

REPORT ON CLOUD COMPUTING INITIATIVES FOR TSF INTERNSHIP TASK

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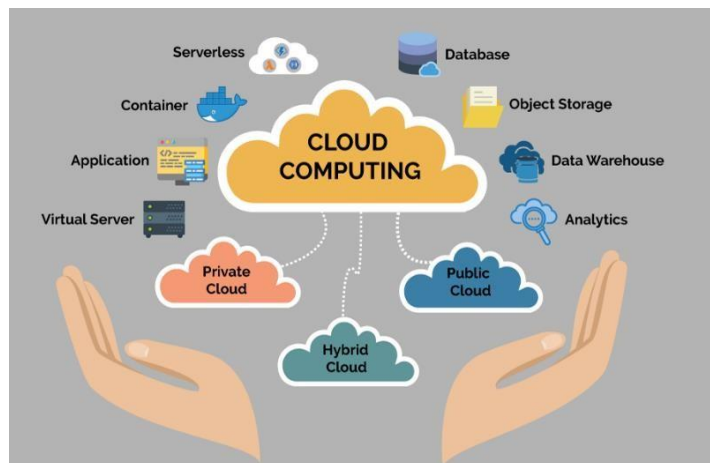
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Cloud Computing:

Cloud Computing is the on-demand delivery of IT resources over the internet. To access the services, we need to pay. Instead of buying, owning and maintaining own computing infrastructure or data centers, Companies can rent access to anything from applications to storage from a cloud service provider.

In today's world cloud computing is used by many organizations of every type for wide variety of purpose such as for software development and testing, big data analytics, data backup, etc. Major benefits of using cloud computing are that it gives access to a range of technologies so that we can create, build faster than we imagine, it provides elasticity to grow and shrink the resources according to the situation of the business and only pay for that.



Categories of Cloud Computing:

There are three main categories of cloud computing:

- **Software as a service,**
- **Platform as a service and**
- **Infrastructure as a service.**

Each of them differs in terms of control, flexibility and management.

1 Software as a Service (SaaS):

Also known as subscribe ware or rent ware is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. It is sometimes referred to as "on-demand software", and was formerly referred to as "software plus services" by Microsoft. SaaS is on the top of the stack because users interact primarily with software hosted on the cloud, and not the platform or infrastructure on which it runs. It has become a common delivery model for many business applications, including office software, messaging software, payroll processing software, DBMS software, management software, CAD software, development software, gamification, virtualization, etc.

2 Platform as a Service (PaaS):

Platform as a service (PaaS) is a cloud computing model in which a third-party provider delivers hardware and software tools -- usually those needed for application development -- to users over the internet. A PaaS provider hosts the hardware and software on its own infrastructure. As a result, PaaS frees developers from having to install in-house hardware and software to develop or run a new application. It is provided through a cloud service provider's hosted infrastructure with users most frequently accessing the offerings through a web browser. PaaS can be delivered through public, private and hybrid clouds to deliver services such as application hosting and Java development. Other PaaS services include: Development team collaboration, Application design and development, Application testing and deployment, Web service integration, Information security, Database integration

3 Infrastructure as a Service (IaaS):

They are online services that provide high-level APIs used to dereference various low-level details of underlying network infrastructure like physical computing resources, location, data partitioning, scaling, security, backup etc. A hypervisor, such as Xen, Oracle VirtualBox, Oracle VM, KVM, VMware ESX/ESXi, or Hyper-V, LXD, runs the virtual machines as guests. Pools of hypervisors within the cloud operational system can support large numbers of virtual machines and the ability to scale services up and down according to customers' varying requirements. Typically IaaS involves the use of a cloud orchestration technology like Open Stack, Apache Cloudstack or OpenNebula. This manages the creation of a virtual machine and decides on which hypervisor (i.e. physical host) to start it, enables VM migration features between hosts, allocates storage volumes and attaches them to VM.

Amazon Web Service (AWS):



It was founded in 2006 by Amazon, AWS is the most comprehensive cloud service provider with a wide range of products and services. AWS is a mixture of Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). It provides tools such as database storage, computer power and content delivery services. Amazon was the first one to introduce pay-as-you-go cloud computing model. It offers services efficiently to everyone from small organizations to large organizations which has made the AWS best cloud-based platform, leader in cloud computing market.

