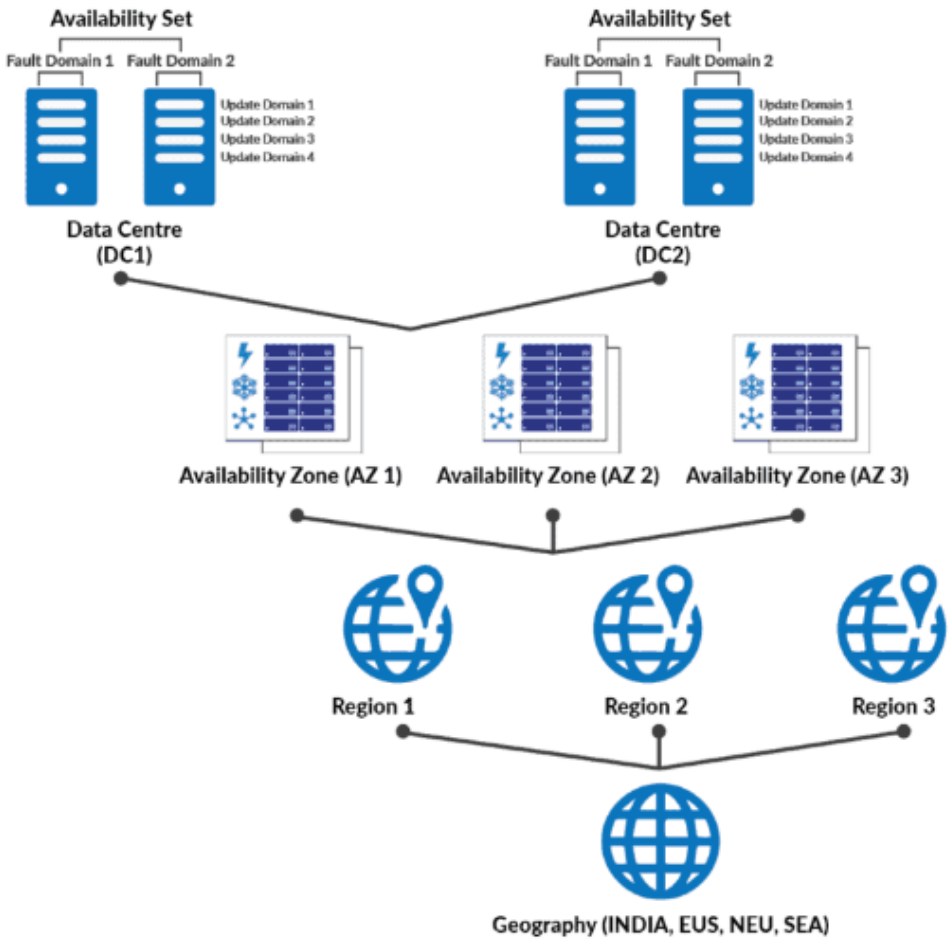
2. Azure Availability Zones, Azure Regions, Availability sets, Fault & Update domain

