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AWS Global Infrastructure

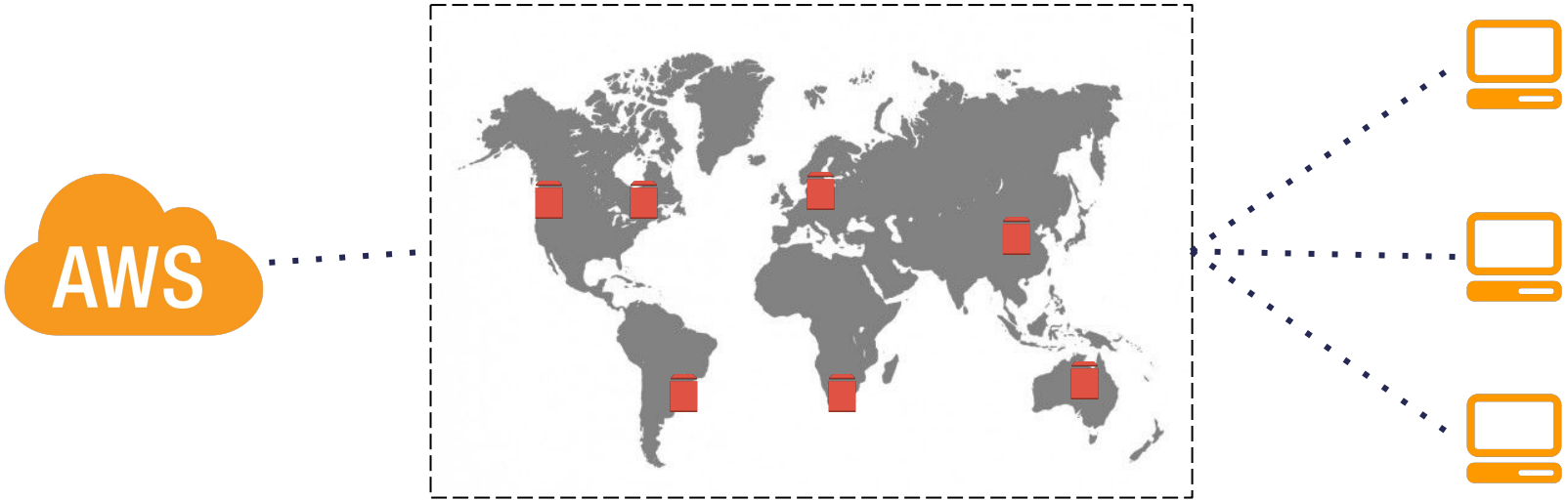
Train Overview

In this train we will cover the following:

The **role and function of regions, availability zones and edge locations**. We will also be going over some **high level concepts** of how cloud vendors **ensure security of the cloud**. Finally, we will discuss some **general considerations** that need to be kept in mind when **choosing a region** for your cloud solution.

Cloud Computing Region Overview

When building a single cloud application or architecting a multi-cloud solution it is important to understand the concept of cloud regions



https://aws.amazon.com/about-aws/global-infrastructure/

Cloud computing regions refer to the physical geographical location where the servers/ clustered data centers are located

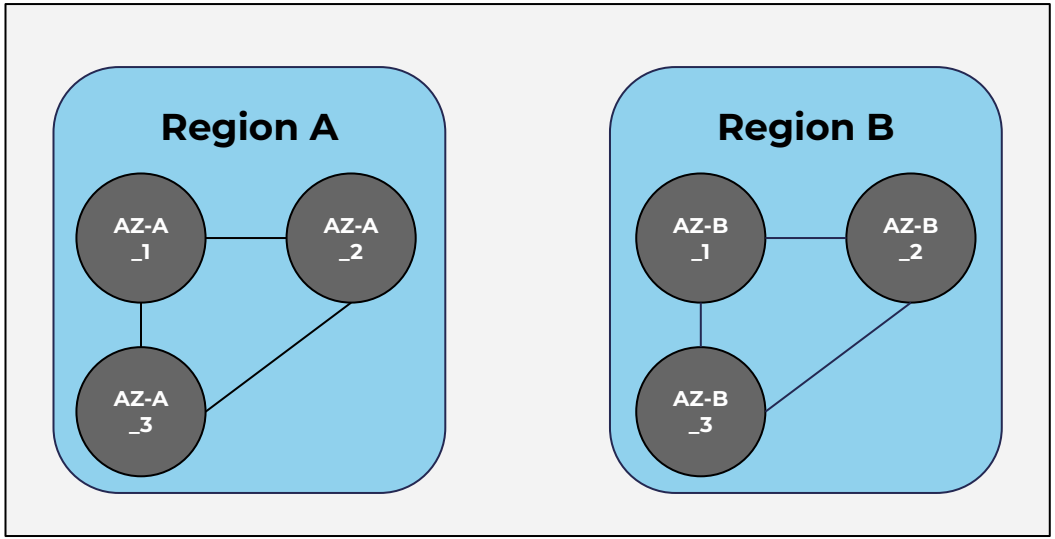
Cloud Computing Availability Zones Overview

