

INTRODUCTION TO CLOUD COMPUTING



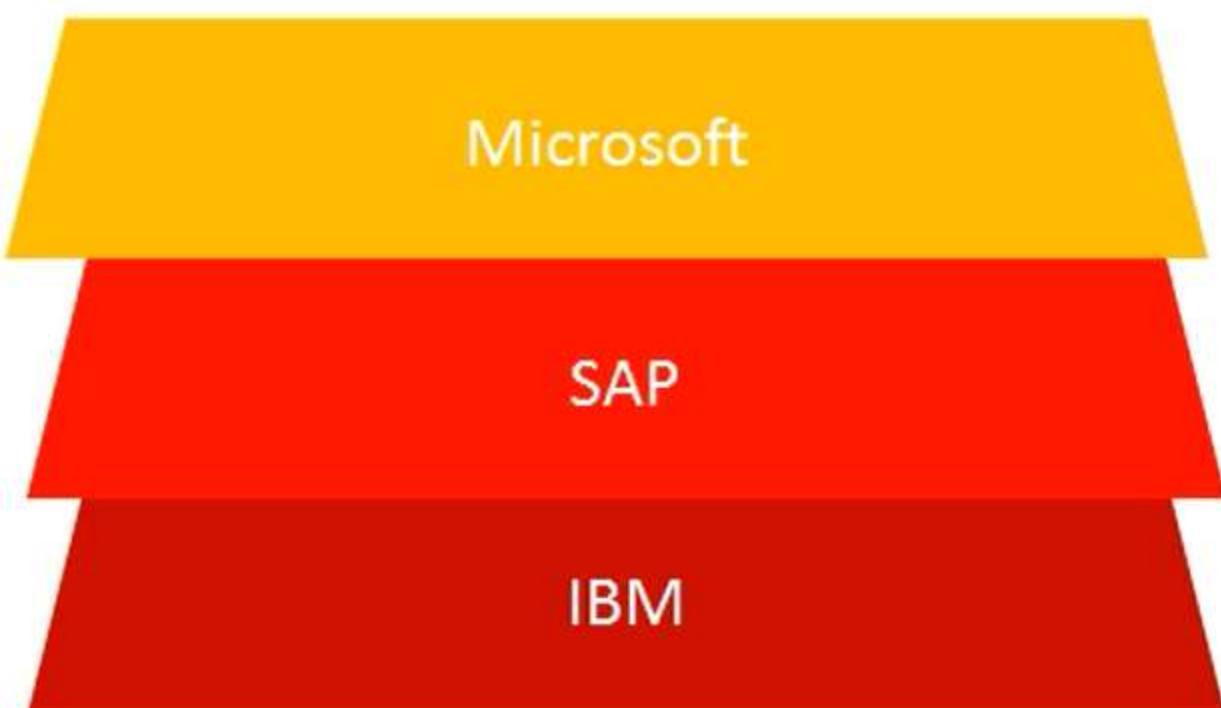
Objectives

In this session you will learn about,

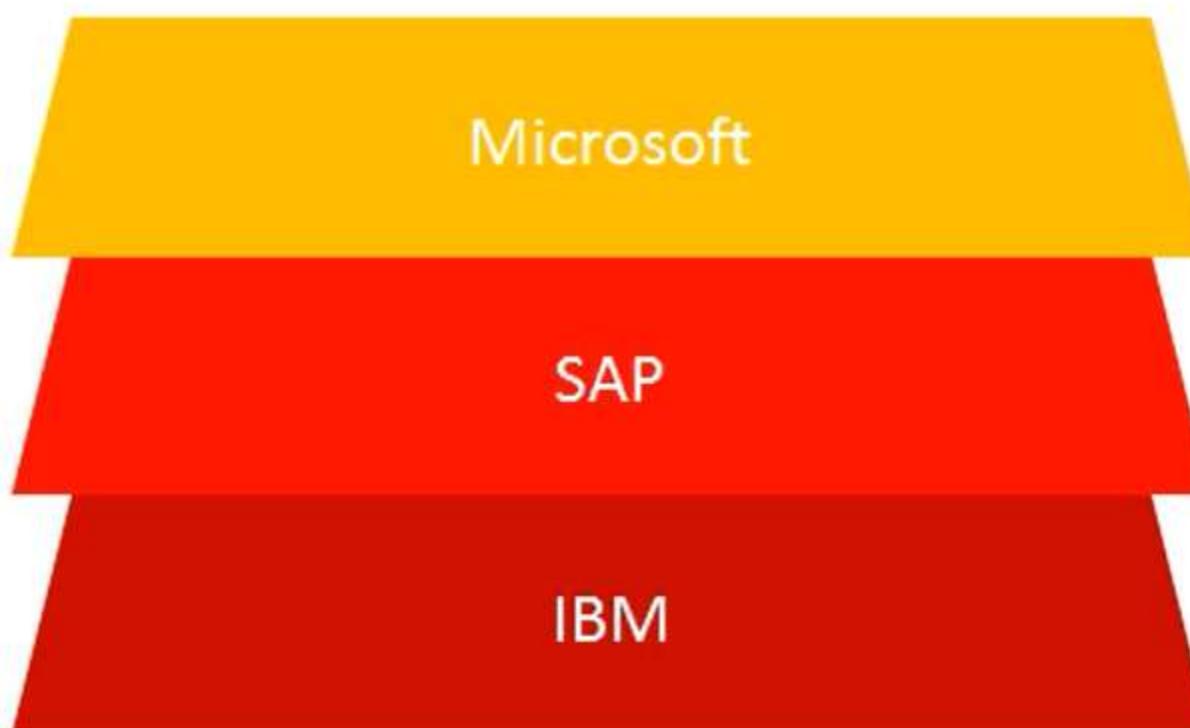
- Introduction to Cloud Computing
- Types of cloud computing



Overview



Overview



Business app requires a datacenter

Power and coolant

Servers and storage

Network and security

Operating System and app dependency
software's

Team of experts to manage and configure
the server and applications

Traditional On-Premises



- Benefits
 - ✓ Fully customizable
 - ✓ Very few limitations
 - ✓ Full control
- Costly and time commitment
 - ✓ Weeks to setup and deploy
 - ✓ Maintenance/upgradation of hardware and software
 - ✓ Upfront investment

Solution – Cloud Computing

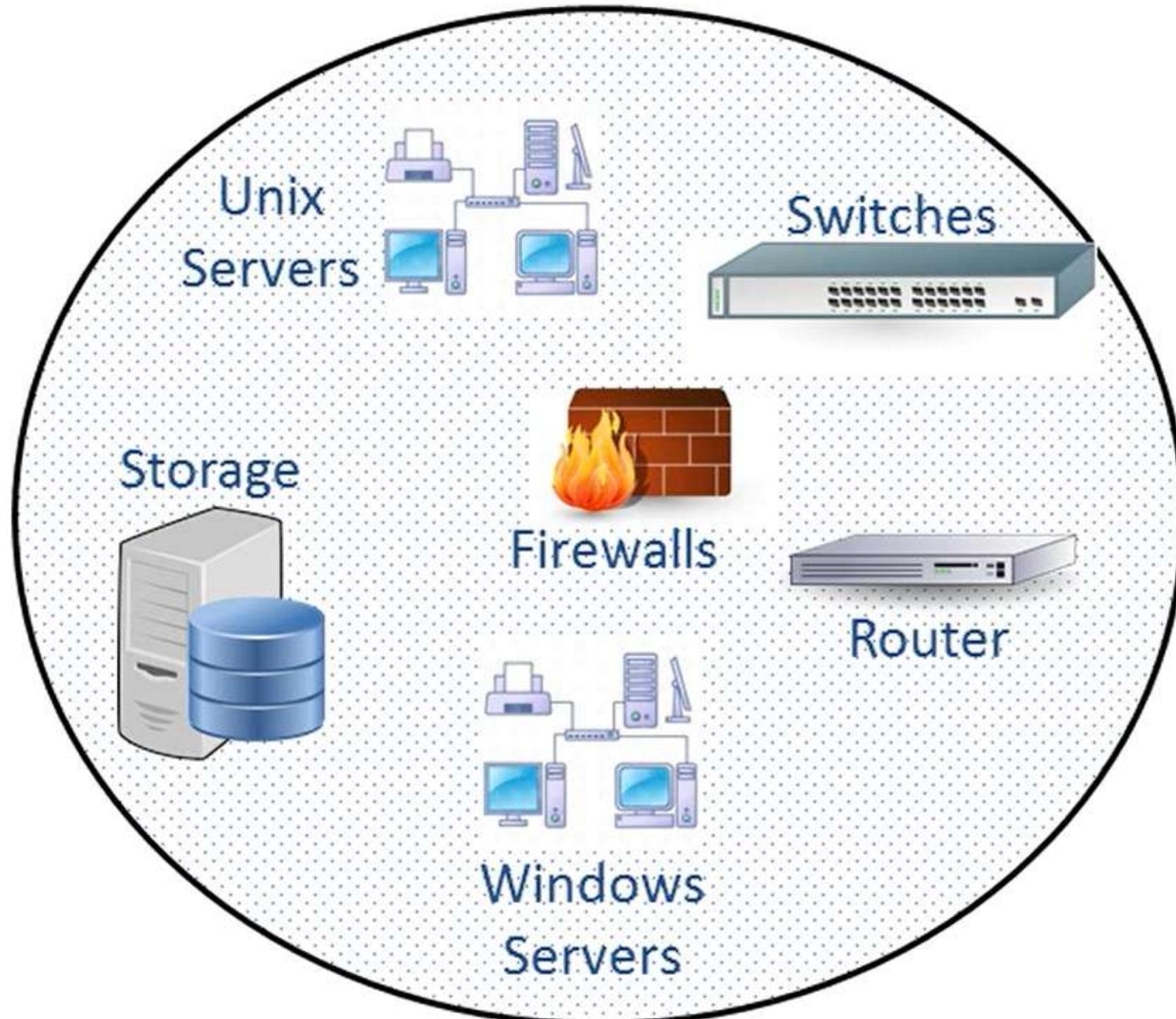
Cloud computing is a method in which dynamically scalable and virtualized resources are provided as a service over the Internet.



- Instead of running the application on-premise, they run on shared datacenter
- Cost less
- Pay as go

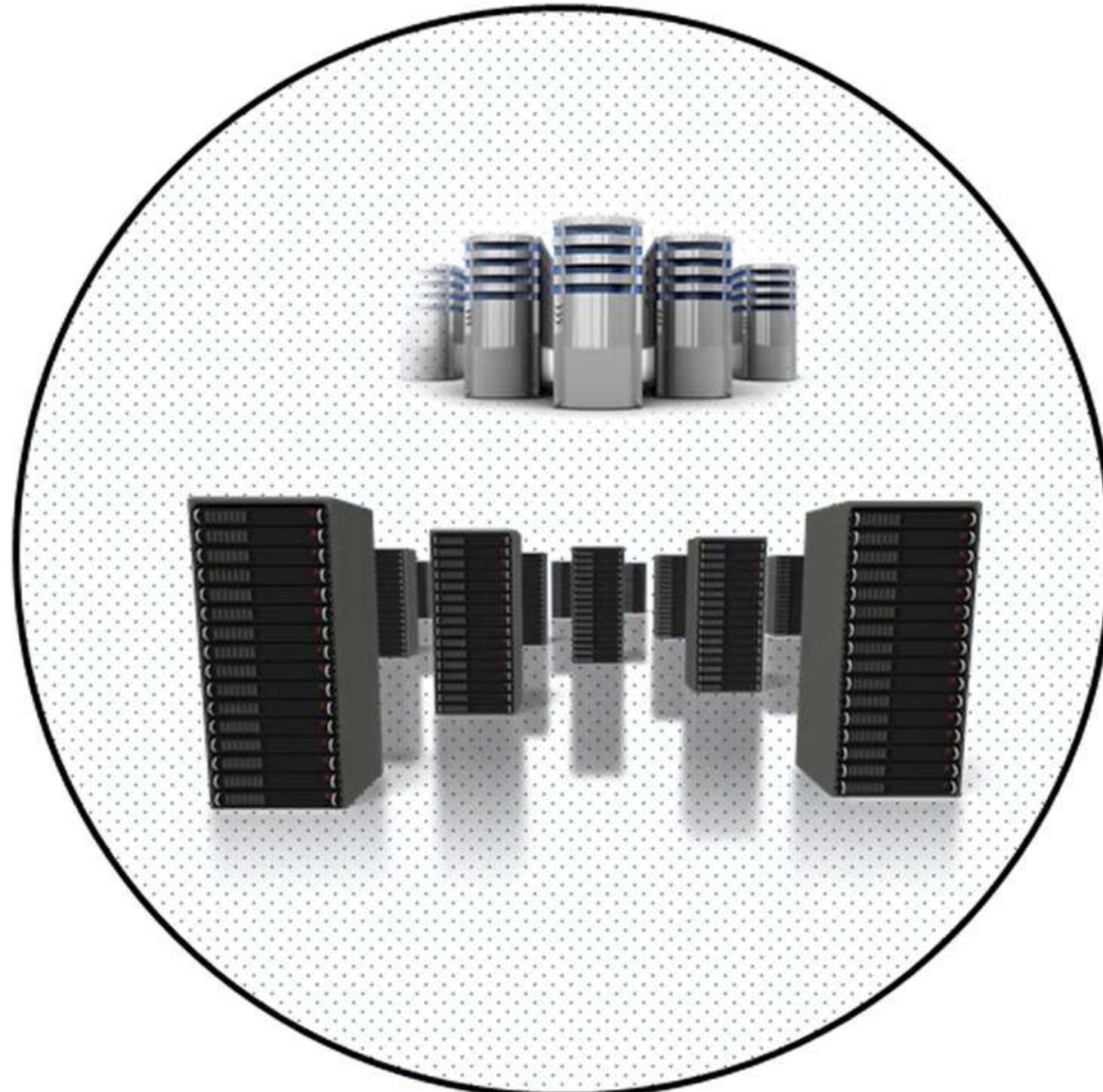
Technology roadmap to cloud computing

Complex infrastructure sprawl – On premise



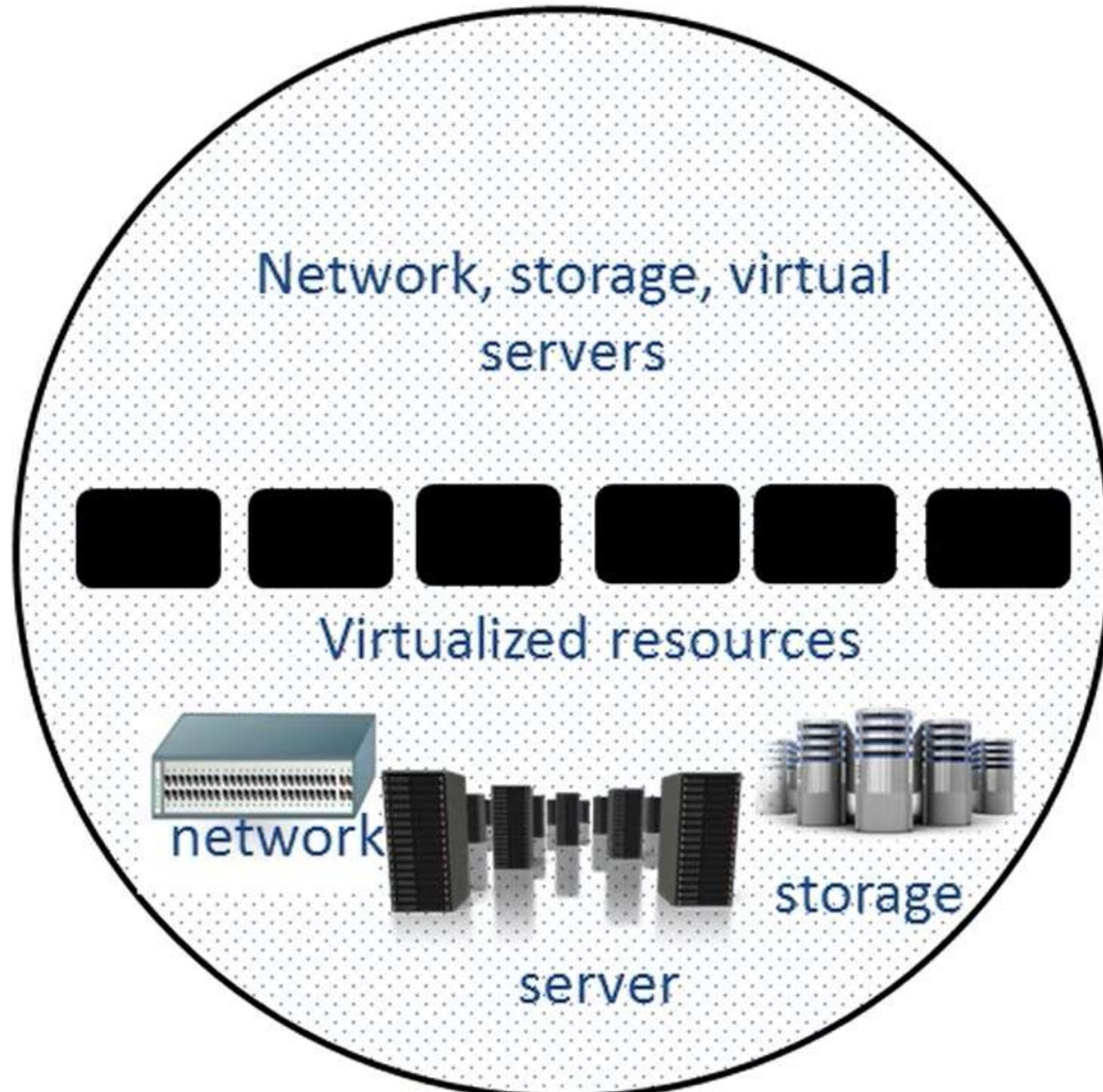
- IT assets & datacenters kept growing
- Inconsistent processes
- Soaring IT and energy costs
- Desperate system tools