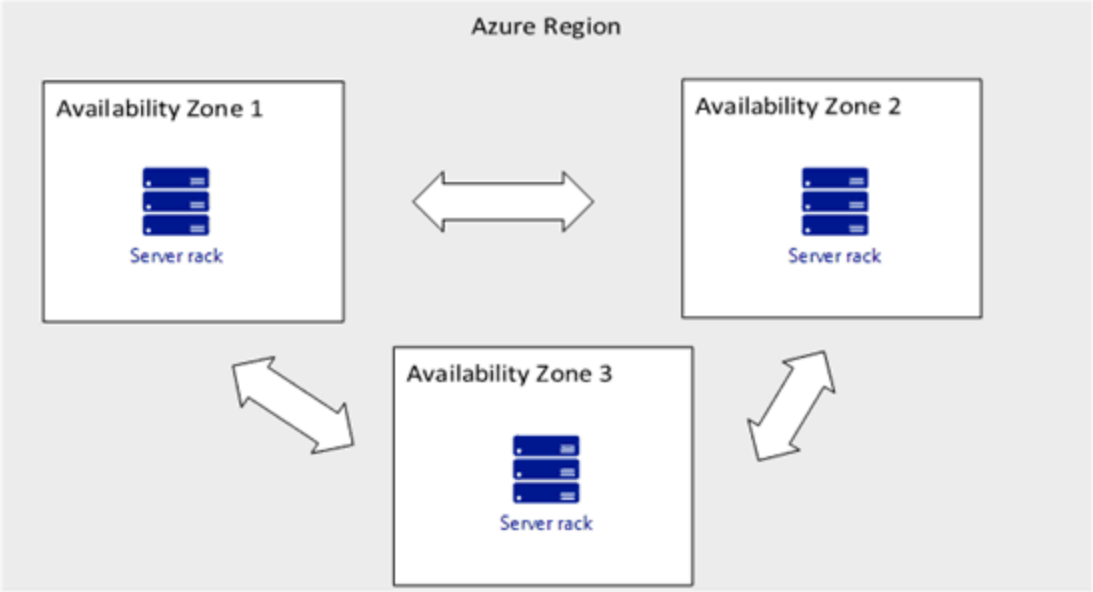


Azure Region

- Azure regions are geographic locations where Microsoft Azure operates datacenters.
- A region is a set of data centers deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network.

Azure Availability Zone

- Azure Availability Zones is a high-availability offering that protects your applications and data from datacenter failures.
- These are unique physical locations within an Azure region. Each zone is made up of one or more data centers equipped with independent **power**, **cooling**, and **networking**.
- **Not every region has support for Availability Zone Azure.** The **examples of Availability Zones** are Central US**,** East US 2, West US 2, West Europe, France Central, North Europe & Southeast Asia
- With **Availability Zones**, **Azure** offers industry best 99.99% VM uptime **SLA(Service Level Agreement)**



Azure Availability Set

- An Availability Set is a logical grouping capability for isolating VM resources from each other when they're deployed.

- By deploying your VMs across multiple hardware nodes Azure ensures that if hardware or software failure happens within Azure, only a sub-set of your virtual machines is impacted and your overall solution is safe and in working condition.
- It provides redundancy for your virtual machines.

- An Availability set spreads your virtual machines across multiple **fault domains** and **update domains.**
- If you want to leverage Microsoft's 99.95% SLA from Microsoft you must place your VMs inside availability set except your VMs are having premium storage.

  An **Update Domain** and **Fault Domain** is assigned to each VM in Availability Set by Azure platform.

Availability Set vs Availability Zone

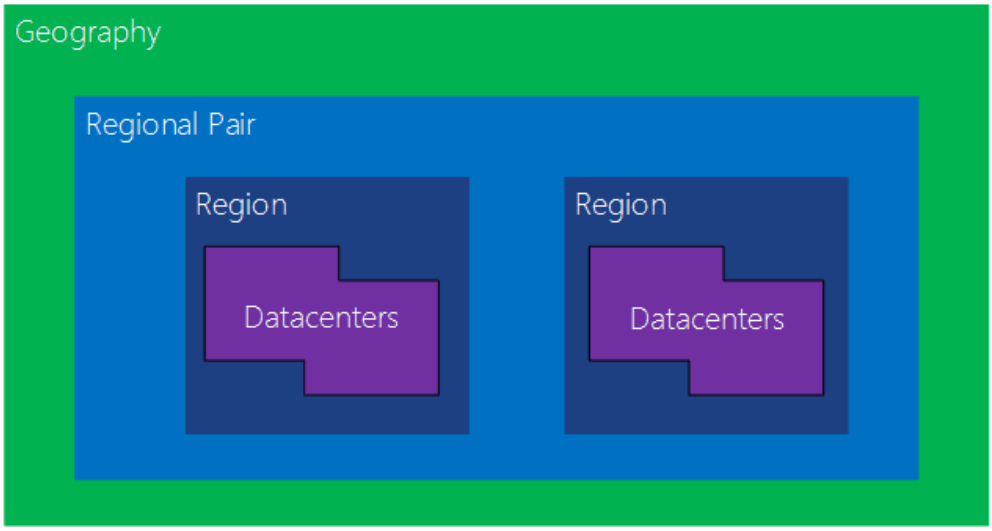
Availability Set	Availability Zone
Protect from failures within data centers	Protect from entire data center failure
99.95% SLA	99.99% SLA

When should I use an Available Zone vs Set?