An availability zone in cloud computing refers to an isolated data center(s) within a single region. It is typical to find that one region will have multiple availability zones.

Availability Zone Properties

1. A single availability zone can run on multiple data centers
2. No two availability zones share the same data center
3. Local AZ enable you to place your resources closer to the end user

Availability Zones (AZ) Within Regions



Edge Locations and their Function

Edge locations are used to cache data near the end-user to reduce latency. User data is automatically routed to the nearest edge location for caching purposes.

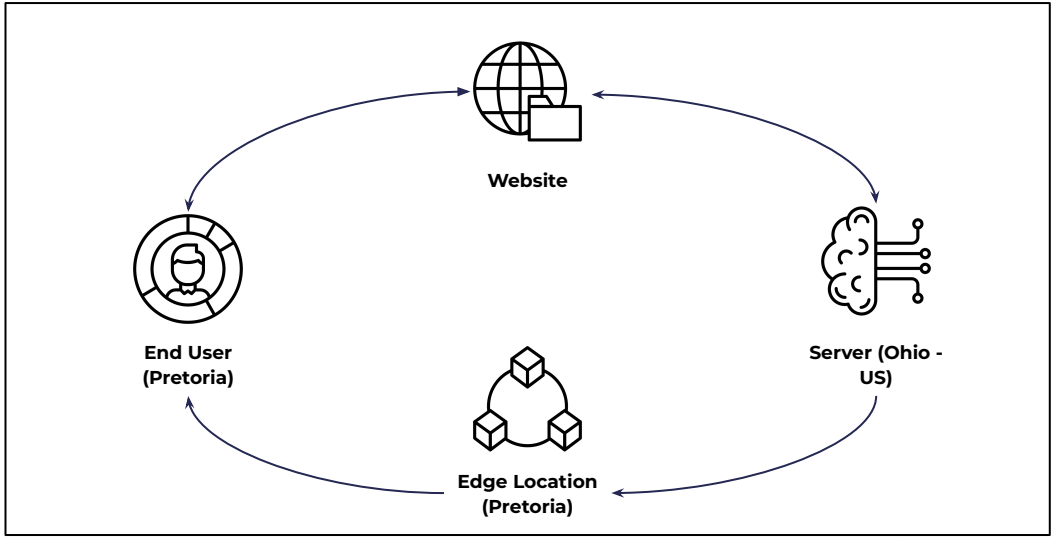
Edge Location Example

Let's say you have a website hosted in a data center sitting in the US i.e your region is Ohio - US.

Your main client base is however sitting in Pretoria - South Africa. If your end users therefore request information there will be high latency because of the geographical separation (distance).

Edge locations solve this latency problem. Rather than making requests to the Ohio data center, data will automatically be cached in the nearest edge location to Pretoria.

Visual Example of Edge Location



Considerations when Selecting a Region

Latency	Latency can be described as a delay before a transfer of data begins - following an instruction for its transfer. When creating a solution we would like to minimise latency. This can be done by locating the data center near the end consumer. For example, if your client base sits in Germany it is wise to choose a data center somewhere in Europe.
Cost	The cost of running your solution in the cloud is dependent on the choice of region. This is simply the case because some data center regions have higher real estate cost compared to others - think of a data center in an urban area compared to one in a rural area.
Security	Every country has its own security, regulatory and compliance requirements. When choosing a region to host your solution it is important to choose the region that will make your life easier in trying to adhere to country specific regulations and requirements.
Compute	Different regions have different data centers with varying specifications. When choosing a region be sure to investigate if the chosen region has available the required computational resources.
Services	As with the compute example, different regions offer different services. It is therefore important to align your region choice with your service and feature requirements.
Recovery	When choosing a region make sure that the backup or redundant data center is not in the same region. That way, when a disaster hits one region your application/solution/data will be safe.