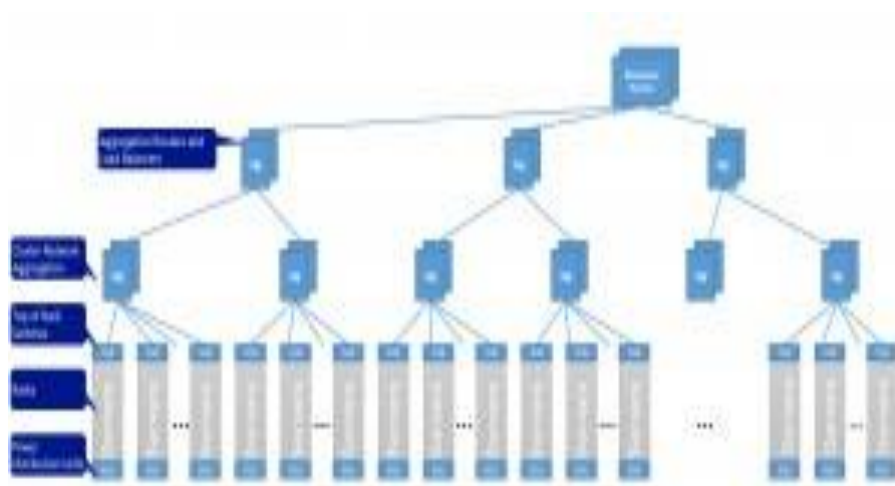
AWS provides all the latest and trending technological innovation such as Machine Learning, Blockchain, Virtual Reality (VR), Internet of Things (IOT), Big Data Management etc. Some of its IaaS and PaaS services are EC2 (Elastic Cloud Compute), S3 (Simple Storage Service), RDS (Relational Database Service). Basically, AWS provides more than 100 services.

Microsoft Azure:



Azure is the second largest cloud-based platform provided by Microsoft. It is a public and private cloud platform. Microsoft Azure also includes all three major categories of cloud computing Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). It also provides same services as AWS such as Big Data, Virtual Reality, etc. Moreover, Azure provides organizations to create applications in such a way which ensure high data security. Azure Migration Centres has the capability to perform cloud transfer faster and quicker. Furthermore, to provide more opportunities to the users they have partnership with other organizations such as Adobe, Cisco, etc.

Microsoft Azure uses a technology called virtualization. “Virtualization separates the close coupling between a computer’s CPU or server and its operating system by means of an abstraction layer called a hypervisor. The hypervisor emulates all the functions of a real computer or server and its CPU in a virtual machine.”¹ So, multiple virtual machines can run at the same time and on each machine can run different compatible operating system. With the help of this virtualization technology, Azure rethinks it on a massive scale in Microsoft data centres around the world.



Comparison between AWS and Microsoft Azure:

<p>AWS provide a hybrid platform through its storage gateway. This gateway provides a secondary storage option with backup feature. Organizations can also use single object storage with S3 for large containers. Moreover, file storage expands the capability as we create files. AWS also provides SQL supported database, ElastiCache for additional memory and data migration service.</p>	<p>Azure provides a dedicated storage option called Blob Storage. Azure also provides users with the largest array of databases, which support three different types of SQL-based formats. Their Server Stretch database is a hybrid that offers on- and off-premises storage for companies that use Microsoft SQL Server for their enterprise but might utilize other protocols on the cloud. This is the only company of the three that has a backup recovery system, which is in addition to their archival and standard system backups.</p>
<p>AWS primary compute service is Amazon Elastic Compute Cloud (E2C). E2C integrates with almost all amazon web services which provides a high degree of flexibility and allow database administrators to optimize the cost. Moreover, it a ability to deploy thousands of server in seconds. Some other AWS compute features are AWS Batch, VMware Cloud for AWS, AWS Fargate, AWS Lambda, Amazon Lightsail, AWS Outposts.</p>	<p>AZURE compute features rely on a network of virtual machines so, that provide a range of computing solutions such as development, testing, etc. It is based on an open source platform which is compatible with Windows, Linux, SQL Server, Oracle. Other compute features of Azure include Azure Batch, Service Fabric, Paas and FaaS (Function as a Service).</p>

<p>AWS has three key tools AI/ML, IOT and Serverless. Their key tools allow organizations to utilize SageMaker for staff training and deploying machine learning. It is also used to power Alexa. Another is Lambda serverless computing environment which allow to deploy all the apps from their serverless repository.</p>	<p>Azure has fewer AI tools compare to AWS and the developed once are designed to perform specific function for an organization. Their Cognitive Services is a suite of API-supported tools that integrate with on-premises Microsoft software and business apps. Their serverless platform allows to manage complex workloads.</p>
<p>AWS pricing structure is very complex, it does not provide better transparency, third party app should be used to see the costing. They offer 750 hours of EC2 service per month for up to 12 months as part of their free tier.</p>	<p>Azure offers 750 hours of the Windows or Linux B1S addition of their primary compute platform, Virtual Machines, per year (it's free to try, which is nice for any business who wants to test the cloud).</p>

CONCLUSION:

The things that the two platforms have in common are on-demand pricing, a free tier, great support, and an emphasis on security. If the organizations perform all its operation on Microsoft product then Microsoft Azure is the best option and the organizations that need less reach and more innovation can go for Google Cloud Platform. So, basically it depends on the needs and requirement of the organization which cloud to use.

CLOUD PROVIDER STRENGTHS

AWS



- Greatest **global reach**
- Long record of reliable service
- Flexibility and wide range of services
- Ideal for larger companies

AZURE

- Offers a hybrid solution
- Easy first time **cloud migration**
- Ideal for startups and developers
- Great for Windows-based organizations