Physical consolidation – On premise



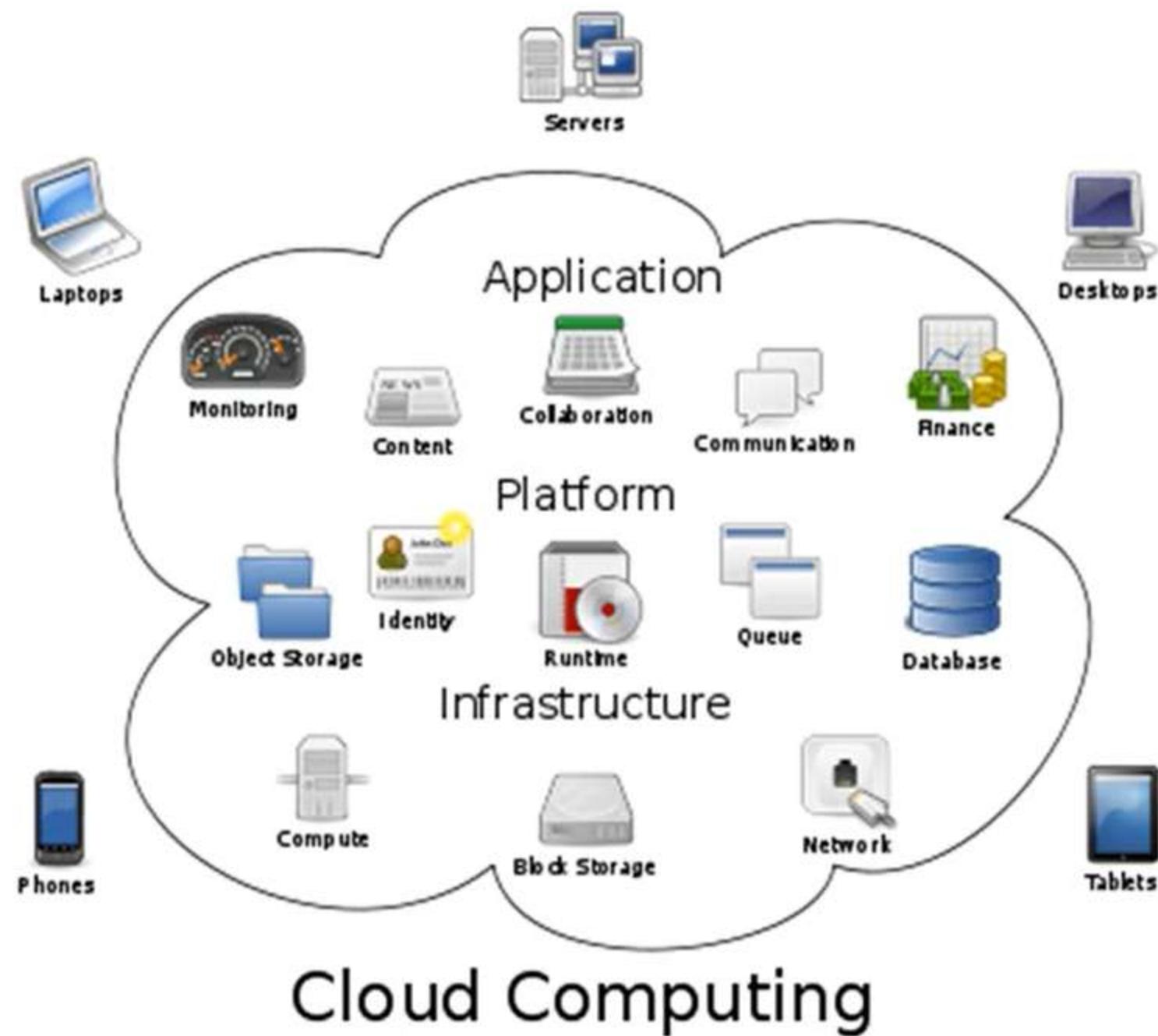
- Consolidate IT assets and datacenters
- Centralized management
- Streamline process – ITIL best practices
- Phase out inefficient HW – Energy and cost saving

Virtualization – On premise



- Virtualized Infrastructure – Better resource utilization
- Unify Virtual and physical management
- Resource sharing
- Energy and cost saving

Cloud



- Service oriented architecture
- Rapid provisioning of IT resources
- Dynamically scaling
- Energy saving by auto workload distribution
- Pay as you go

Types of cloud computing

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Summary



In this session you learnt about

- Introduction to Cloud Computing
- Types of cloud computing

INFRASTRUCTURE AS A SERVICE (IAAS)



Objectives

In this session you will learn about,

- Infrastructure as a Service



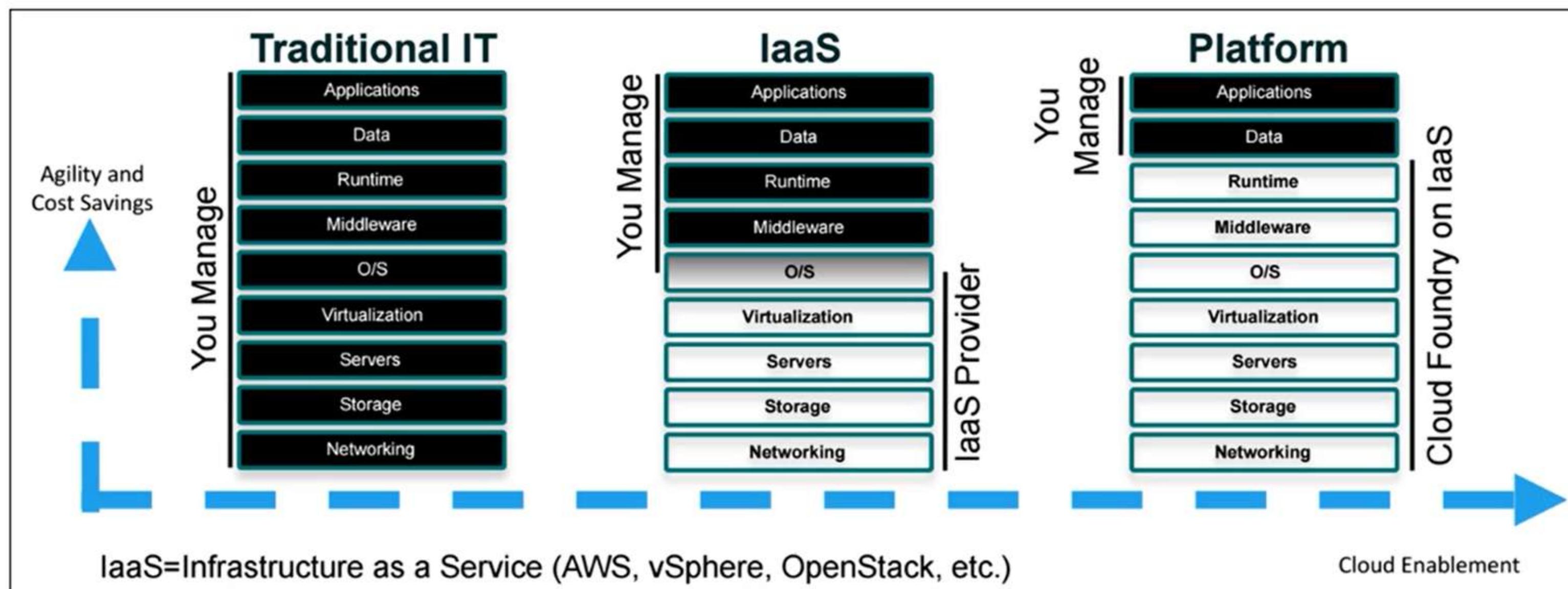
What is Infrastructure as a Service?

IaaS is one of cloud computing models wherein the customers outsource its IT infrastructure such as :

- Servers
- Networking
- Processing
- Storage
- virtual machines and other resources.
- Customers access these resources over internet



What is IaaS



Characteristics of IaaS

- Scalability and Elasticity

Customers can increase and decrease the infrastructure capacity as needed



Characteristics of IaaS

- Availability and Reliability
 - Resource accessible during failure of system
 - Regular backup of machine state



Characteristics of IaaS

- Manageability and Interoperability
- Customers should be able to control the resources allocated



Characteristics of IaaS

- Performance and optimization

Process of making a server work as effectively as possible



Characteristics of IaaS

- Accessibility and Portability

Accessible through web browsers without additional hardware or software installation



Examples of IaaS

- AWS EC2,
- Rackspace
- Google Compute Engine (GCE)
- Digital Ocean
- Magento 1 Enterprise Edition*.

