**Introduction to Cloud Computing Project**

**Topic: Comparison between Azure & AWS**

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**Microsoft Azure**

Microsoft Azure is a cloud service platform by Microsoft, which provides services in different domains such as compute, storage, database, networking, developer tools and other functionality which help organizations to scale and grow their businesses. Microsoft Azure was launched in 2010 and it emerged as one of the biggest commercial cloud service providers.

Azure was announced in October 2008, started with codename "Project Red Dog" and released on February 1, 2010, as "Windows Azure" before being renamed "Microsoft Azure" on March 25, 2014 [1].

**Azure Services**

Azure offers free introductory tiers with restricted usage limits that let users try and use their services before they can buy. Also, both offer credits to grab the attention of start-ups onto their cloud platforms.

These services can be used by developers and software employees to create, deploy and manage services and applications through the cloud. Azure provides multiple database services to store a wide variety of data types and volumes such that with global connectivity, this data is available to users instantly. Some of the data services include – Azure Cosmos DB, Azure SQL Database, Azure Database for MySQL, Azure Database for PostgreSQL, SQL Server on VMs, Azure SQL Data Warehouse, Azure Database Migration Service, Azure Cache for Redis, and Azure Database for MariaDB.

**Benefits of Microsoft Azure**

Following are some of the benefits that Microsoft Azure provides to its users:

1. **Security**

Azure is equipped with multi-level protection to protect data from ever-emerging security threats. The Azure environment is protected with a range of tools, such as Advanced Threat Analytics, Threat Intelligence, and Azure Information Protection. The platform offers increased protection with the help of user-friendly measures, such as app passwords and multi-factor authentication.

### **Scalability**

Owing to the large amount of backing architecture that Azure offers, companies can scale their infrastructure up and down as they require. For scaling up, they do not need to pay upfront for new services or products. For scaling down, companies do not incur losses when selling hardware.This makes it very easy to scale compute power up or down with the help of Microsoft Azure.

### **High Availability**

With Microsoft’s global presence, Azure can increase the reach of a company’s infrastructure while offering redundancy across geographies. This means that the adaptability of Azure is not dependent on location. Azure is present in 54 geographical regions; which Microsoft claims is more than any other cloud provider on the market. With data centers located across the world, Microsoft Azure guarantees 99.95% uptime for maximum reliability.

#### **Flexibility**

Azure delivers an appreciable level of flexibility giving you the option to have functionalities as required. You can pay as you consume, switch to Azure, accommodate the business fluctuations and, etc. Thus, there is no worry about the infrastructure all the time.[3]

1. **Hybrid Cloud**

Azure is open to Hybrid cloud systems. A hybrid cloud is a computing environment that combines a public cloud and a private cloud by allowing data and applications to be shared between them. When computing and processing demand fluctuates, hybrid cloud computing gives businesses the ability to seamlessly scale their on-premises infrastructure up to the public cloud to handle any overflow—without giving third-party data centers access to the entirety of their data [2]. Hybrid cloud computing is a “best of all possible worlds” platform offered by Microsoft Azure, delivering all the benefits of cloud computing - flexibility, scalability, and cost efficiencies with the lowest possible risk of data exposure.

1. **Data Storage**

Azure allows you to store any type of data, whether it is file data, structured data sets or queries in a reliable and fast environment. It’s easy to manage using an import/export feature to move data as desired. Azure offers four main types of storage services which are:

* Azure Blob storage
* Azure File storage
* Azure Queue storage
* Azure Table storage

**Challenges to Microsoft Azure**

Following are the challenges discussed that Microsoft Azure encounters:

1. **Cost**

When it comes to short term subscription plans, Azure gives you a lot more flexibility. In case of certain services, Azure tends to be costlier than AWS when the architecture starts scaling up. Azure is a little less flexible than AWS when it comes to the pricing model.

1. **Requires Platform Expertise**

Unlike local servers, Azure requires expertise to ensure all moving parts work together efficiently. A common mistake by business administrators that are not fully engaged in how well (or poorly) their cloud servers are operating is to over-provision cloud services. While a common mistake, on premise servers’ compute power does not translate equivocally in the cloud, potentially costing businesses thousands of dollars per year.

1. **Your Location can Affect Speed**

While Microsoft Azure covers 54 regions in the world, it does not have the same performance in all countries. Locations such as Europe, the U.S, Australia, India, Japan, and China are reliable and seamless. However, areas such as South America, Africa, and Canada have limited regions. Speed is an issue depending on your location.

1. **Requires Management**

While Azure allows you lower cost for purchasing hardware and locally maintaining infrastructure, it still needs you to handle data management. It does not assist in managing cloud-based data centers, which means that you need to hire people that know how to use Microsoft Azure and can handle server monitoring and patching. So, you will have to spend some money on a professional or manage that part yourself.

