

Microsoft Azure vs. Amazon Web Services

A Comparative Study

Introduction

Current generation business and industry needs are growing rapidly and hence require scalability, availability and other features for their business or products. Most of these features required by today's businesses are inherent characteristics of cloud computing and hence are offered by most cloud vendors. But there are a host of vendors to choose from, and features provided by each one of them differ in many ways. In this paper, we have opted to compare the features provided by two major cloud vendors – Amazon Web Services and Microsoft Azure, with an aim to help the reader decide which cloud vendor is more suitable to their requirements.

Compute Services

Amazon Web Services

Amazon **Elastic Compute Cloud (Amazon EC2)** provides basic computation service in AWS. It presents a virtual computing environment and enables resizable compute capacity. Users can simply use a pre-configured Amazon Machine Image (AMI) (pre-configured operating system and application software) or create their own AMIs. Users can then choose between different instance types with different virtual CPU cores and amount of memory. EC2 instances can be launched in multiple locations (Regions and Availability Zones). Failures are insulated among different Availability Zones. Regions are geographically distributed and consist of one or more Availability Zones. Amazon **Elastic IP Addresses** are static IP addresses and can be used to remap public IP addresses to any instance in an account in case of instance or Availability Zone failures. Apart from launching instances on demand, users can also reserve certain instances or bid on unused EC2 capacity to run Spot Instances.

EC2 also offers **Auto Scaling** and **Elastic Load Balancing** services. Auto Scaling allows users to scale up/down their EC2 capacity automatically when predefined events are triggered. Elastic Load Balancing automatically distributes incoming traffic across multiple Amazon EC2 instances, which brings improved responsiveness as well as fault tolerance.

Microsoft Azure

Microsoft Azure Virtual Machines provides IaaS similar to EC2. To create a VM, users need to choose a virtual hard disk (VHD) for the VM's image. Users can either use VHDs provided by Microsoft (Windows Server) and its partners (Linux images), or upload their own VHDs. Then users need to specify the size of new VM (different number of cores and amount of memory).

Storage

Amazon Web Services

EC2 instances come with a virtual local disk, but data in this disk may be lost if the instance fails. AWS provides **Elastic Block Store (EBS)** which offers persistent storage to EC2 instances and is independent from instance life. EBS provides block level storage volumes and can be mounted as devices by running EC2 instances. EBS behaves like a raw/unformatted block device and users can create a file system on it. There are two types of EBS volumes: Standard volume and Provisioned IOPS volume. Users can choose Provisioned IOPS volumes if predictable and high I/O performance is desired. An EBS volume is placed in a specific availability zone and automatically replicated within the same availability zone. Users can create consistent snapshots of EBS volumes which will be stored in Amazon S3 and automatically replicated across multiple availability zones.

Amazon **Simple Storage Service (S3)** is a fully redundant data storage for the Internet. It can be used alone or together with other AWS services such as Amazon Elastic Compute Cloud (Amazon EC2), Amazon Elastic Block Store (Amazon EBS), and Amazon Glacier, as well as third party storage repositories and gateways.

Amazon **Glacier** provides extremely low-cost storage, specifically for data archiving and backup. It is optimized for data that is infrequently accessed and retrieval of data may take several hours.

AWS **Storage Gateway** is a service connecting an on-premises software appliance with cloud-based storage to provide seamless integration between an organization's on-premises IT environment and AWS's storage infrastructure.

AWS **Import/Export** service offers faster data transfer into and out of AWS by using portable storage devices rather than transferring data via the Internet.

Amazon offers **Relational Database Service (Amazon RDS)** to give users access to the capabilities of MySQL, Oracle or Microsoft SQL Server database engine. Amazon **SimpleDB** provides NoSQL database service for smaller datasets and Amazon **DynamoDB** provides fully managed, high performance, NoSQL database service.

Microsoft Azure

Azure Storage provides the flexibility to store and retrieve large amounts of unstructured data, such as documents and media files with Azure **Blobs**. Azure **Table** is a NoSQL datastore which is ideal for storing structured, non-relational data. Azure **Queue** is a service for storing large numbers of messages that can be accessed from anywhere. Azure **File storage** (in Preview) offers shared storage for applications. Microsoft Azure virtual machines and cloud services can share file data across application components via mounted shares, and on-premise applications can access file data in a share via the File storage API.

Azure Storage keeps up with your growing data needs, with up to 500 TB of total storage per account. A single subscription supports up to 50 storage accounts, delivering petabytes of storage for the largest scenarios. Whether you're building a consumer site or a terabyte-scale big data application, Azure is designed to handle it.

Azure storage automatically replicates your data to help guard against unexpected hardware failures and make sure it is available when you need it. 3 copies of data are maintained within a single region. A geo-redundancy option creates 3 additional copies hundreds of miles away for higher availability and disaster recovery.

Microsoft provides Azure **SQL Database** as a relational database-as-a-service option.

AWS vs. Azure Cloud Costs

AWS and Azure use different naming conventions for the same types of features, complicating direct comparisons. A feature parity between the 2 cloud giants is provided below:

Naming Convention/Feature Parity	
AWS	AZURE
Ec2	Virtual Machines
VPC	Virtual Network
RDS	SQL Database
ELB	Traffic Manager
EBS/S3/Glacier	Storage
Direct Connect	ExpressRoute
IAM with MFA	Multi Factor Authentication
Security Groups	EndPoints
SNS/SES	Service Bus
EC2ConfigService	VM Agent
SQS/Auto Scale	Scheduler
CloudFormation/CloudWatch/Auto Scale	Automation

Pricing Models

Amazon Web Services

AWS instance types and prices break into three categories: On-demand, Reserved Instance (RI) and Spot Instances.