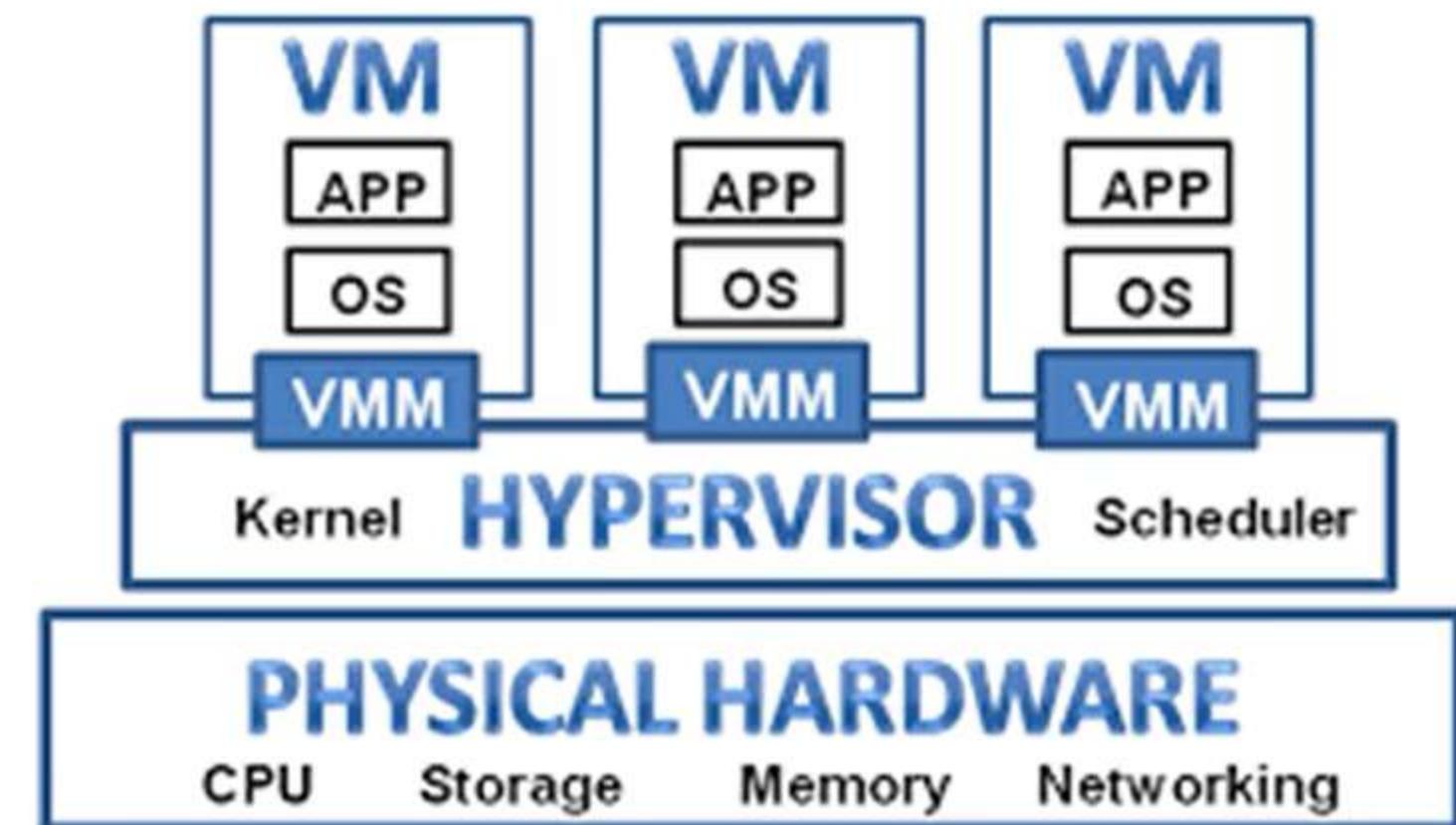


Amazon EC2

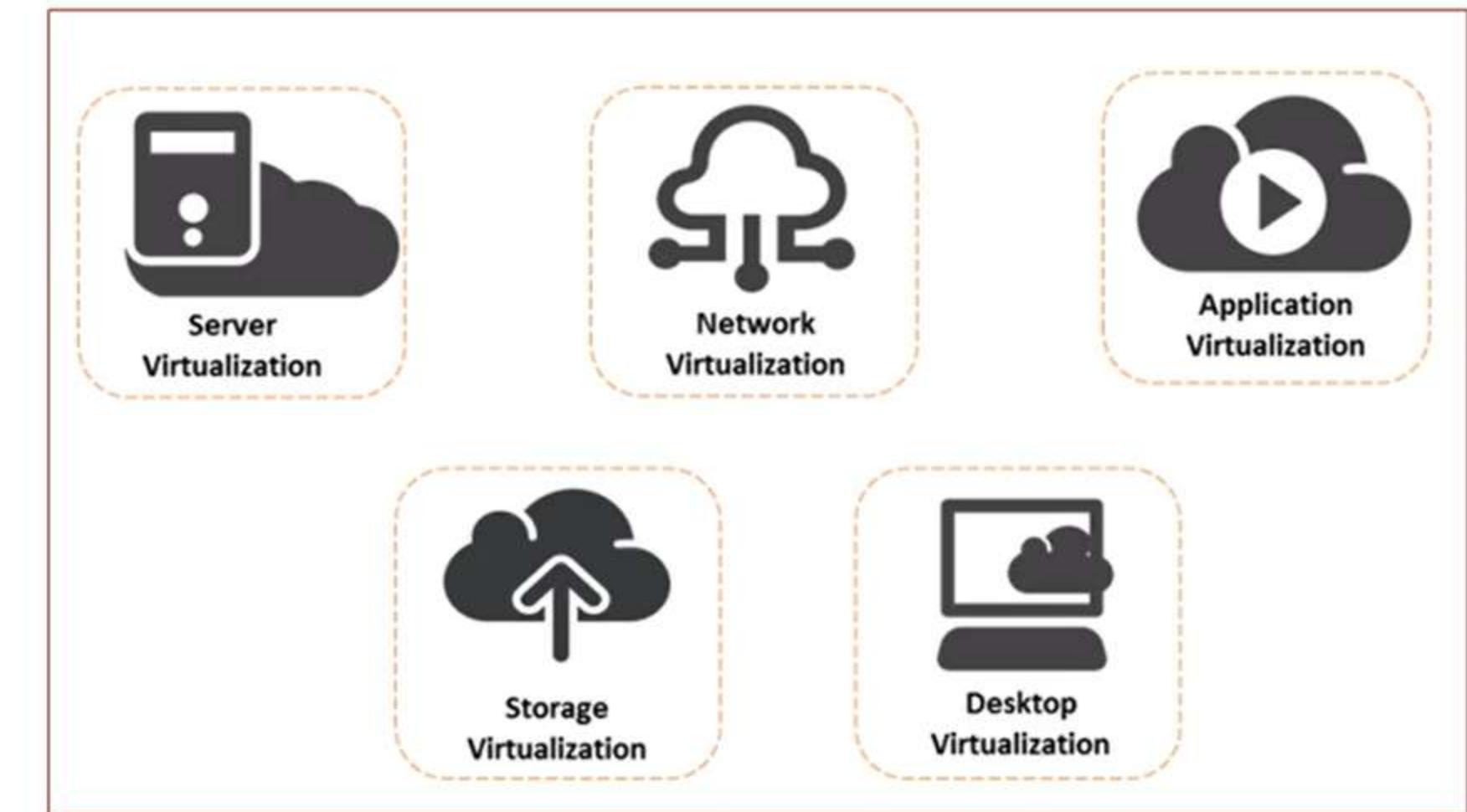
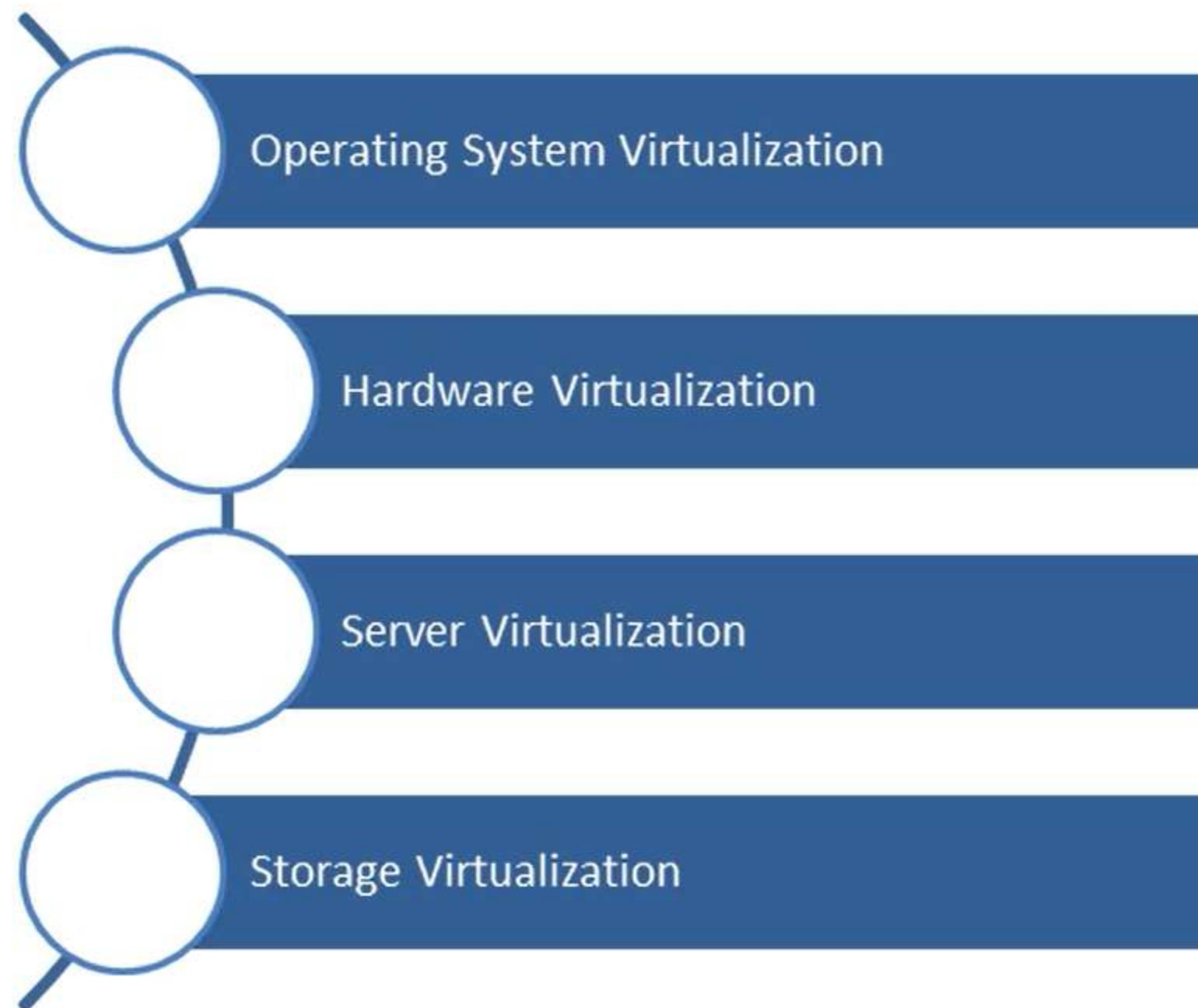


Virtualization in Cloud Computing

Virtualization means to create a virtual version of a device or resource, such as a server, storage device, network , etc.



Types of virtualization



Advantages of IaaS

- [] Cost Saving
- [] On-demand Scalability
- [] Flexibility
- [] Business Growth
- [] Reliability



Disadvantages of IaaS

Security



Lack of Flexibility



Technical Problems



Over Dependency



Upgrade & Maintenance



Virtualization Services & User-Privacy



Security considerations for IaaS

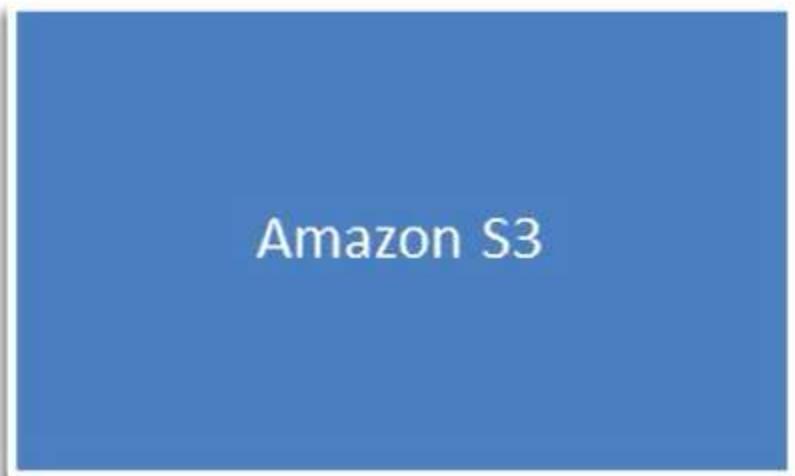
- Most cloud environments are characterized by shared responsibilities for security.
- IaaS client responsibility is much larger.
 - Controlling network access
 - Granting or denial of access at the server and service layer
 - Designing, implementing, maintaining and inspecting access control within the application
 - Implementing failover and other redundancy solutions.
 - Ongoing monitoring for access, security and availability



Cloud Storage



Popular Cloud Storage Options



Advantages of Cloud Storage

- Companies only pay for the storage they use
- The data is quickly accessible and reliable.
- Better protection in case of a disaster
- Cloud vendors provide hardware redundancy
- Virtually limitless storage capacities
- Workload balance
- A unified view of storage

Disadvantages of Cloud Storage

- Immaturity.
- Price and Reliability
- Security
- Bandwidth limitations
- Network Distance (Latency)

Summary



In this session you learnt about

- Infrastructure as a Service (IaaS)

PLATFORM AS A SERVICE(PaaS)



Objectives

In this session you will learn about,

- Platform as a Service(PaaS)

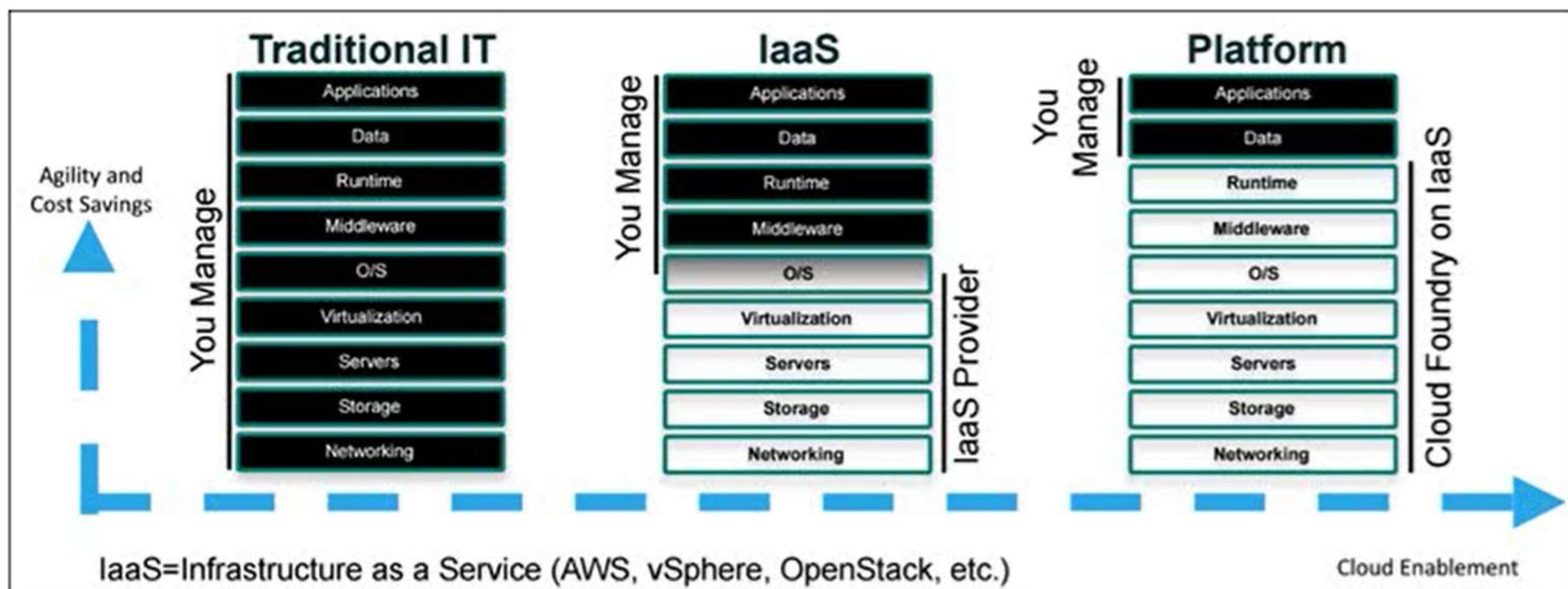


What is PaaS

- Provides a framework for developers to deploy their application without worrying about the underlying infrastructure.
 - All the infrastructure is managed for you
 - Enables businesses to build and run web-based, custom applications in an on-demand fashion
- Eliminates the complexity of **selecting, purchasing, configuring, and managing** hardware and software, Dramatically decreases upfront costs



What is PaaS



PaaS Characteristics

- Multi-tenant architecture
- Built-in scalability of deployed software
- Integrated with web services and databases
- Users are provided with tools to simplify creating and deploying applications
- Simplifies prototyping and deploying start up solutions
- Users only pay for services they use
- More fine grained cost model
- Provides tools to handle billing and subscription management

What is PaaS

Standalone Application Platforms

Typically built on top of an existing IaaS

Provides development tools for designing and deploying software

Provide all required computing resources and services needed for hosted applications

Open-Computing Platforms

Not tied to a single IaaS provider

Goal is interoperability and supporting open source platform tools

Supports applications that are written in numerous languages and that use any type of database, operating system, and server

E.g. Cloud Foundry, Red Hat OpenShift etc.

Google App Engine

- PaaS for developing and hosting web applications in Google-managed datacenters
- Easy to build, maintain, and scale applications
- No servers to maintain or configure by yourself
- Upload & Go
- Supported languages – Python, Java, PHP, Go etc



App Engine

Windows Azure App Service

- Hybrid PaaS & IaaS cloud platform
- Designed more for enterprise applications
- Programming languages – .NET, Java, PHP, Node.js, Python, or Ruby
- Datastores – Azure SQL database and NoSQL storage



AWS Elastic Beanstalk

Languages: Java, .NET, PHP, Node.js, Python, Ruby, Go

Platforms: Docker, Apache, Nginx, Passenger, and IIS

Automatically handles deployment, capacity

provisioning, load balancing, auto-scaling, application health monitoring

More manual control available (and required)



AppScale

- Open-Source framework
- Supports Google App Engine Applications
- Supports MySQL Clusters, HBase, Hyper table, and Apache Cassandra
- Python, Go, and Java applications



Cloud Foundry

- An open Cloud Native Platform (PaaS)
- Fast and easy to build, test, deploy & scale apps
- Works with any language or framework
- Available as open source, commercial distributions or hosted offerings
- Cloud Foundry is ideal for anyone interested in removing the cost and complexity of configuring infrastructure for their apps.



IBM Cloud (PaaS) offerings

- DevOps - From development to deployment
- Big Data - Harness the power
- Mobile - Quickly get started with your next app
- Watson - Enable building cognitive apps
- Business Analytics - Powerful analytics made easy
- Data Management - Agile data mgmt. & refinement
- Web and Application - Deliver new web and mobile apps
- Security - Build security into application design
- Internet of Things - A new generation of apps
- Integration - Extend existing investments and infrastructure

Developer experience

- Rapidly deploy and scale applications in any language
- Compose applications quickly with useful APIs and services and avoid tedious backend config
- Realize fast time-to-value with simplicity, flexibility and clear documentation



Built on a foundation of open technology.

Enterprise capability

- Securely integrate with existing on-prem data and systems
- Choose from flexible deployment models
- Manage the full application lifecycle with DevOps
- Develop and deploy on a platform built on a foundation of open technology

OpenShift

- The open source PaaS from RedHat
- OpenShift runs on top of OpenStack
- Companies can deploy OpenShift on top of their infrastructure
- OpenStack is the infrastructure and OpenShift is the platform that run on top of it
- This analogous to Apache and MySQL that run on top of a Linux machine



PaaS Advantages

- User does not have to manage low level computing resources and services
- Many services ready to use in a plug-in fashion without any configuration or setup
- Provider handles most of the non functional requirements of your applications
- Scaling is automatically managed by the platform
- Easier and Agile application deployment
- Lower costs
 - ✓ Pay for only what is used
 - ✓ More fine-grained cost model than in IaaS
- Platform provider has the best knowledge to optimize the services running on the underlying hardware



PaaS Disadvantages

- **Not in full control over**
 - Computing resources (Intel vs AMD, GPU's, FPGA, ...)
 - Software and library versions
 - Service configuration
- **Available programming languages are often limited**
- **Offered services may not be flexible enough for user needs**
- **Have to fully trust in the PaaS provider**
 - Billing accuracy
 - Security
 - Reliability
 - Data ownership



SOFTWARE AS A SERVICE (SaaS)



Objectives

In this session you will learn about,

- Software as a Service (SaaS)



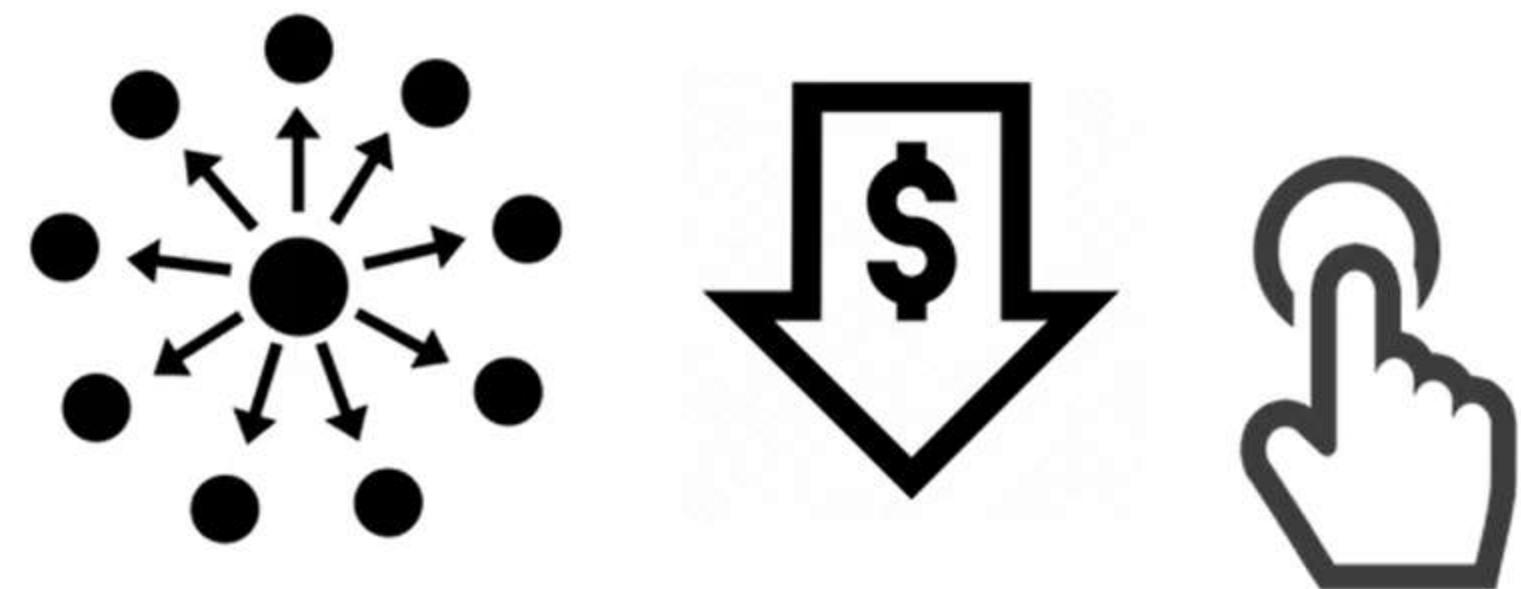
What is SaaS?

