their customers (companies or organizations who host applications or store data on the cloud).The responsibility is shared, however. The provider must ensure that their infrastructure is secure and that their clients' data and applications are protected, while the user must take measures to fortify their application and use strong passwords and authentication measures.

Costing Model

- Pay as you go model (will discuss more when discussing services of AWS).
- Capital Vs Opertions.