**Amazon Web Services (AWS)**

Amazon Web Services (AWS) is a secure cloud services platform, offering compute power, database storage, content delivery and other functionality to help businesses scale and grow. Running web and application servers in the cloud to host dynamic websites

Amazon Web Services is a cloud computing platform that provides customers with a wide array of cloud services. We can define AWS (Amazon Web Services) as a secured cloud services platform that offers compute power, database storage, content delivery and various other functionalities

Structured learning approach can help you understand the details of AWS better. ChalkStreet has a course on AWS that enables you to learn and understand AWS from scratch

Amazon Web Services is built on two fundamental services: S3 for storage services and EC2 for compute services. These were the first services AWS launched. Since launching in 2006 we have added more and more services that build on top of each other every year

AWS is a good career option for a fresher. In cloud computing, AWS has been on top for almost 6 years now and they are not going to lose their market soon so, AWS is a good option

Amazon Web Services (AWS) is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis. In aggregate, these cloud computing web services provide a set of primitive abstract technical infrastructure and distributed computing building blocks and tools. One of these services is Amazon Elastic Compute Cloud, which allows users to have at their disposal a virtual cluster of computers, available all the time, through the Internet. AWS's version of virtual computers emulate most of the attributes of a real computer, including hardware central processing units (CPUs) and graphics processing units (GPUs) for processing; local/RAM memory; hard-disk/SSD storage; a choice of operating systems; networking; and pre-loaded application software such as web servers, databases, and customer relationship management (CRM)

**Benefits of AWS**

**1. Zero CapEx:**

Many people tend to believe that AWS or any other cloud-based solution are only for the riches. However, the reality is completely opposite. We see AWS as playing field leveler enabling start-ups to leverage high-end technologies and infrastructure needs with ZERO CapEx. Start-ups shying away from leveraging Oracle as their database or any other commercials software which demand high-upfront licensing cost must explore [AWS Marketplace](https://aws.amazon.com/marketplace) and in high-probability, they might find those products in an hourly priced model with no up-front cost.

**2. No-Commitment:**

Whether you require a server for hosting a small website, a [Content Delivery Network (CDN)](https://aws.amazon.com/cloudfront/) for heavy traffic sites, reliable & scalable email service, [data warehousing service](https://aws.amazon.com/redshift/), or [Hadoop cluster](https://aws.amazon.com/elasticmapreduce/) for your Bigdata needs, AWS offers everything with absolutely no-commitment at all, not even a month. All server-backed services are charged on hourly basis, so as soon as you terminate/stop a server, you won’t be billed from next hour.

**3. Get Rid of Negotiations:**

Surely price negotiations are not an expertise area for many (at least me) and neither we like spending our time & energy doing that even if we have the skills. AWS is highly focused on reducing infrastructure cost for their customers. They have reduced their pricing across various services more than 30 times in last few years. Tools like [Trusted Advisor](https://aws.amazon.com/premiumsupport/trustedadvisor/), or 3rd-party tools like CloudCheckr, Cloudability, Cloudyn etc. can provide you insights to optimize cost within your existing setup on AWS.

**4. Procurement:**

Procuring a new server might take time between several hours to 8-10 days depending upon whether your infrastructure is on-premise, co-located or if you are associated with a hosting provider. Similar time is needed to procure software licenses as well. However, AWS enables you to spin-up new servers within few minutes with no need to buy separate licenses for many operating systems & software.

**5. Pay Per Use:**

Think of infinite space for your backup & archival needs, ability to launch new servers, up-scale/downscale a server, CDN integration, [transcoding media files](https://aws.amazon.com/elastictranscoder/), unlimited bandwidth and many more highly scalable services/features available to you while you pay based on your actual usage only.

**6. Security:**

AWS has built world class, highly secure infrastructure, both physically and over the internet. Few highlights from the security measures mentioned on [AWS website](https://aws.amazon.com/security/) are:

* · Data centers are staffed 24×7 by trained security guards, and access is authorized strictly on a least privileged basis
* · Multiple geographic regions and Availability Zones allow you to remain resilient in the face of most failure modes, including natural disasters or system failures
* · Ability to configure built-in firewall rules from totally public to completely private or somewhere in between to control access to instances.
* · Leverage [Identity & Access Management (IAM)](https://aws.amazon.com/iam/) & [CloudTrail](https://aws.amazon.com/cloudtrail/) to keep track to all activities done by different users.

Few other highlights include private subnets, Multi-factor authentication (MFA), Isolate GovCloud & encrypted data storage.

**7. Flexibility:**

Forget about guess-work or scientific analysis to identify your infrastructure needs. You can leverage auto-scaling to build a self-managing infrastructure aligned closely to the actual need based on traffic/resources utilization. Amazon Machine Images (AMIs) enable you to spin-up clones in multiple regions for different environments within few minutes, eliminating the need to repeat the set-up steps every time.