Software as a service is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.



Advantages Of Software As A Service (SaaS)

- Reduced time to benefit
- Lower costs
- Scalability and integration
- New releases (upgrades)
- Easy to use and perform proof of concepts



Examples Of Software As A Service (SaaS)

- BigCommerce,
- Google Apps,
- Salesforce,
- Dropbox,
- MailChimp,
- ZenDesk,



User Benefit

- Lower Cost of Ownership
- Focus on Core Competency
- Access Anywhere
- Freedom to Choose (or Better Software)
- New Application Types
- Faster Product Cycles

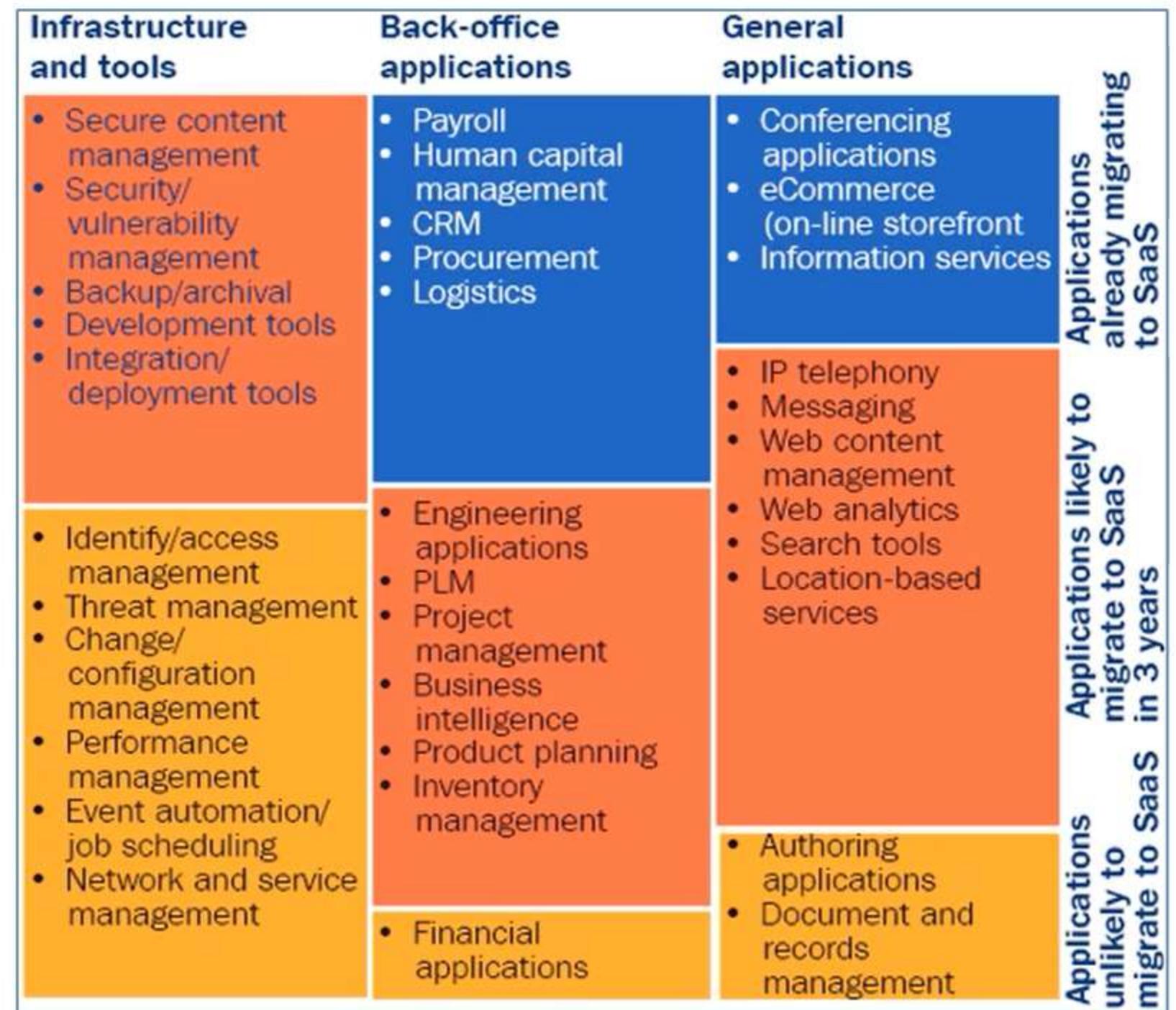


Vendor Benefits

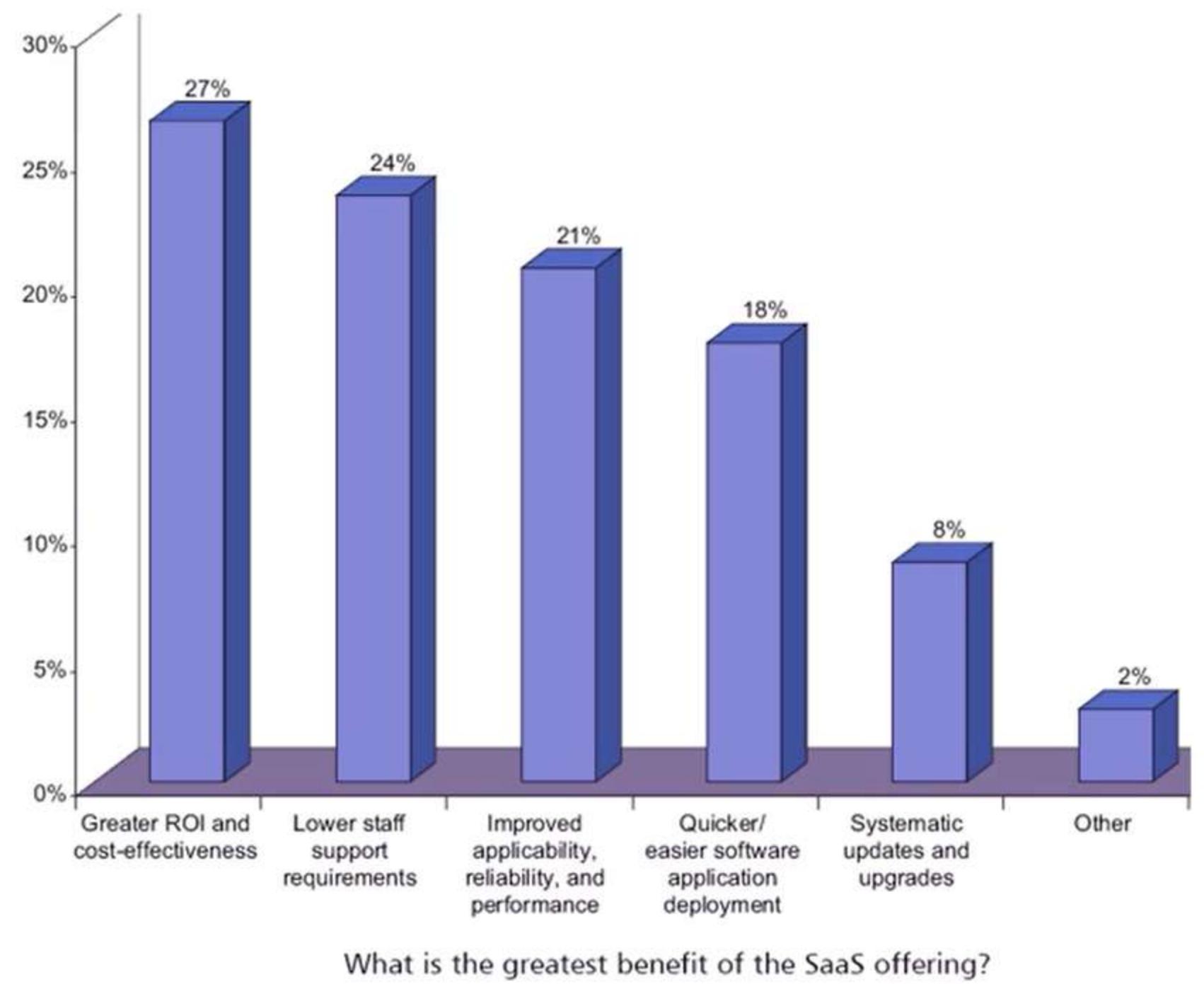
- Increased Total Available Market
- Enhanced Competitive Differentiation
- Lower Development Costs & Quicker Time-to-Market
- Effective Low-Cost Marketing
- Predictable MRR Revenue
- Improved Customer Relationships
- Protecting of IP



SaaS Adoption By Segment – Enterprise



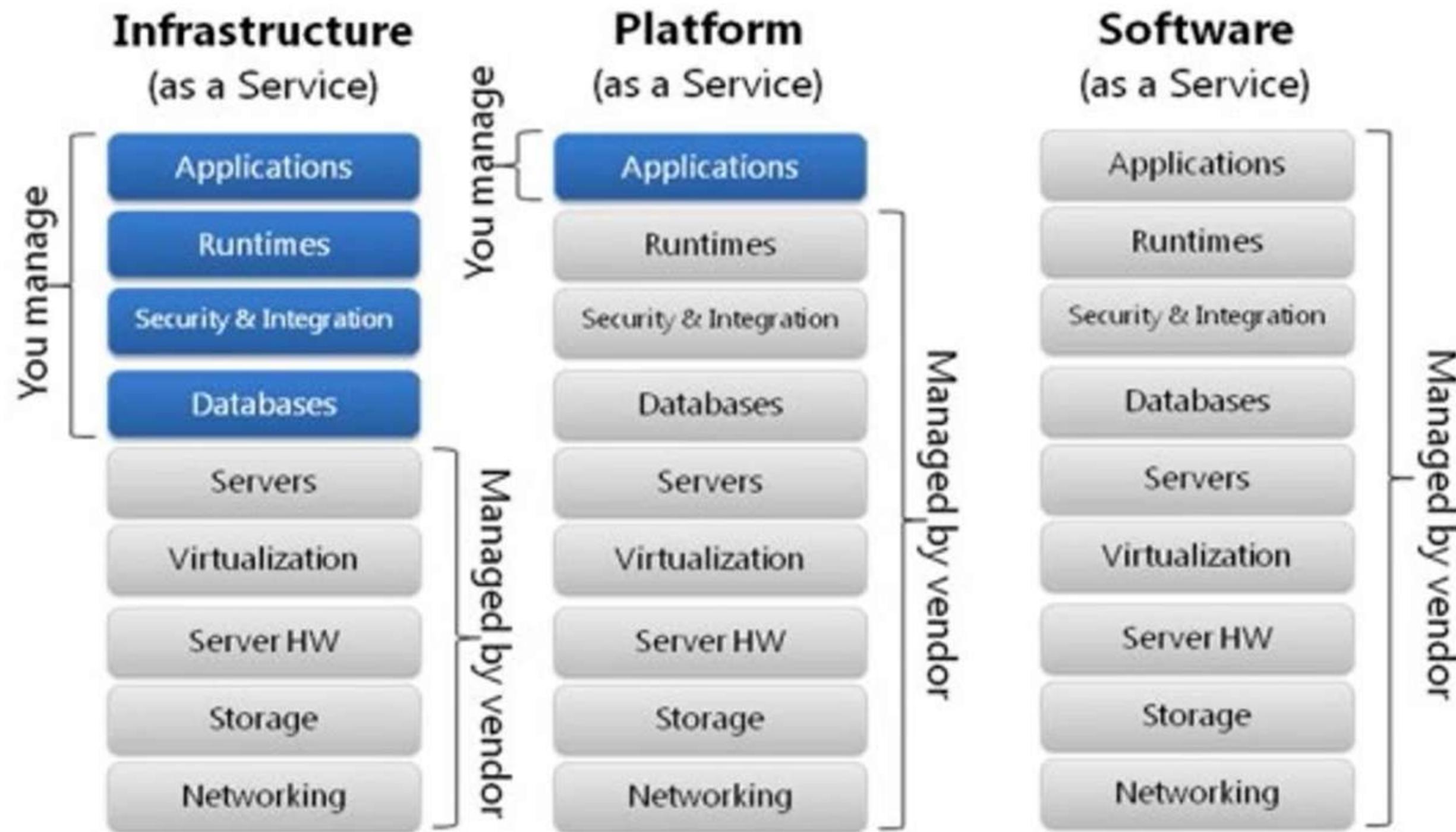
Why Going SaaS ?



Disadvantages of SaaS

- Inadequate data Security
- Low performance
- Lack of control
- Difficult with Regulation and compliance
- Limited applications

Comparison Between IaaS/PaaS/SaaS



Summary

In this session you learnt about

- Software as a Service (SaaS)

DEPLOYMENT & CLOUD NFRS



Objectives

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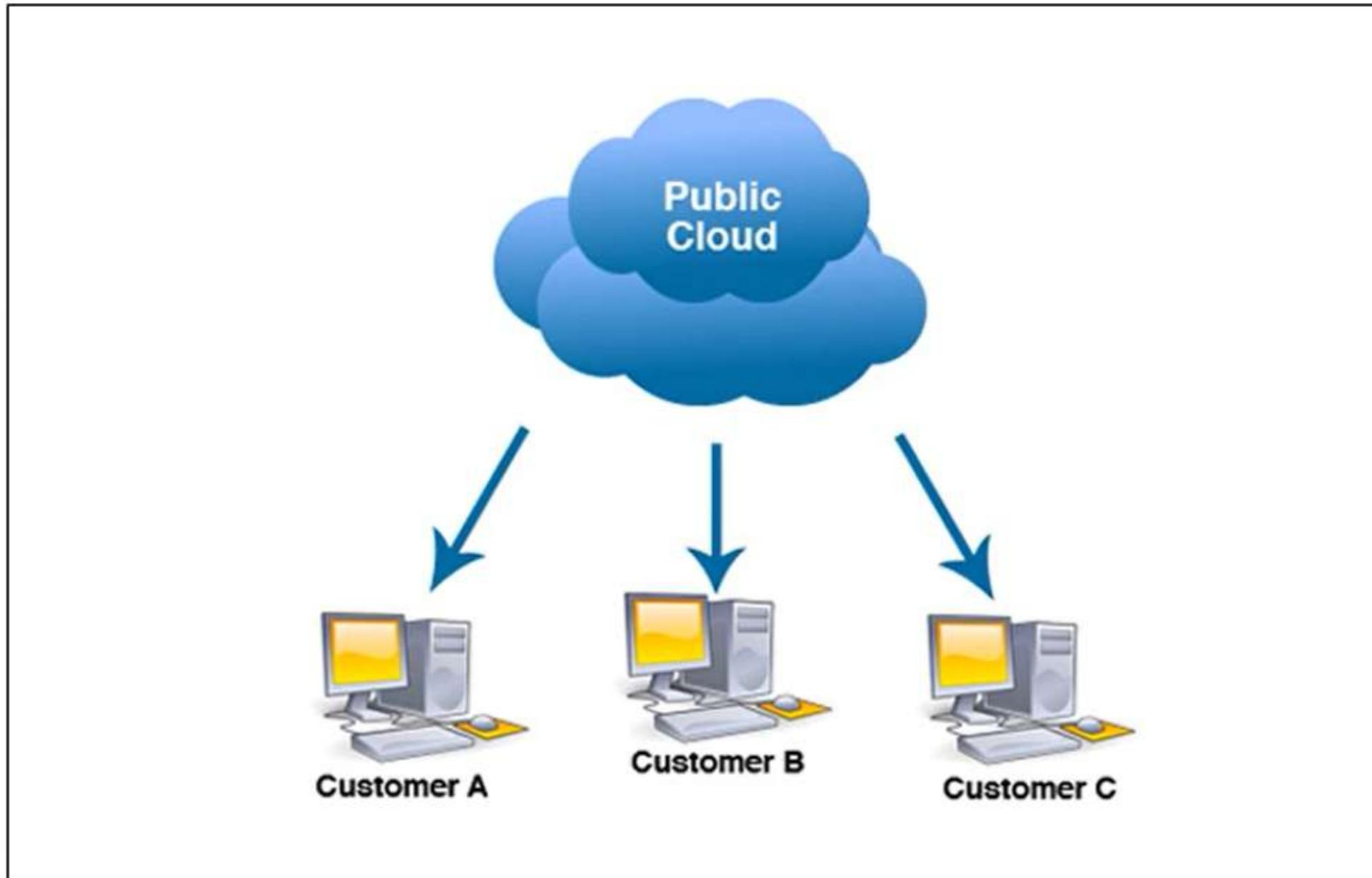
- Deployment & Cloud NFRS



Private Cloud



Public Cloud



In this model, the infrastructure is accessible to the public and it is owned by a vendor, who offers the services of the cloud to the users.