Availability zones are used to protect applications from entire Azure data center failures, while Availability sets are used to protect applications from hardware failures within an azure datacenter.

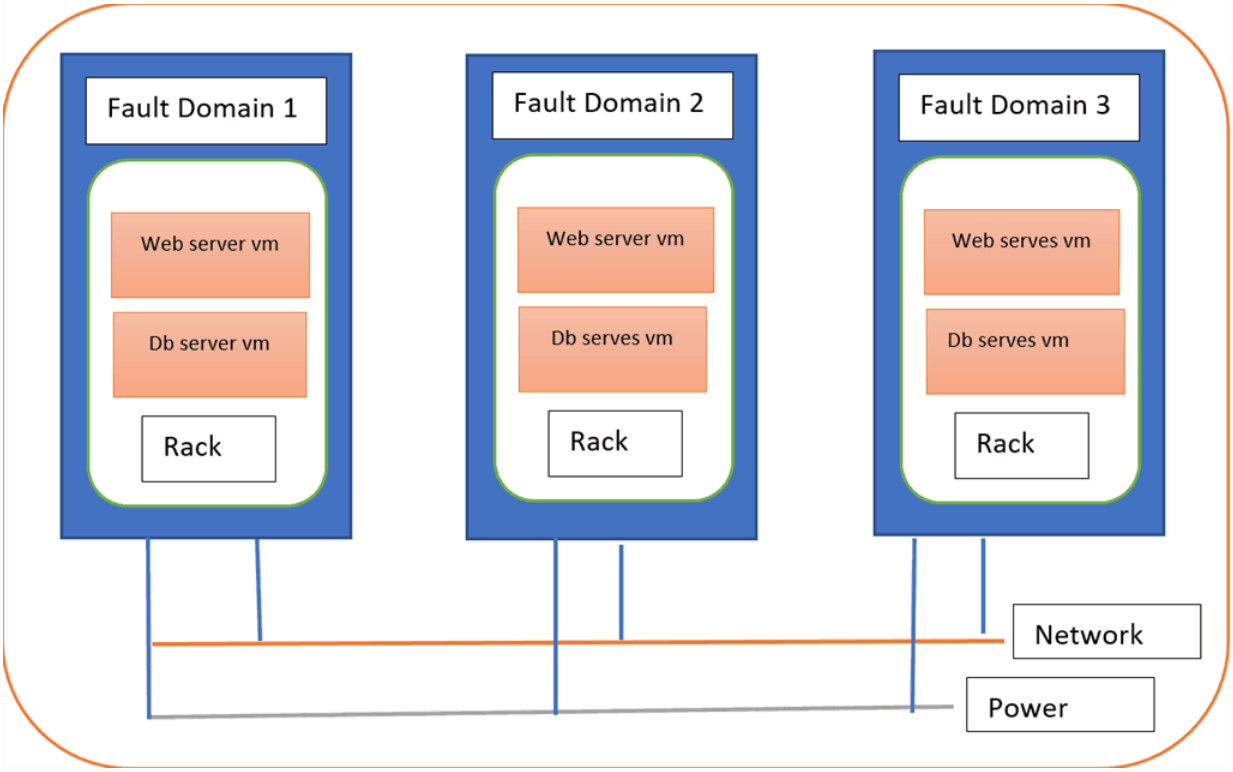
Geographies

Geography is a discrete market, typically containing two or more regions, that preserves data residency and compliance boundaries.



Azure Fault Domains

- Azure Fault domains define the group of virtual machines that share a **common power source** and **network switch.**
- Each and every fault domain contains some racks and each rack contains a virtual machine.
- Each of these Azure Fault domains shares a power supply and a network switch.
- All the resources in the fault domain become unavailable when there is a failure in the fault domain.
- You should place your VMs in such a way that each fault domain gets one web server, one database server, and like that.