**8. Global Leader:**

Amazon has global presence with 10 regions, 36 availability zones and more than 50 edge locations. Few months ago, [Gartner positioned AWS in Leaders Quadrant of the new Magic Quadrant for Cloud Infrastructure as a Service](https://tinyurl.com/GartnerIaaS2013). Gartner also mentioned that AWS has more than five times the compute capacity in use than the aggregate total of rest 14 service providers placed in the same Magic Quadrant.

**9. Best-in-class PaaS Offerings:**

AWS has come-up with highly scalable managed services for database, caching, data-warehousing, transcoding, storage, backup, [infrastructure management](https://www.tothenew.com/devops-aws) & application management which decreases the overall time & effort spent in setting-up & managing the infrastructure and thereby considerably decreasing the go-to-market cycle for end-customers.

**10. API:**

APIs are available in various programming languages to help you manage your infrastructure programmatically. Whether it means launching a new instance, or taking backups, everything is possible through API. In fact, APIs are more powerful than AWS Management Console.

In case you are still not sure if AWS suits you need but would like to try-out, the following links might interest you:

* · [AWS Free Tier](https://aws.amazon.com/free/) – Most of the AWS services offer free quota to start with.
* · [AWS Activate Packages](https://aws.amazon.com/activate/) – In case you are a start-up, look at AWS Activate Packages and you might get free credits & trainings to get started.
* · [AWS Jumpstart](https://www.tothenew.com/services) – In case you do not have the required expertise, TO THE NEW can [help you migrate your application to AWS](https://www.tothenew.com/devops-aws).

**Challenges To Az 1: Skill set**

AWS is known for providing a highly configurable, feature-rich cloud offering but it does have a steep learning curve. So, if your in-house IT resource is small and potentially new to AWS, it can be a challenge to get skilled up and started swiftly.

**Challenge 2: Tech support**

Amazon does offer different levels of tech support depending on how quickly you need issues resolved and if you need a dedicated account manager or tech support for integrations with third-party plugins if something goes wrong. However, AWS support fees vary on a sliding scale tied to monthly usage, so support costs can grow quickly if you are a very heavy user.

**Challenge 3: Control**

Storing sensitive and proprietary data on external environments carries risks. Despite successful use cases that Amazon provides, moving sensitive data and business pertinent environments to the public cloud can require authorization and extensive levels of bureaucratic red tape.

**Challenge 4: Security and data protection**

Ensuring that data is secure when deploying a cloud environment can be a daunting task. Naturally, as the adoption of cloud resources continues to grow, the risk of data breaches grows with it too. Closely tied in with security, is data protection. Many governments place strict data protection requirements on companies and standards audit schemes such as ISO-9001 place additional restrictions on firms.

**Challenge 5: Performance and uptime**

Performance and uptime have a direct effect on the bottom line. A fraction of a second on load time can lead customers to leave a site, costing sales. And if your site is down for even a few minutes it can affect not just the direct bottom line, but have a longer-term impact on SEO and brand reputation as well.

**Comparison between Microsoft Azure & Amazon Web Services**

Following are the points that compares both Azure and Amazon services:

## **Pricing**

Both Azure and AWS pricing models differ in a way that AWS charges you on an hourly basis whereas Azure charges you on a per minute basis. When it comes to short term subscription plans, Azure gives you a lot more flexibility. In case of certain services. Azure tends to be costlier than AWS when the architecture starts scaling up.

## **Storage Services**

Both AWS and Azure provide long-running and reliable storage services. AWS has services like AWS S3, EBS, and Glacier whereas Azure Storage Services have Blob Storage, Disk Storage, and Standard Archive.

**Cloud Platform**

Azure and AWS both offers different cloud platforms to work in. Public cloud platform is provided by Microsoft Azure and on the other hand, on-demand cloud computing platform is offered by Amazon.

**Databases**

Almost all cloud providers provide an ability to implement a database in both SQl and NOSql. AWS uses a relational database as a service by using RDS and for NoSQL, it uses Dynamo DB and caching. However, Azure uses SQL database, MYSQL, and PostgreSQL for the relational database. It uses Cosmos DB for NOSql solutions and Redis Cache for caching purposes .

**Long term data archiving**

Long term data archiving and retrieval takes place easily through Amazon Glacier while there is no long term data archiving and retrieval option offered by Azure yet.

**Hybrid Cloud**

Azure is open to Hybrid cloud systems whereas AWS is less open to private or third-party cloud providers.

**Open source Developers**

AWS is excellent for open source developers as it welcomes Linux users and offers several integrations for different open source applications.Azure provides the facility for enterprise users so that they can use current active directory account to sign on the Azure cloud platform and runs .net framework on Windows, Linux, and MacOS.

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