Hybrid Cloud



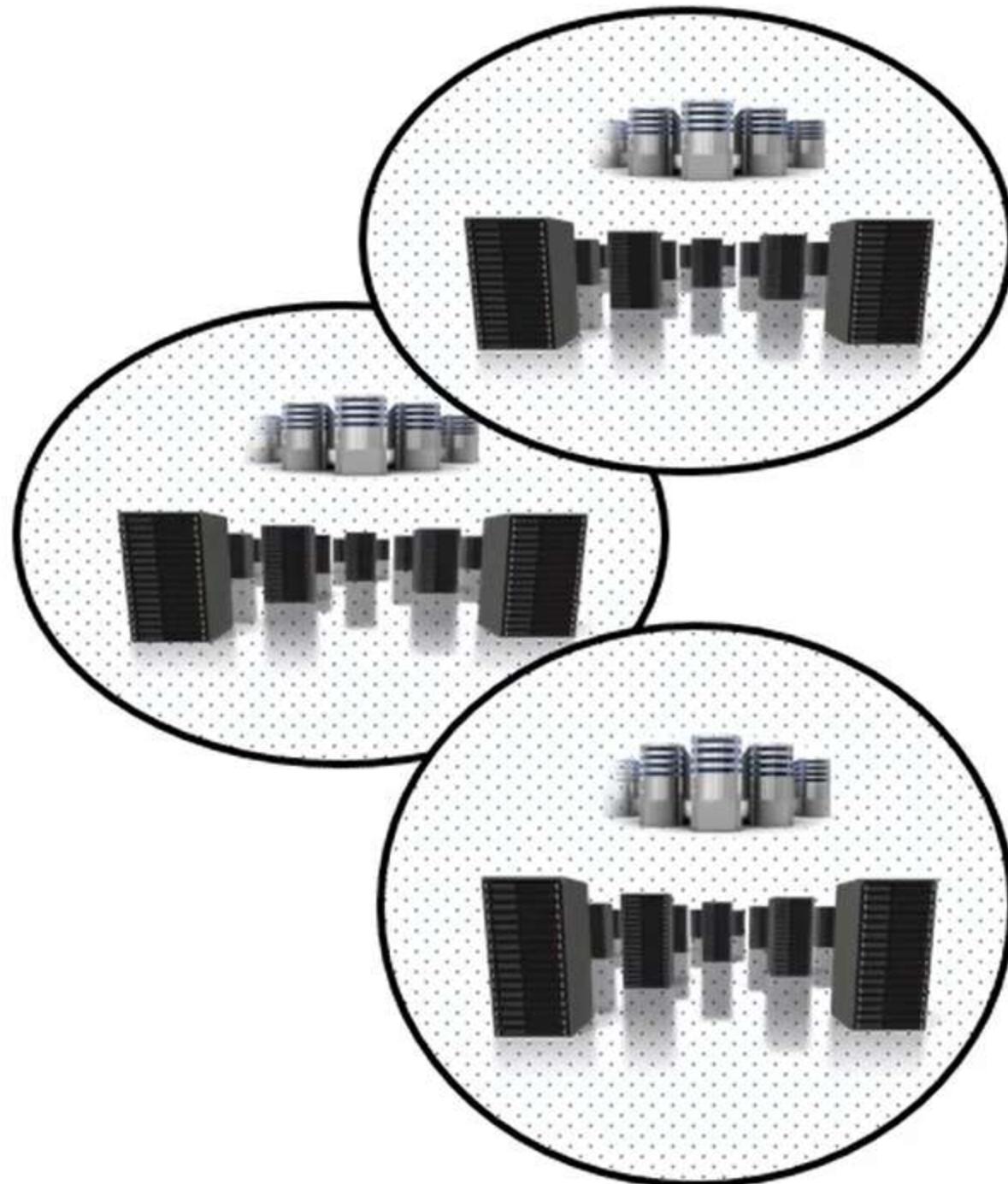
The Hybrid Cloud deployment model comprises of two or more clouds. This can be a combination of the other three cloud types – public, private, or community.

Reliability and Availability

Availability Zone

Each Availability Zone is:

- Made up of **one or more** data centers
- Designed for **fault tolerance**
- Availability zones within the region are interconnected



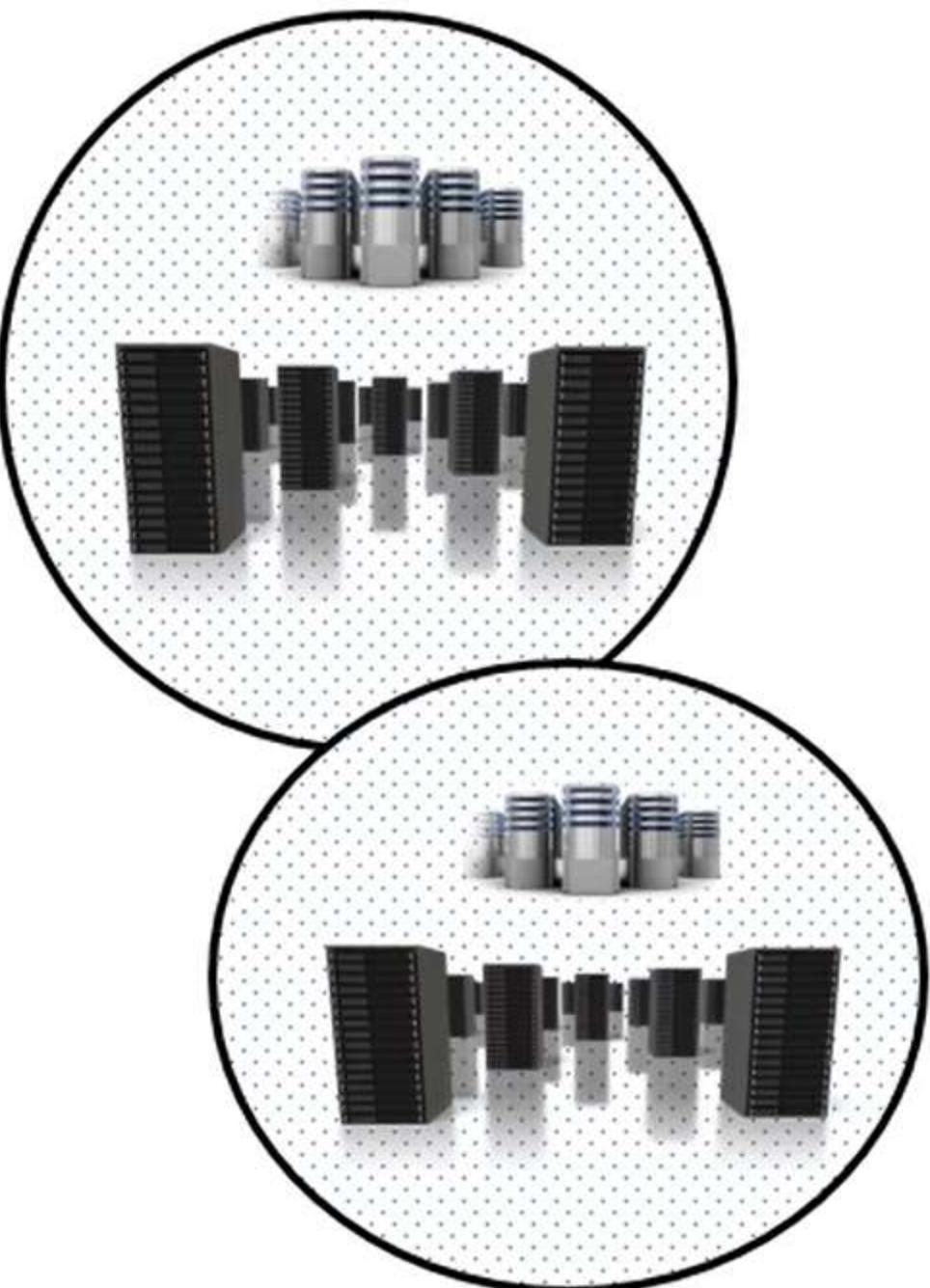
Region

Each AWS Region is made up of **multiple Availability Zones**.



Inbuilt-Failover

- A single data center typically houses tens of thousands of servers
- In case of failure – Automated processes move customer data away from affected area

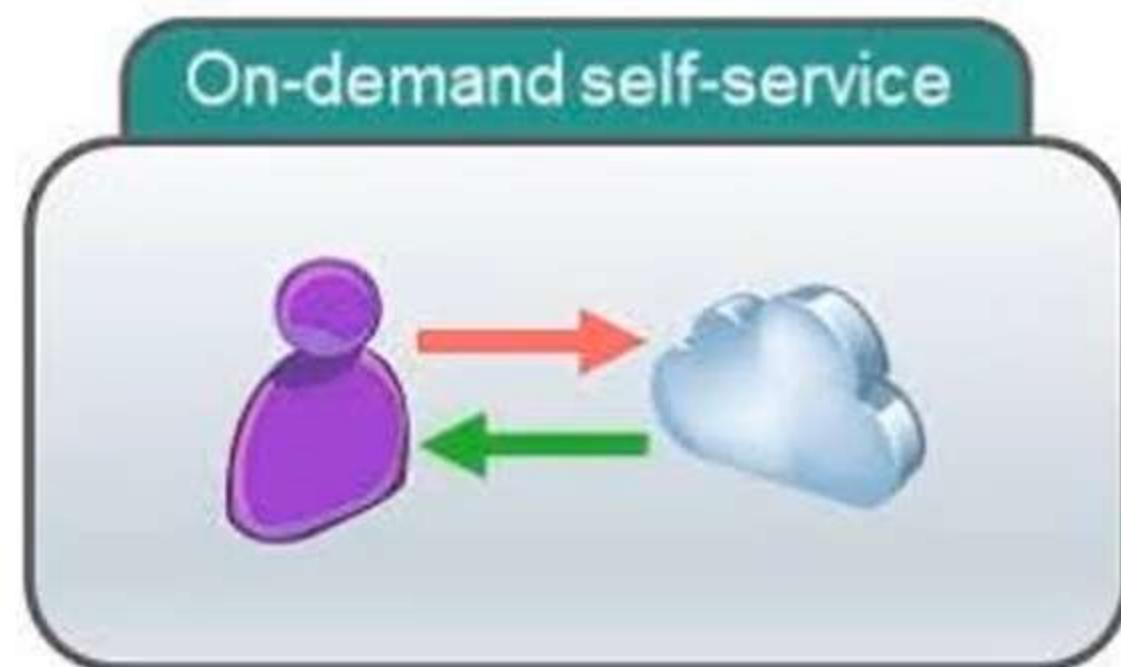


Benefits of Cloud Computing

On-Demand

Provides On-demand self-service

- Computing power
- Storage
- Networks
- Software's



Broad Network Access

Broad network access via

- Tablets
- PC's
- Macs
- Smartphones



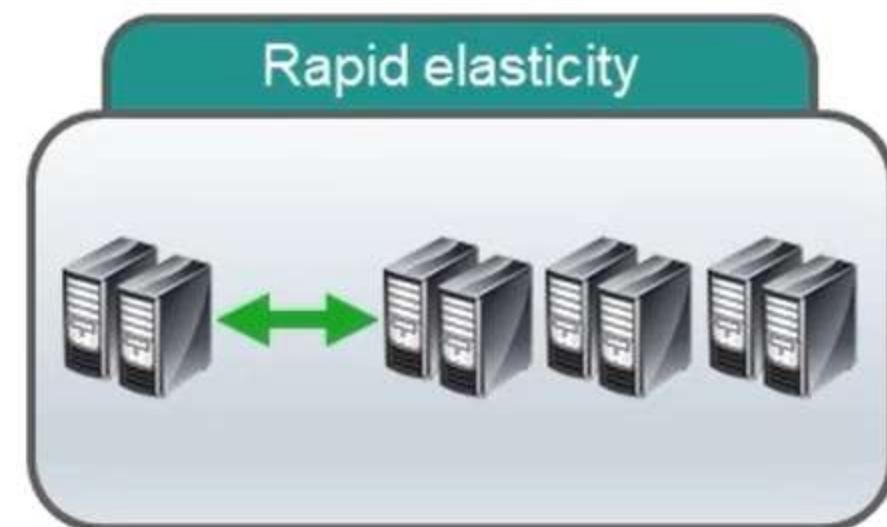
Resource Pooling

- Modern scalable systems involved
- Providers can create resources immediately
- Change level of service



Rapid Elasticity

- Allow users to automatically request for additional resources
- Provisioning can be seamless for the user
- Users can allocate and de-allocate the resources



Measured Service

- Billing
- Effective use of resources
- overall predictive planning



Reduce IT Cost

- Maintaining your IT Systems
- Procuring Expensive systems
- Procuring Expensive equipment
- System upgrades



Scalability

- Scale up and down your operation depends upon the needs
- Procuring and installing based on the needs



Business Continuity

- Protection of data and systems
- Protection from Natural Disaster
- Protection from Power failure
- Other Crisis



Collaboration Efficiency

- Working from different location
- Share the same files across the globe to the employees



Access To Automatic Updates

- Updates for your IT requirements
- Up to date software versions



Common Risks of Cloud Computing

- **The impact on a business return on investment (ROI)**
 - Cost assessment of owning a software to leasing needs to be considered before migrating to cloud.



Common Risks of Cloud Computing

- **Compatibility**
 - Migration across cloud providers or from on premises
 - As per companies Security requirements /Organization policies



Common Risks of Cloud Computing

- Trust
 - Outages from service provider
 - 24/7 support



Common Risks of Cloud Computing

- **Confidentiality**
 - First priority for data protection
 - Not sharing the data with external party



Common Risks of Cloud Computing

- **Compliance**
 - Risks involved in existing policies
 - Contractual obligations



Common Risks of Cloud Computing

- **Security**
 - Data security
 - Data access permissions



Common Risks of Cloud Computing

- Lack of control over performance
 - System quality may be inadequate
 - No direct access to infrastructure



Common Risks of Cloud Computing

- **Lack of control over quality**
 - Mitigated by careful planning and attention during SLA
 - Lack of ownership of data and resources



Need for Global Deployment (Reduced Latency and Increased Redundancy)



- **Latency:**
 - Low latency is critical for interactive networked applications.
 - Even slightly higher web page load times can significantly reduce visits from users and revenue, as demonstrated by several sites

Need for Global Deployment (Reduced Latency and Increased Redundancy)



- **Latency to Redundancy:**
 - The overall latency is the minimum of the delays across each query, thus potentially reducing both the mean and the tail of the latency distribution.
 - Powerful technique to reduce latency is redundancy
 - The goal of redundancy is to prevent or recover from the failure of a specific component or system.

Need for Global Deployment (Reduced Latency and Increased Redundancy)



- **Global Deployment**
 - Multi Zonal support to achieve redundancy.
 - Deploying across regions to achieve multiple deployment for fail over.
 - Multiple regional support have HA and DR

Securing App in Cloud

Few basic security concepts, including **authorization**, **auditing**, **confidentiality**, and **integrity**.

- **Authorization** addresses the question, what are you authorized to do?
- **Auditing and logging** guarantees that a user cannot deny an operation or initiate a transaction without the activity being recorded.
- **Confidentiality**, or privacy, is the process of making sure that your data remains confidential.
- **Integrity** is the guarantee that data is protected from accidental or malicious modification.

Securing App in Cloud

Three ways to make your public cloud applications more secure.

1. Focus on the data

- Platform Level
- Data Base Level
- The application Level

Securing App in Cloud

2. All about Identity

- IAM ensures that access privileges are granted according to policy set by both the developers and security administrators.
- IAM systems include APIs that you can use for such things as rechecking that the user is authorized to access the application, the platform, the services, and the data.