On-demand

The most common instance type purchased, and the most expensive with the highest cost per hour charged for use (compared to the other two AWS options). Full price is paid for utilization and doesn't include cost of upgrading network speed. With no long-term commitments required or upfront fees, it is the most flexible option which may be ordered on the fly when needed.

Reserved instances

Upfront fees are paid to "reserve" an instance for one or three year periods of time. Amazon discounts the hourly usage price in return for the long term commitment. This model deviates from the pay-as-you-go model, and some companies view the reserved instance as Capex as opposed to Opex, which undermines their original motive to migrate to the cloud.

Spot instances

A spot instance is acquired through bidding in an auction with Amazon determining the price based on demand. This instance is significantly cheaper than RI instances, but provides zero control over the lifespan of the instance provided.

Microsoft Azure

On-demand instance

The most common and expensive instance type, with hourly costs listed and calculated based on total minutes. No short or long term commitment is required, so high flexibility is available to increase or decrease instances as needed.

Six or Twelve month terms

Companies looking for discounted pricing can order six or twelve month terms, which offer a reduced price on each hour of use. There is a monthly model, as well as a pre-paid, the latter of course further reduces the cost with the upfront payment requirement.

Enterprise Agreements

Large organizations often sign up for a Microsoft Enterprise Agreement (EA). By making an upfront usage commitment to Azure they earn several additional benefits including flexible billing options and the best prices.

Billing		
	AWS	AZURE
Pricing	Per hour - Rounded up	Per minute - Rounded up commitments(pre-paid or monthly)
Models	On-demand, Reserved, Spot	On-demand, short term commitments and Enterprise Agreements(long-term commitments)

AWS vs. Azure SLA's

Amazon and Azure both provide a 99.5% SLA for cloud services and virtual machines. AWS S3 and Azure Storage both offer a 99.9% SLA. Amazon Route 53 comes with a 100% SLA, compared to a 99.99% SLA for Azure Traffic Manager. AWS's CloudFront and Azure CDN both come with 99.9% SLA.

The Microsoft Azure Edge

Enterprise IT environments today require solutions that can be delivered faster, more cost effectively and with greater flexibility at global scale. With Azure, you can use the cloud along with your existing infrastructure and apps, leveraging common tools, technologies, and skills. From Microsoft .NET to Java, Windows Server to Linux, SQL to Hadoop or Oracle Database, and your heterogeneous IT needs are addressed.

Here we present some key features and benefits of Microsoft Azure which makes it a better choice over AWS:

Hybrid Capability

The Microsoft hybrid cloud leverages both on-premises resources and the public cloud without the need for complex workarounds or other products and vendors. Easily move workloads between your datacenter, service providers, and Azure and build hybrid applications that leverage resources across all three. Unlike Amazon Web Service's cloud-only approach, Azure gives you lots of options for an effective hybrid cloud strategy without forcing you to snap to a rigid all-or-nothing approach.

End-to-end Support from Microsoft

Microsoft Azure works seamlessly with your existing Microsoft applications and unlike Amazon Web Services, Microsoft provides end-to-end support - right from infrastructure to your operating system to your applications. Whether it's Visual Studio, SharePoint, SQL Server, Active Directory or Team Foundation Server, Microsoft offers the best in class support. If the company has a good interest in Microsoft Technologies like Microsoft SharePoint, Microsoft .NET, Active Directory synchronization, BizTalk Server, Office 365, LOB applications built on Microsoft .NET, then Microsoft Azure is definitely the better choice - for both IaaS&PaaS.

True Hybrid Storage

Azure offers enterprise-grade storage solutions for on-premises, cloud and hybrid environments with enhanced security and governance. Different from AWS, Azure's hybrid storage options offer cloud storage solutions that integrate with your datacenter, so you can take full advantage of elasticity and lower costs in the cloud while leveraging on-premises performance.

Best Support for Oracle

Microsoft Azure is the only cloud provider certified for Oracle applications and databases. You'll get best in class, end-to-end support for your Oracle software on Azure and Windows Server Hyper-V. Simply use your existing licenses to run Oracle software on Azure and receive full support from Oracle. Plus, Oracle software including Java, Oracle Database and Oracle Weblogic Server are all available in the Azure image gallery.

First-class Integration

Unlike AWS, Azure doesn't limit you to third-party integration solutions so you can take full advantage of the cloud at every layer of the stack. Microsoft BizTalk Server 2013 R2 and Service Bus work together to enable customers to extend on-premises integration solutions to the cloud, and Azure BizTalk Services provides business-to-business, enterprise application integration, and hybrid connection capabilities. Microsoft BizTalk is a leading enterprise-class solution with first-party integration across on-premises, infrastructure-as-a-service, and platform-as-a-service.

Best Identity Platform

Microsoft has a long history of developing successful identity and access management technologies, and Active Directory is used by thousands enterprises of all sizes. While AWS's identity service only focuses on its own cloud, Azure Active Directory provides a comprehensive identity and access management cloud solution to help control access to thousands of Microsoft and non-Microsoft applications in the public cloud.

Conclusion

Companies preparing for a cloud migration must do their homework to find the best route for them. Each vendor has its own sweet spot for particular deployments and it is down to the deploying company to figure out which KPIs are most important to them and select a cloud vendor accordingly.

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