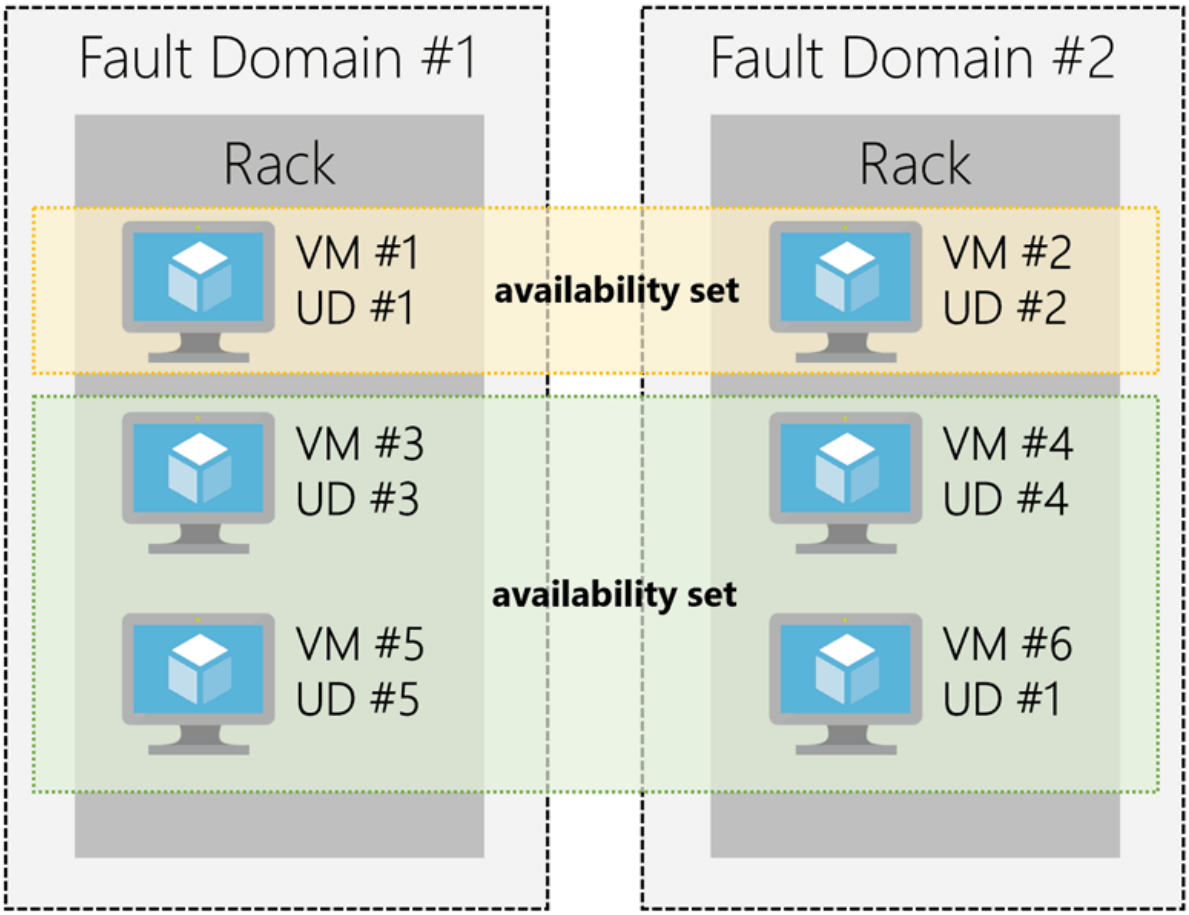


Azure Update Domain

- Virtual machines get updated domains automatically once they are put inside the availability set.
- All virtual machines within that update domain will reboot together.
- They are used for patching of the virtual machines.
- Only one updated domain can be updated at a time.

How many Fault Domains and How many Update Domains we can have?

- In the Azure Service Management (ASM) portal, we have two Fault domains and 5 update domains.
- In the Azure Resource Manager(ARM) portal, we have three Fault domains and 5 update domains but we can upgrade our update domains from 5 to 20.
- VMs are assigned sequentially in the update domains and fault domains.



How many availability zones does Azure have?

For all the Azure regions available in the world, there are 3 availability zones in each region.

What is the purpose of Availability Zones in Azure?

The purpose of Availability Zones in Azure is to enhance the reliability and resiliency of business-critical workloads by providing redundancy and isolation within an Azure region. Availability Zones are physically separate zones within an Azure region, each having its own power source, network, and cooling infrastructure