Securing App in Cloud

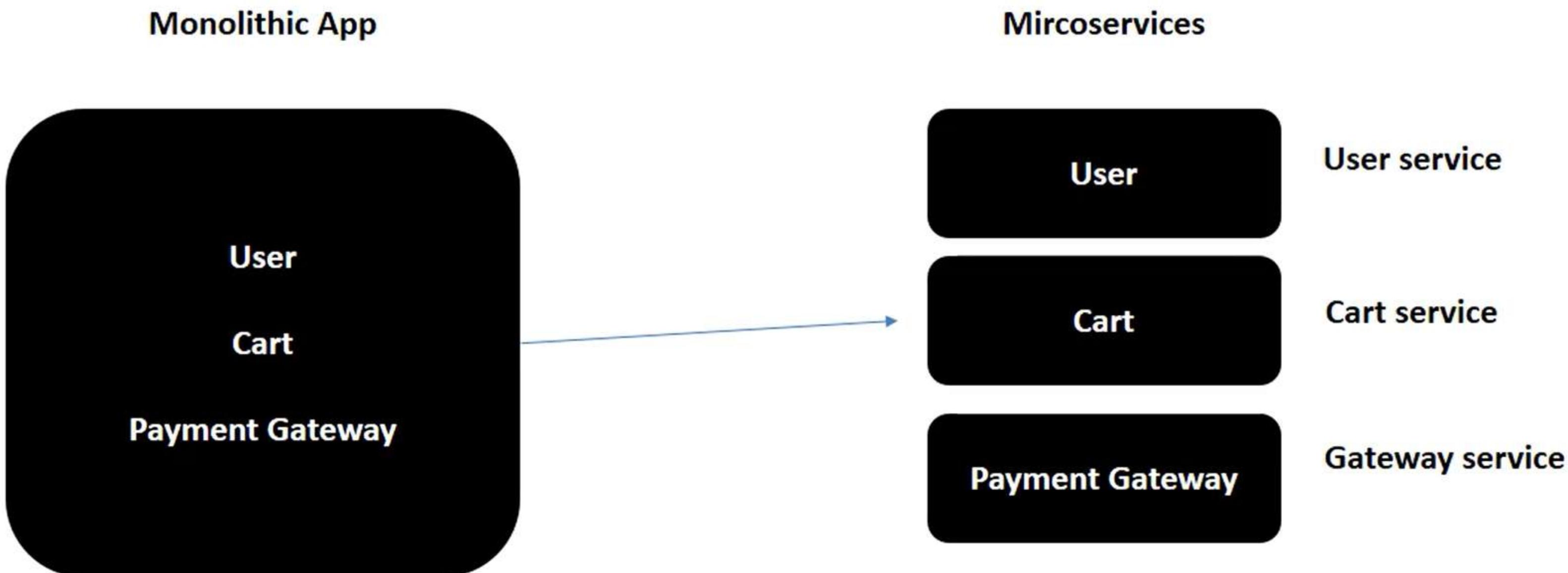
3. Move from DevOps to DevSecOps

- DevSecOps means that when you do continuous testing, you include continuous security testing as well.
- DevSecOps will vary greatly depending upon your applications, your industry, and the brand of public cloud on which you deploy.

New Paradigm of Application Architecture

Microservices

Independent services of an application that communicate over well-defined APIs

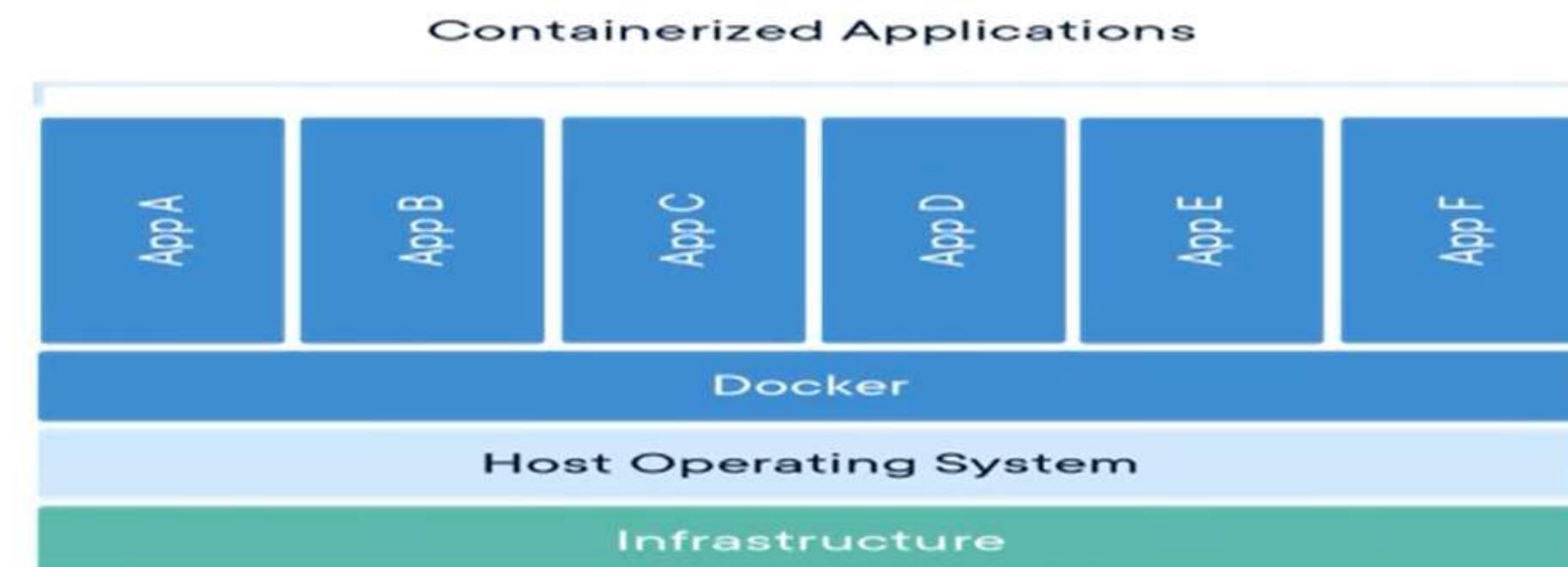


Twelve Factors

1. Codebase - One codebase tracked in revision control, many deploys
2. Dependencies - Declared and isolated
3. Config - Store config in the environment
4. Backing services - Treat backing services as attached resources
5. Build, release, run - Strictly separate build and run stages
6. Processes - Execute the app as one or more stateless processes
7. Port binding - Export services via port binding
8. Concurrency - Scale out via the process model
9. Disposability - Maximize robustness with fast startup and graceful shutdown
10. Dev/prod parity - Keep development, staging, and production as similar as possible
11. Logs - Treat logs as event streams
12. Admin processes - Run admin/management tasks as one-off processes

Containers

Operating system virtualization that allow you to run an application and its dependencies in resource-isolated processes



Containers Orchestration

- Automating deployment, scaling and the management of containerized applications.

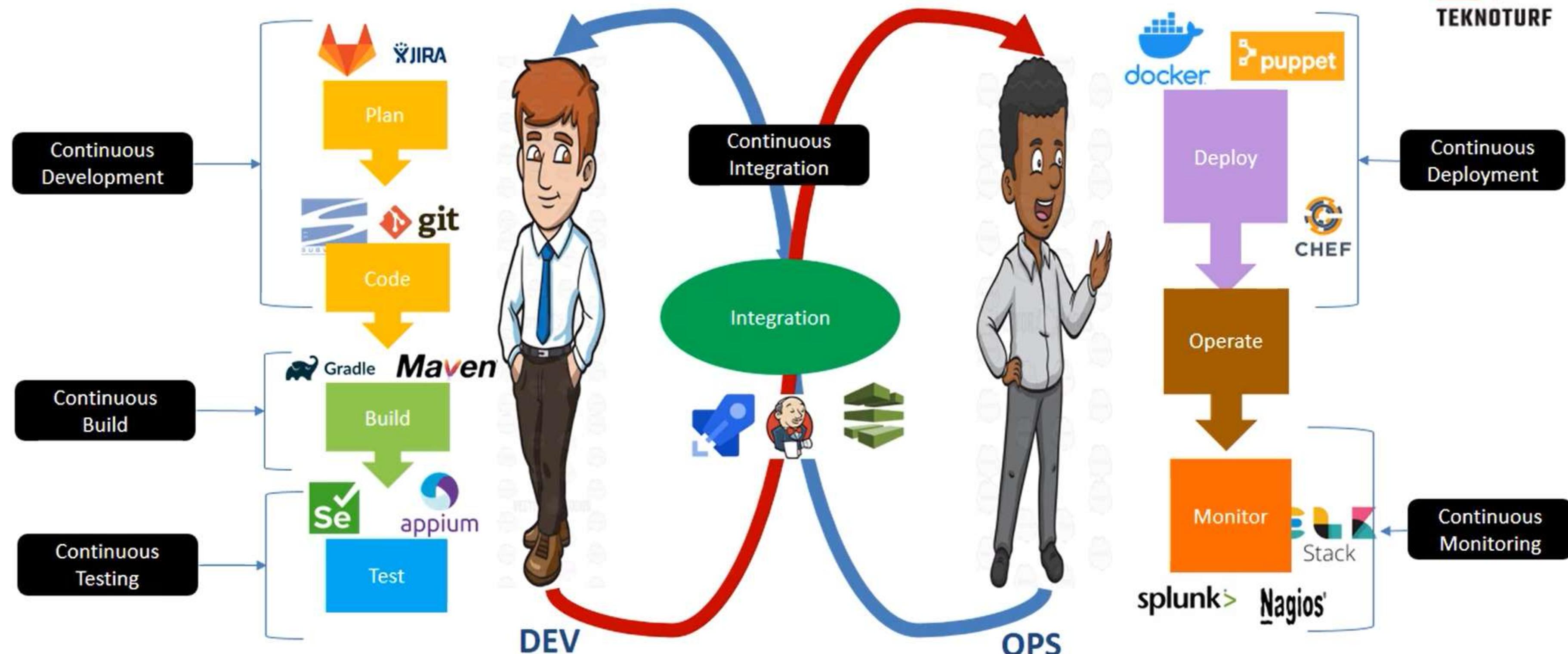


kubernetes



Amazon ECS

DevOps Cycle and The Tools



Automation of infrastructure

- Provides a common language to describe your AWS infrastructure
- Build resource automatically



AWS CloudFormation



Summary

In this session you learnt about

- Deployment & Cloud NFRS

CLOUD PROVIDERS



Objectives

In this session you will learn about,

- Cloud Providers



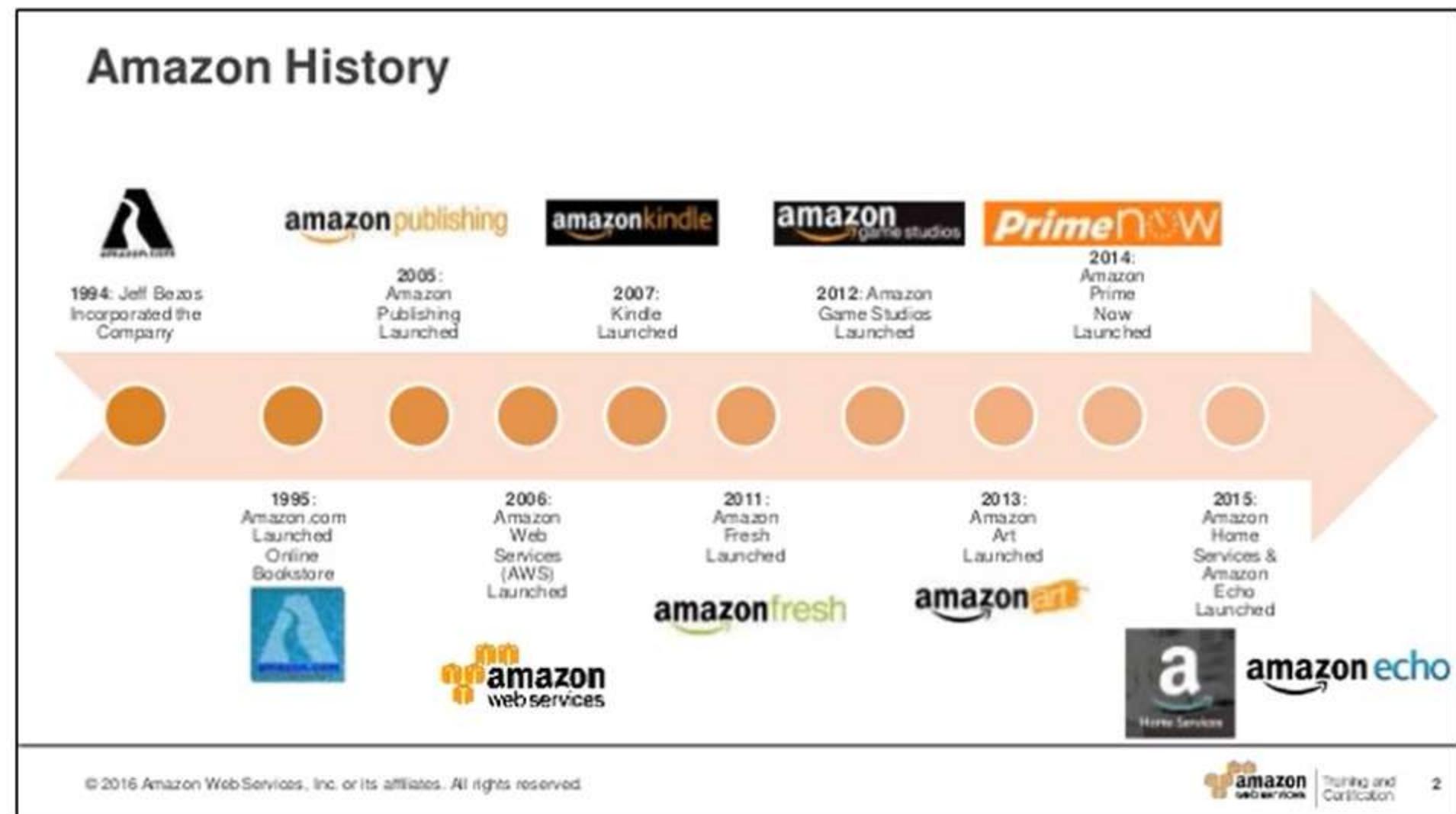
Common Services in Cloud

- Compute
- Database
- Storage
- Networking & Content Delivery
- Containers
- Application Integration
- Analytics
- Developer Tools
- Blockchain
- AR & VR
- Internet of Things
- Machine Learning
- Security, Identity, & Compliance

AWS (Amazon Web Services) is a comprehensive, evolving cloud computing platform provided by Amazon that includes a mixture of infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS) offerings.



What is AWS?



amazon.com was incorporated in 1994 as an online bookstore. amazon.com was an ecommerce company. started selling books online.
AWS was launched in 2006. Today AWS is one of best cloud provider in the world with highest market share.

AWS Services



AWS offers 200+ services including computing, storage, networking, database, application services, management, analytics, deployment, mobile, developer tools, and tools for the Internet of Things.

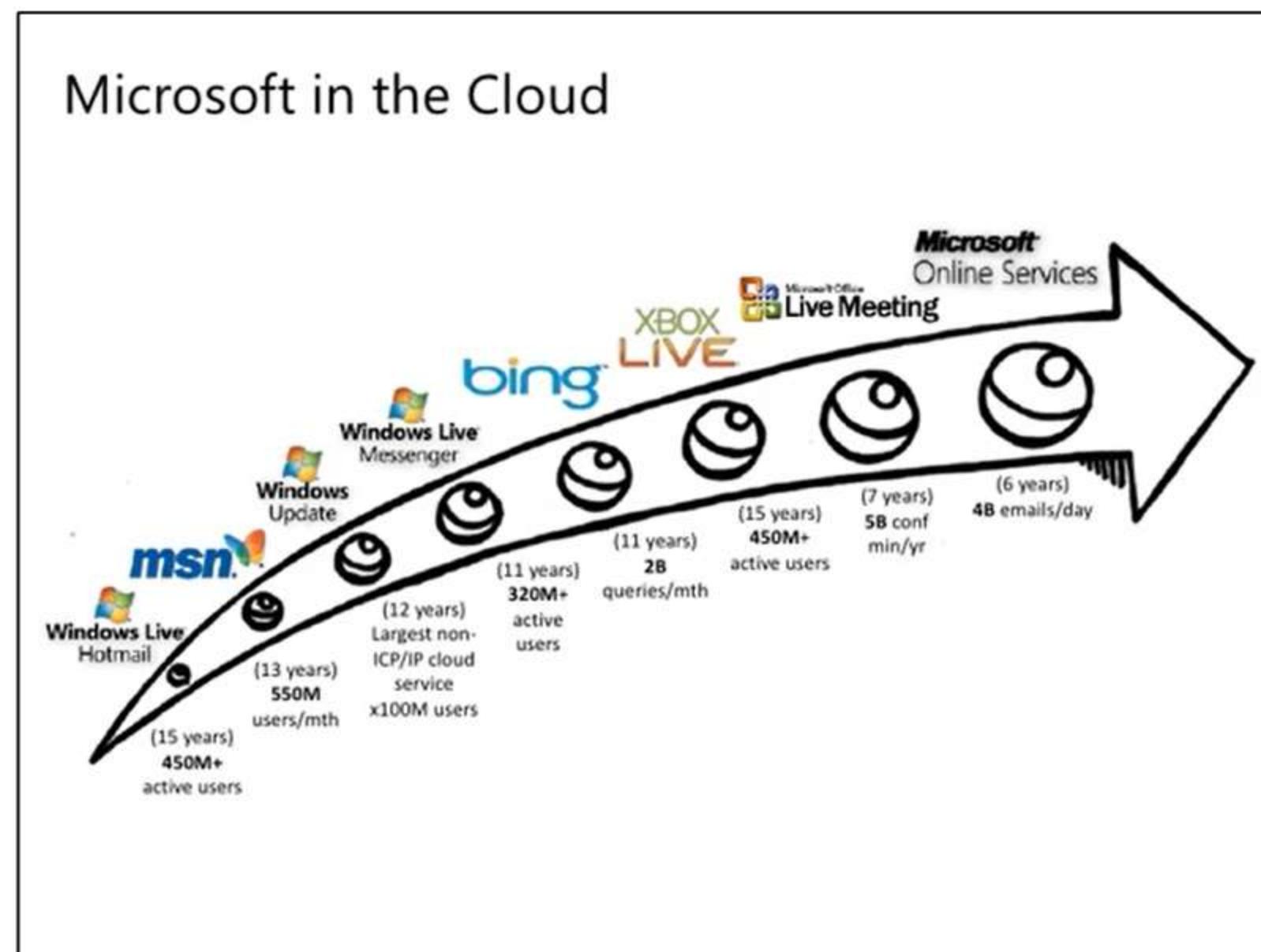
Microsoft Azure

[Azure](#), Microsoft's cloud computing platform, launched in February 2010. In addition to traditional cloud offerings such as virtual machines, object storage, and content delivery networks (CDNs), Azure offers services that leverage proprietary Microsoft technologies such as remote apps, cloud-hosted versions of common enterprise Microsoft solutions



