Core Architectural Components of Azure

In this chapter we will be discussing core architectural components of Azure. This includes:

- Regions, Region Pairs, Sovereign Regions
- Availability Zones and Data
- Resources and Resource Groups
- Subscriptions
- Management Groups

Regions

These are areas of the world where Azure has a set of datacenters (set of buildings and datacenters and son on. Azure has about 60 of these around the globe).

Nor necessarily "countries but can be".

Usually, each region is connected another region to make a "region pair". (This is essentially two well connected regions with fiber optic cable and fast connections. This will help if you are doing backups and massive data transfers.)

Region pairs have highest speed connections and special treatment during Azure updates. (They may not send updates in the same time to both regions if they belong to a region pair.)

Through the link below we can view where they have datacenters and how they are connected:

Link: https://datacenters.microsoft.com/globe/explore/

For example, let's look at data centers in Canada.

Canada has two regions: Canada Central and Canada East

Data stored in these regions never leave Canada (concept of data resident. This is due to data privacy lows of different countries.)

For Brazil, there is only one region: Brazil South. It is paired with South Central US (one way) and data does leave Brazil (to the US).

Qutar is the first region that does not have a pair (solo region). It does not support Geo-Redundant Storage (GRS) option (users has to take care of backups and redundant). This uses Availability Zones for high availability.

Examples of pairs:

Canada: Canada Central & Canada East

Europe: North Europe & West Europe

USA: East US & West US

USA: East US 2 & Central US

USA: North Central US & South Central US

Brazil: Brazil South -> South Central US

When you create a resource in Azure (virtual machine/storage), you have the choice of where to deploy it (Note: prices may vary)

Even though there are 60+ regions, they are not available to everyone.

Sovereign Azure

These are not connected to the Azure Public Cloud.

These require approval to join / create a subscription.

Adhere to different compliance standards.

For example, in US, we see: Azure (commercial) / Azure Public Cloud, Azure Government, Azure Government Secret, Azure Government Top Secret.

Availability Zones and Data Centers

Azure Availability Zones (basically data centers) are physically separated locations within each Azure region.

Note: Region may consist of a couple of data centers / Zones (very close/separated by a couple of kilometres). They have their own power supply, cooling system, and networking infrastructure. Now every region supports Availability Zones. Thus, if it is a requirement, we have to select regions with Availability Zones.

Also, not every service supports Availability Zones.

There are three types of Availability Zones (AZ) Services:

- Zonal Services:

  Here you can choose a specific AZ to deploy the service (e.g. Virtual Machines) to. You should deploy a duplicate service to another zone to achieve resiliency (for redundancy when there is a power outage, ...).

- Zone-Redundant Zone:

  Automatically deployed across zones for you and you do not have to configure it. E.g. Azure SQL Database.

- Always Available Services:

  These are global services and Microsoft takes care of the ensuring that they are always on. Also called “non-regional services”. E.g. Azure Portal, Entra ID (formerly Azure Active Directory), Azure Front Door

There are some services give you the choice between zonal and zone-redundant.

Resources and Resource Groups

There is a hierarchy in resources in Microsoft Azure. At the lowest level we have actual resources. Above that resource groups, above those subscriptions, and above that Management groups.

Resources -> Resource Groups -> Subscriptions -> Management Groups

Resources:

This is a generic word to represent an Azure service that you have access to, such as specific Virtual Machines, storage Account, or Database. You can create a resource in many ways: Azure Portal, CLI, PowerShell, ARM Template, …

Each resource has a name created by you. Sometimes it has to be unique, sometimes not. Generally. You indicate the region where they are to be created (Microsoft recommend some naming convention for easy tracking).

In Azure portal there is tab “All Resources”. A brand-new subscription is created with no resources. Most resources have costs associated with them. The resource is associated with one (and only one) subscription, to which its cost is billed.

Resource Group:

A logical group of resources (it is a folder or container type of a structure). It needs to associate with a region. However, it does not restrict you and you can put any resource from any region in your Resource Group. All the services in a resource group should have a similar lifecycle (deploy together, delete together).

Resource & Group:

All resources must belong to one and only one resource group. Permissions (read/write/create/delete) can be assigned at the resource group level. Beyond permissions, there is no security boundary offered by a resource group for communication (that is, any resource can access any other resource in another resource group, except other securities).

Subscriptions:

In the documentations we may see a graph that shows individual resources and subscriptions. In the bottom layer we have resources. All the resources must be organized into one-and-only resource group (in is a folder structure logically organizing resources together). Then they will belong to a subscription in a logical fashion

At the most basic level, subscription is a billing unit within Azure.

Every resource must exist inside one subscription and there is a payment method associated with a subscription.

User can have access to more that one subscription, and different riles.

Subscription Plans:

- Free plan: When created account, $200 credits available for first 30 days.
- Pay as you Go: Billed to credit card
- Enterprise Agreement: EA
- Free credits: MSDN, Startup plans

Users:

- A single user can have access to multiple subscriptions with different roles through Roles Based Access Control (RBAC).
- If you are not in a subscription, you can't see it resources.

Multiple Subscriptions:

- It is common with some companies to have multiple subscriptions. This can be used to separate out business units within organization (Sales, IT, Finance) or separate by geography (North America, Europe, Asia)

Since we can't have subscriptions within another subscription. Thus, we do that with Management Groups. Management group can own other management groups and subscriptions.

Note: It is possible to operate an entire organization on a single subscription.

Management Groups:

When you are scaling managing multiple subscription become complex. This is where Management Groups come in. They provide logical container for subscriptions allowing you to govern access, policy, and compliance across those subscriptions from a single centralize point.

Even though they are optional, it is highly recommended for the organization with multiple subscriptions.

At the top, we have Root management Group. Everything roll up to this.