AWS Foundational Services: Storage Services

Amazon Web Service	Service Overview
Amazon S3 	Fully managed scalable, safe and simple online object storage service
Amazon EBS 	Low Latency, block level storage volumes for EC2 instances
Amazon EFS 	Scalable shared file storage service for EC2 instances
Amazon Glacier 	Long term object storage service ideal for backup or archival of data

AWS Foundational Services: Compute Services

Amazon Web Service	Service Overview
Amazon EC2 	On-demand and scalable compute capacity in the AWS cloud
Amazon ECS 	Service for the management and orchestration of containers
Amazon Elastic Beanstalk 	Easy-to-use service for deploying and scaling web applications and services
Amazon Lambda 	Easily run code without the need to provision or manage servers and only pay for the resources used

AWS Foundational Services: Database Services

Amazon Web Service	Service Overview
Amazon RDS 	Managed Relational Database Service for MySQL, PostgreSQL, MariaDB, Oracle BYOL, or SQL Server.
Amazon Aurora 	MySQL and PostgreSQL-compatible relational database built for the cloud
Amazon Redshift 	Fully managed big data warehouse service designed for petabyte-scale data storage and analysis
Amazon DynamoDB 	Multi-region, durable database with built-in security, backup, and in-memory caching for large scale web applications

AWS Foundational Services: Networking and Content Delivery Services

Amazon Web Service	Service Overview
Amazon VPC 	Define a isolated virtual network in which you can launch your AWS services at scale. With Amazon VPC you can control your IP address range, creation of subnets and configure network gateways
Amazon Elastic Load Balancing 	Automatic distribution of incoming application traffic across multiple Amazon EC2 instances.
Amazon CloudFront 	Web service to distribute content to end users with low latency and high data transfer speeds.
Amazon Route 53 	Highly available and scalable cloud Domain Name System (DNS) web service.

AWS Foundational Services: Security, Identity and Compliance Services

Amazon Web Service	Service Overview
Amazon IAM 	Securely manage access to your AWS services and solutions
Amazon Organisations 	Centrally manage billing - control access, compliance and security; and share resources across your AWS accounts
Amazon Cognito 	Mobile user identity and synchronization
Amazon KMS 	Easily create and manage cryptographic keys and control their use across AWS services and solutions

Conclusion

What we've learnt

The basics of edge locations, availability zones and regions

How vendors keep your data safe in the cloud

Key considerations when choosing a specific region for your cloud solution

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Appendix

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Edge Computing vs Cloud Computing

Edge computing refers to carrying out the computation or running an application as close to the source as possible, thereby eliminating the need to relay the data to a data center, carry out the computation and send back the results. Adopting the approach of edge computing reduced/eliminates latency.

Edge Computing Advantages

Improved Performance: Data collection, transformation, processing and analyses happens locally

Reduced Cost: Because the requirement for data transfer is eliminated, costly bandwidth additions to the solutions architecture are no longer required

Cloud Computing Advantages

Scalability/Flexibility: Cloud models allow for small initial rollout and then rapid and efficient scalability later

Reduced Maintenance: Cloud vendors maintain the hardware and software

Edge Computing Examples

- Self-driving AI powered cars
- Smart homes
- Streaming services

Cloud Computing Examples

- Data storage and file sharing
- Big data analytics
- Cybersecurity

Service Offerings Cloud Vendors Provide to Customers to Ensure Data Security

	Protection Mechanisms		AWS Offering
1	Data Encryption at Rest and in-transit	Cloud vendors encrypt data and provide encryption services to their clients to allow for data encryption across all storage, compute and data base services	AWS Key Management Service; AWS Cloud HSM
2	Infrastructure and Physical Access Control	Firewalls are built into cloud service offerings. On top of this access to the data centers are strictly regulated and often their physical locations are not disclosed	AWS WAF
3	Access	Cloud vendors provide capabilities that make it easy to centrally establish and maintain access rights across many of their services	AWS IAM
4	Monitoring	Vendors provide cloud monitoring services which can be used as management tools to prevent malicious attacks and budget overruns	AWS CloudWatch; AWS GuardDuty; AWS CloudTrail

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AWS Regions Around the World

For more information on the latest AWS regions world wide, visit this link

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Azure Regions Around the World

For more information on the latest Microsoft Azure regions world wide, visit this link

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Google Cloud Regions Around the World

For more information on the latest Google Cloud Platform regions world wide, visit this link

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