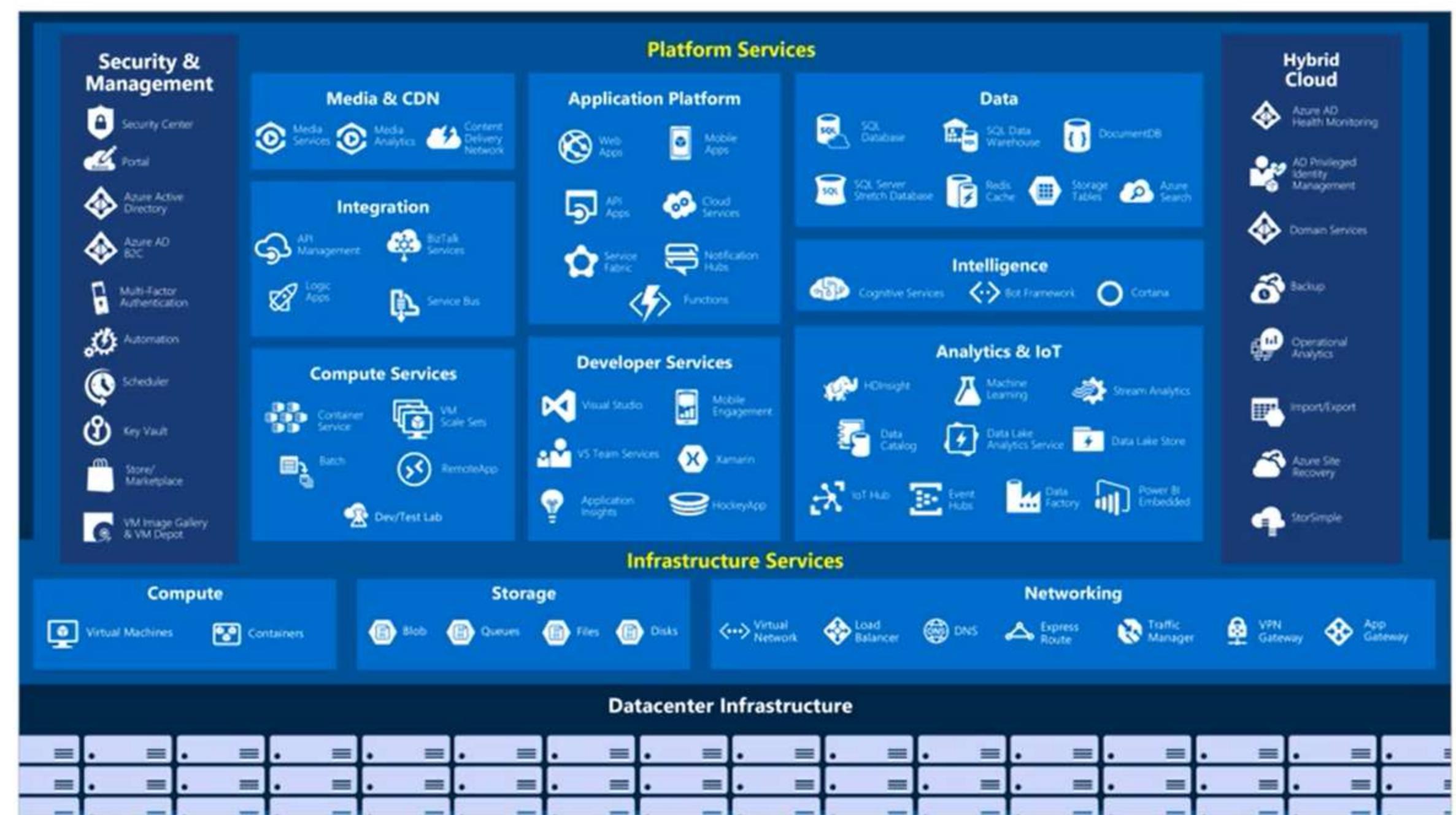
History of Azure

Microsoft Azure was codenamed “Project Red Dog” back in the mid-2000s when it began.

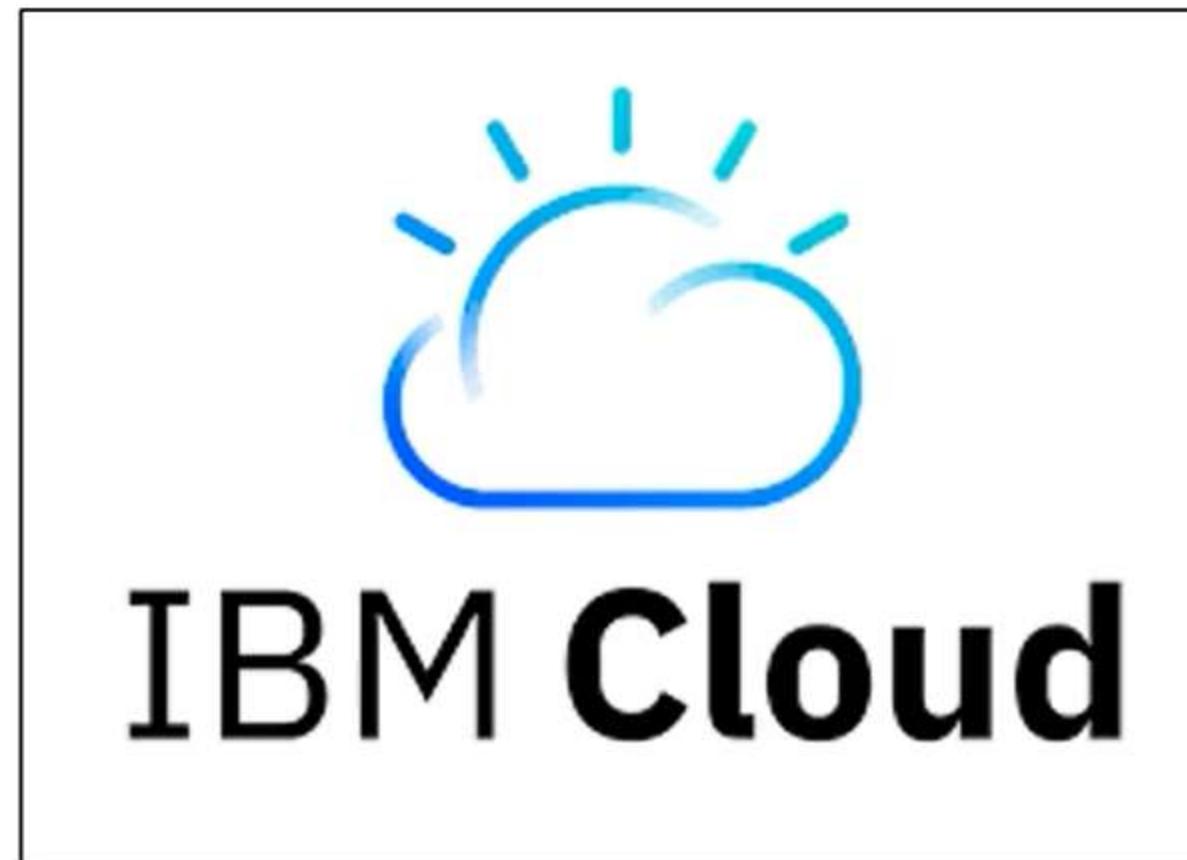


Azure Services

- Azure Virtual Machines
- Azure Virtual Network
- Azure Storage Services
- Azure Database Services
- Big data and analytics.
- DevOps



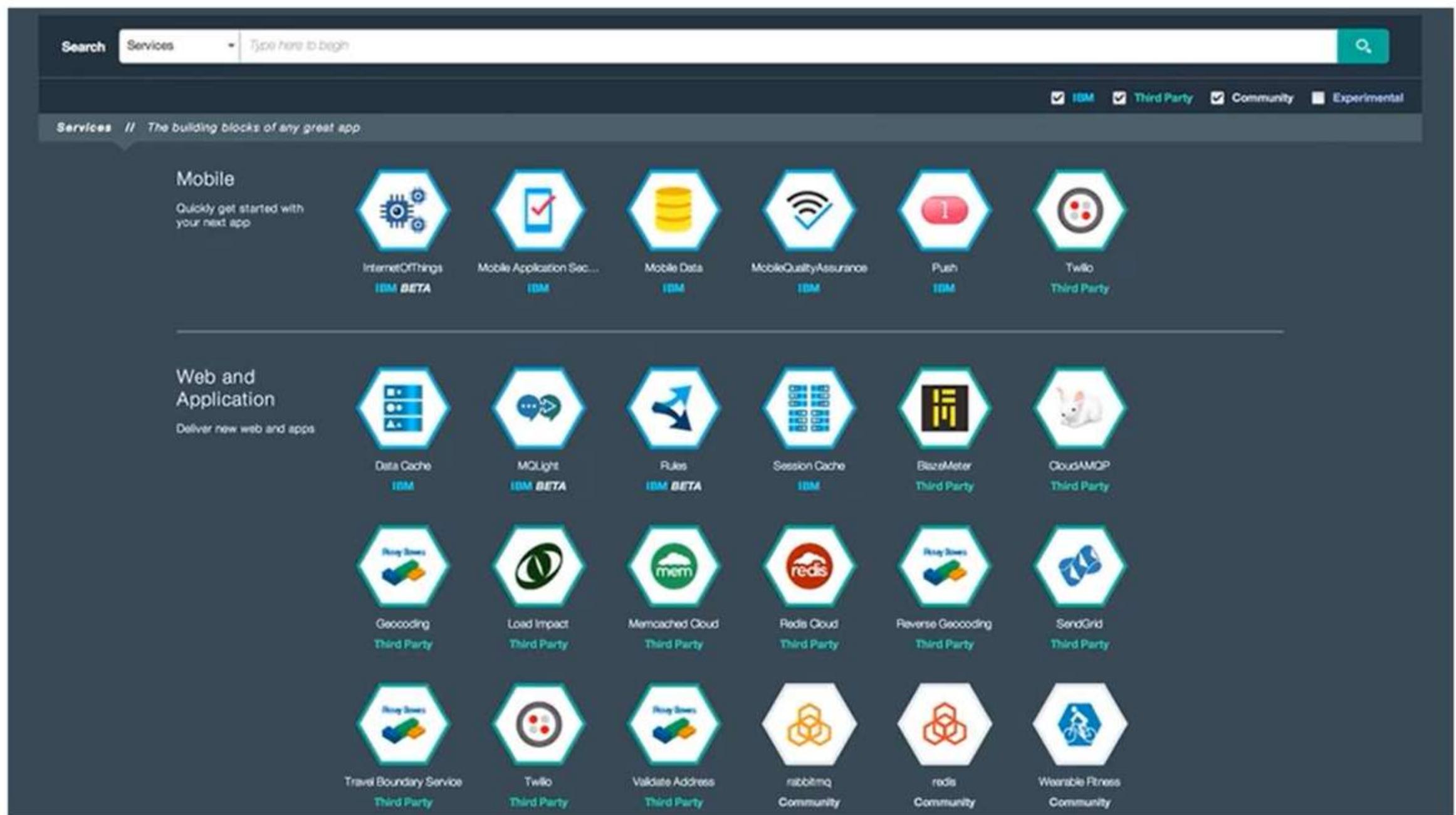
The IBM® cloud platform combines platform as a service (PaaS) with infrastructure as a service (IaaS) to provide an integrated experience. The platform scales and supports both small development teams and organizations, and large enterprise businesses.



History of IBM Cloud



IBM Services



The screenshot shows the IBM Services catalog interface. At the top, there's a search bar with a placeholder "Type here to begin" and a magnifying glass icon. Below the search bar, there are filter checkboxes for "IBM" (checked), "Third Party" (checked), "Community" (checked), and "Experimental" (unchecked). The main content area is titled "Services // The building blocks of any great app". It is organized into sections: "Mobile" (with icons for Internet of Things, Mobile Application Security, Mobile Data, Mobile Quality Assurance, Push, and Twilio), "Web and Application" (with icons for Data Cache, MOLight, Rules, Session Cache, BlazeMeter, CloudAMQP, Geocoding, Load Impact, Memcached Cloud, Redis Cloud, Reverse Geocoding, SendGrid, Travel Boundary Service, Twilio, Validate Address, rabbitmq, redis, and Wearable Fitness), and "Cloud" (which is partially visible at the bottom). Each service icon includes the IBM logo or a third-party logo and a status indicator like "BETA" or "Community".

- Compute Infrastructure
- Compute Services
- Storage
- Network
- Mobile
- Watson
- Data and analytics

Google Cloud

Google Cloud is a suite of Cloud Computing services offered by Google. The platform provides various services like compute, storage, networking, Big Data, and many more that run on the same infrastructure that Google uses internally for its end users like Google Search and YouTube.



Google Cloud

History Google Cloud

Google's first public cloud service was its platform as a service (PaaS) called App Engine. App Engine first launched as a private preview for developers in April 2008.



Google Cloud Platform

Google Cloud Services



- App Engine:
- Compute Engine
- Cloud Storage
- Datastore
- Cloud SQL
- BigQuery

Service Comparison

	AWS	Azure	IBM
Virtual Server	Amazon EC2	Azure Virtual Machine	Virtual Server
Object Storage	Amazon S3	Azure Blob Storage	Cloud object storage
RDBMS	Amazon RDS	Azure SQL database	Compose for MySql
Serverless Computing	AWS Lambda	Azure functions	IBM Cloud Functions
Application Deployment	Elastic Beanstalk	Azure WebApps	Cloud Foundry Apps
Data warehousing	Amazon Redshift	SQL data warehouse	DB2 datawarehouse

Summary

In this session you learnt about,

- Cloud Providers

INTRODUCTION TO AZURE



Objective

- History of Microsoft Azure
- What is Microsoft Azure
- Why Microsoft Azure
- Cost Savings in Microsoft Azure
- Economies of scale
- Capex Vs Opex
- Consumption-based model
- Azure Well architected Framework

History of Microsoft Azure

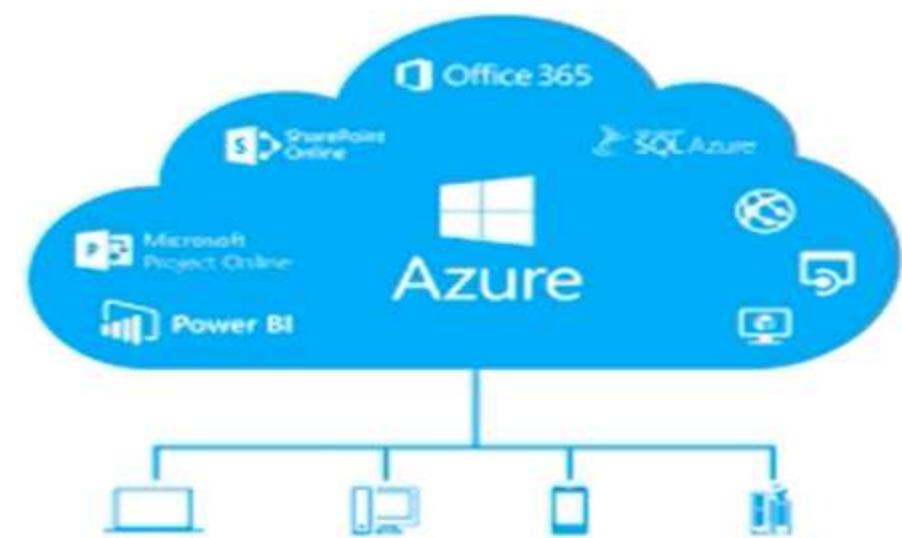
- Launched Project Red Dog in 2008
- Released Windows Azure in 2010
- Renamed as Microsoft Azure in 2014.
- Azure as a public cloud and other Microsoft services offerings are
 - Office 365
 - Dynamics CRM
 - Bing
 - OneDrive
 - Skype
 - Xbox Live

What is Microsoft Azure?

