◈ Describe core Azure services (30-35%)

Describe the core Azure architectural component

Azure Regions and availability Zones

Data Center

- **Physical facility**
- **Hosting for** group of networked **servers**
- Own **power**, **cooling** & **networking** infrastructure

Region

- **Geographical area** on the planet
- **One but usually more datacenters** connected with **low-latency network** (<2 milliseconds)
- **Location** for your services
- Some services are **available only in certain regions**
- Some services are **global services**, as such are not assigned/deployed in specific region
- Globally available with **50+ regions**
- Special **government regions** (US DoD Central, US Gov Virginia, etc.)
- Special **partnered regions** (China East, China North)

Availability Zone

- **Regional feature**
- Grouping of **physically separate** facilities
- Designed to **protect from data center failures**
- If zone goes down **others continue working**
- Two service **categories**
    - **Zonal** services (Virtual Machines, Disks, etc.)
    - **Zone-redundant** services (SQL, Storage, etc.)
- **Not all** regions are **supported**
- **Supported** region has **three or more zones**
- A **zone** is **one or more data centers**

Region Pair

- **Each region** is **paired** with another region making it a region pair
- Region **pairs are static** and cannot be chosen
- Each pair resides within the **same geography***
    - Exception is Brazil South

- **Physical isolation** with at least 300 miles distance (when possible)
- Some services have **platform-provided replication**
- **Planned updates** across the pairs
- **Data residency** maintained for disaster recovery

Region Pair A	Region Pair B
East US	West US
UK West	UK South
North Europe (Ireland)	West Europe (Netherlands)
East Asia (Hong Kong)	Southeast Asia (Singapore)

Geographies

- **Discrete market**
- Typically **contains two or more regions**
- Ensures **data residency**, **sovereignty**, **resiliency**, and **compliance** requirements are met
- **Fault tolerant** to protect from region wide failures
- Broken up into areas
    - **Americas**,
    - **Europe**,
    - **Asia Pacific**,
    - **Middle East** and **Africa**
- Each **region belongs only to one Geography**

Azure Resources Groups and Resources Manager

Azure Resource

- Object **used to manage services** in Azure
- Represents **service lifecycle**
- Saved as **JSON definition**

Resource Groups

- **Grouping** of resources
- Holds **logically related** resources

- Typically organizing by
    - **Type**
    - **Lifecycle** (app, environment)
    - **Department**
    - **Billing**,
    - **Location** or
    - **combination of those**

Resource Manager

- **Management Layer** for all resources and resource groups
- **Unified** language
- **Controls access** and **resources**

Additional Info

- Each **resource must** be in one, and **only one resource group**
- Resource **groups have their own location** assigned
- Resources in the resource groups **can reside in a different locations**
- Resources **can be moved** between the resource groups
- Resource **groups can't be nested**
- Organize based on your organization needs but consider
    - Billing
    - Security and access management
    - Application Lifecycle
    -

Describe some of the core products available in Azure

Virtualization

- Emulation of physical machines
- Different virtual hardware configuration per machine/app
- Different operating systems per machine/app
- Total separation of environments
    - file systems,
    - services,
    - ports,
    - middleware, and configuration

Virtual Machines

- Infrastructure as a Service (IaaS)

- Total control over the operating system and the software
- Supports marketplace and custom images
- Best suited for
    - Custom software requiring custom system configuration
    - Lift-and-shift scenarios
- Can run any application/scenario
    - web apps & web services,
    - databases,
    - desktop applications,
    - jumpboxes,
    - gateways, etc.

Virtual Machine Scale Sets

- Infrastructure as a Service (IaaS)
- Set of identical virtual machines
- Built-in auto scaling features
- Designed for manual and auto-scaled workloads like web services,* batch processing, etc.

Containers

- Use host's operating system
- Emulate operating system (VMs emulate hardware)
- Lightweight (no O/S)
    - Development Effort
    - Maintenance
    - Compute & storage requirements
- Respond quicker to demand changes
- Designed for almost any scenario

Azure Container Instances

- Simplest and fastest way to run a container in Azure
- Platform as a Service
- Serverless Containers
- Designed for
    - Small and simple web apps/services
    - Background jobs
    - Scheduled scripts

Azure Kubernetes Service (AKS)

- Open-source container orchestration platform
- Platform as a Service
- Highly scalable and customizable
- Designed for high scale container deployments (anything really!)

App Service

- Designed as enterprise grade web application service
- Platform as a Service
- Supports multiple programming languages and containers

Azure Functions (Function Apps)

- Platform as a Service
- Serverless
- Two hosting/pricing models
    - Consumption-based plan
    - Dedicated plan
- Designed for micro/nano-services

Summary

- Virtual Machines (IaaS) - Custom software, custom requirements, very specialized, high degree of control
- VM Scale Sets (IaaS) - Auto-scaled workloads for VMs
- Container Instances (PaaS) - Simple container hosting, easy to start
- Kubernetes Service (PaaS) - Highly scalable and customizable * container hosting platform
- App Services (PaaS) - Web applications, a lot of enterprise web * hosting features, easy to start
- Functions (PaaS) (Function as a Service) (Serverless) - micro/nano-services, excellent consumption-based pricing, easy to start

Azure Network Services

Azure Networking

- Connect cloud and on-premises
- On-premises networking functionality

Azure Virtual Network

- Logically isolated networking components
- Segmented into one or more subnets
- Subnets are discrete sections
- Enable communication of resources with each-other, internet and on-premises
- Scoped to a single region
- VNet peering allow cross region communication
- Isolation, Segmentation, Communication, Filtering, Routing

Azure Load Balancer

- Even traffic distribution
- Supports both inbound and outbound scenarios
- High-availability scenarios
- Both TCP (transmission control protocol) and UDP (user datagram protocol) applications
- Internal and External traffic
- Port Forwarding
- High scale with up to millions of flows

VPN Gateway

- Specific type of virtual network gateway for on-premises to azure traffic over the public internet

Application Gateway

- Web traffic load balancer
- Web application firewall
- Redirection
- Session affinity
- URL Routing
- SSL termination

Content Delivery Network

- Define content
- Minimize latency
- POP (points of presence) with many locations