- More than 200 cloud services
- Offers many resources and frameworks
- Create, build and deploy any applications
- Deploy across multi cloud and on-premises
- 80 percent of the Fortune 500 companies use Azure services for their needs

Why Microsoft Azure?

- Cost Efficient
- Storage space
- Fault Resilient
- Scalability
- Lean Management



Cost Saving in Microsoft Azure



- Azure Cost Management
- Azure Reserved VM Instances
- Azure Pricing Calculator

Economies of scale

Ability to do this with less expensive and more efficient way.

- Acquire hardware at a lower cost
- Storage cost decreased significantly
- Larger amounts of storage at significant discounts.

Application
runs **on-**
premises

Buy my own
hardware, and
manage my
own data
center

Application
runs at a
hoster

Co-location
or
Managed
servers

Application
runs using
cloud services

"cloud fabric"
(elastic,
infini-scale)

CapEx vs OpEx

- Capital Expenditure(CapEx) :
 - Investment on physical infrastructure
 - High upfront and value depreciate over time
- Operational Expenditure(OpEx)
 - Spend on services as needed. Get bill immediately
 - No upfront cost, pay-as-you-go use.

Consumption-based model

- No upfront costs
- No need to purchase and manage costly infrastructure that they may or may not use to its fullest
- The ability to pay for additional resources if and when they are needed
- The ability to stop paying for resources that are no longer needed

Azure Well architected Framework

- Set of guiding instructions improve the quality of a workload.
- Framework consists of Five Pillars
 - Cost Optimization
 - Operational Excellence
 - Performance Efficiency
 - Reliability
 - Security

Cost Optimization

- Apply cost principles in your architecture to accelerate your time to market
- Use the cost calculators to estimate initial and operational costs
- Establish policies, budgets and controls that set cost limits for the solution

Operational Excellence

- Process which keeps an application running in the production
- Application deployment must be predictable and reliable
- Application deployments should be automated which is to reduce human error.
- Application deployment fast and routine process, in order that it won't slow down the release of new features or bug fixes.
- Quickly roll back or roll forward, if any issues during updates

Performance Efficiency

- Ability to scale the workload to meet the demand efficiently
- There are two methods of application scaling
 - Vertical scaling
 - Ex. Upgrading to a larger virtual machine instance
 - Horizontal scaling
 - Ex. Database replicas or Virtual machine instances

Reliability

- Resilient and Recover gracefully from failures and continue to run with minimal downtime and data loss
- High available (HA) and run as designed in a healthy state without downtime

Security

- One of the most important aspects of any architecture
- Provides confidentiality, availability and integrity assurances against attacks
- Abuse of valuable data and systems

Summary

- History of Microsoft Azure
- What is Microsoft Azure
- Why Microsoft Azure
- Cost Savings in Microsoft Azure
- Economies of scale
- Capex Vs Opex
- Consumption-based model
- Azure well architected Framework

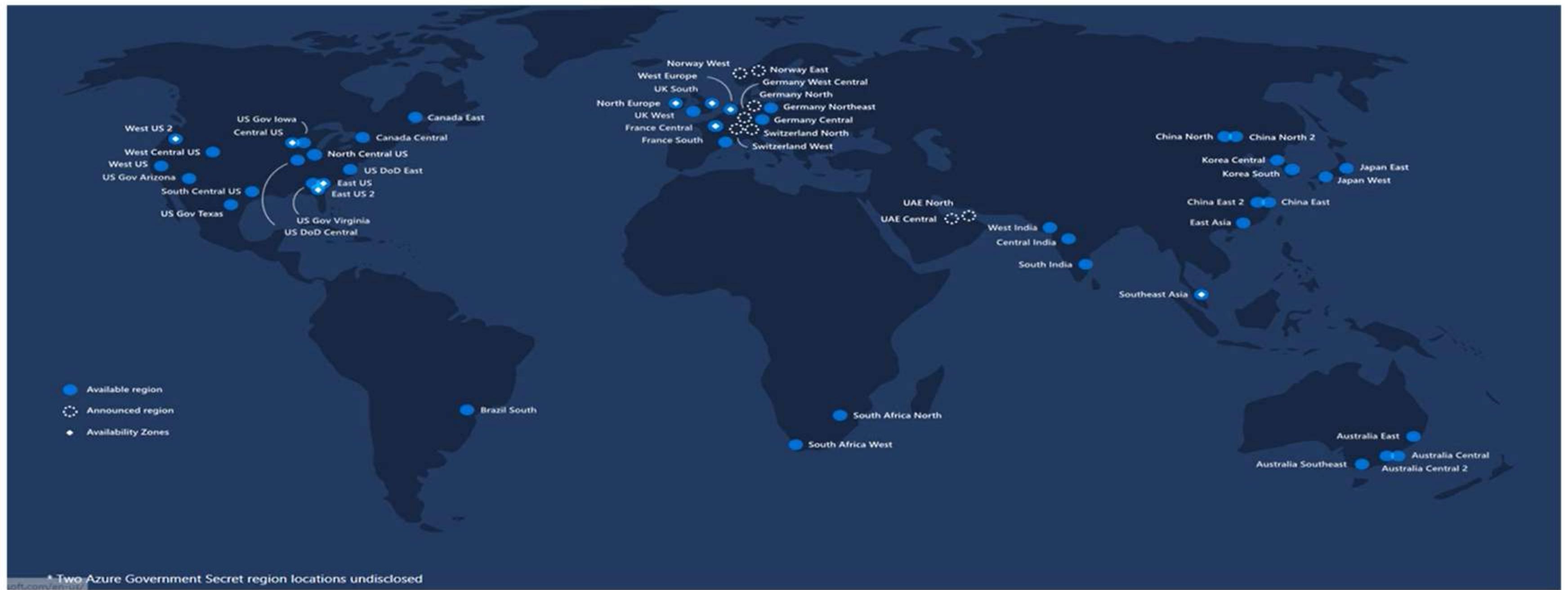
AZURE ARCHITECTURAL COMPONENTS



Objective

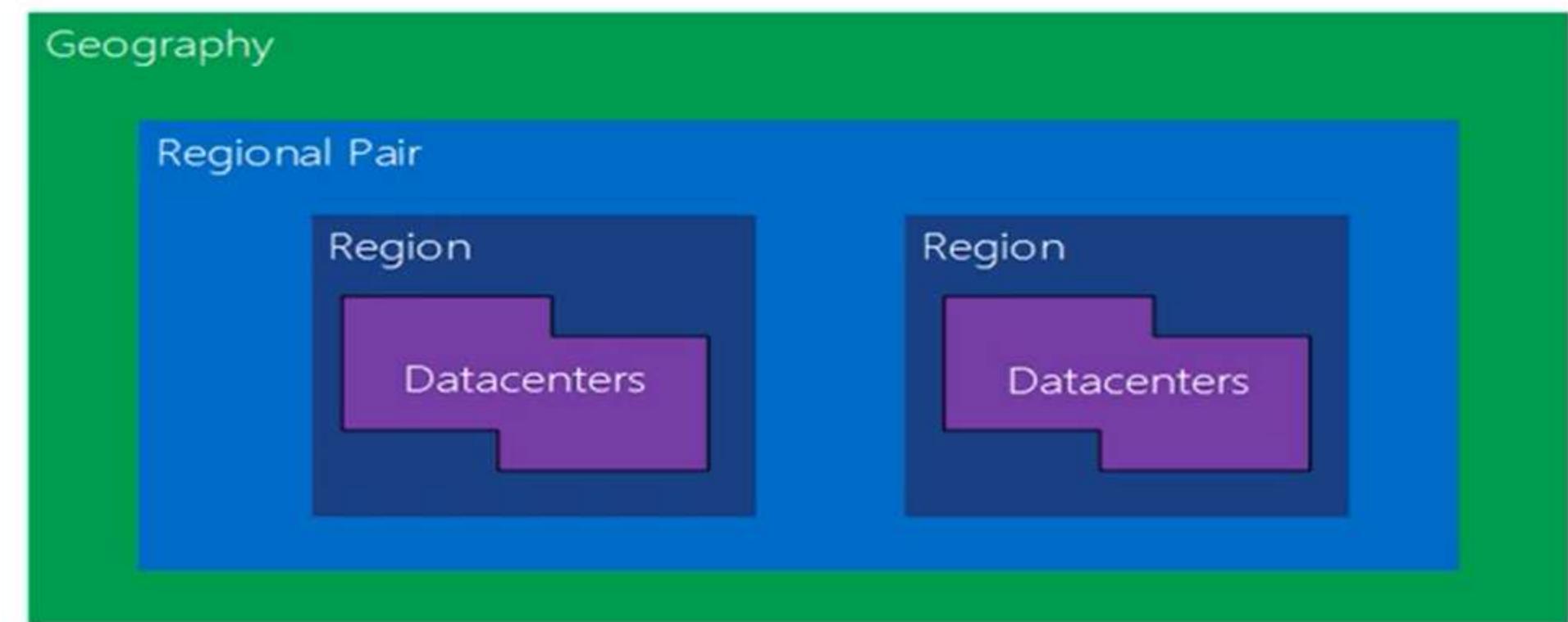
- Region
- Geographies
- Availability zones
- Availability sets
- Resource groups
- Resource manager

Regions



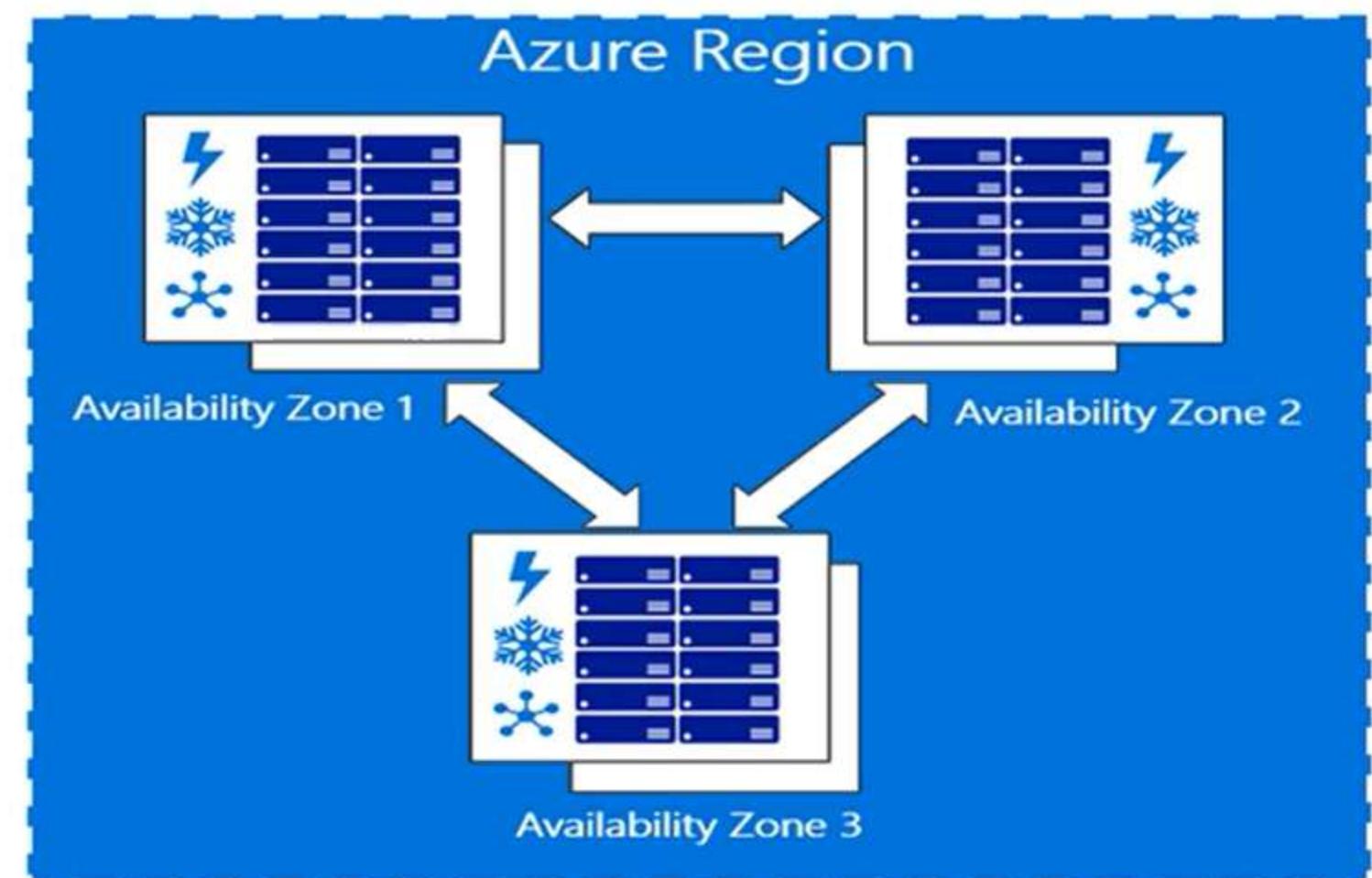
Geographies

- Contain two or more regions
- Preserve data residency and compliance



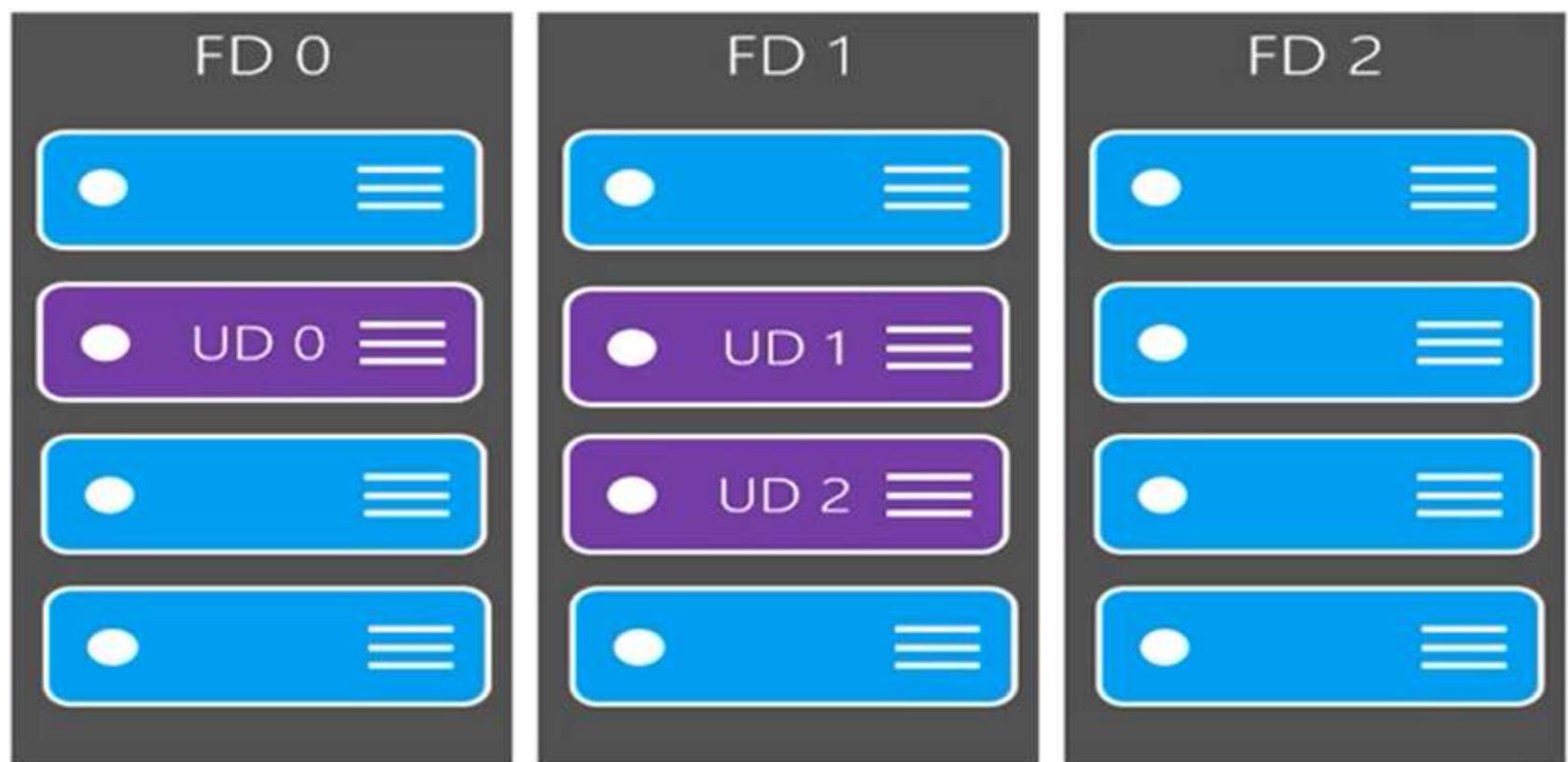
Availability Zones

- Physically separated locations within the region
- Connected with high speed network.



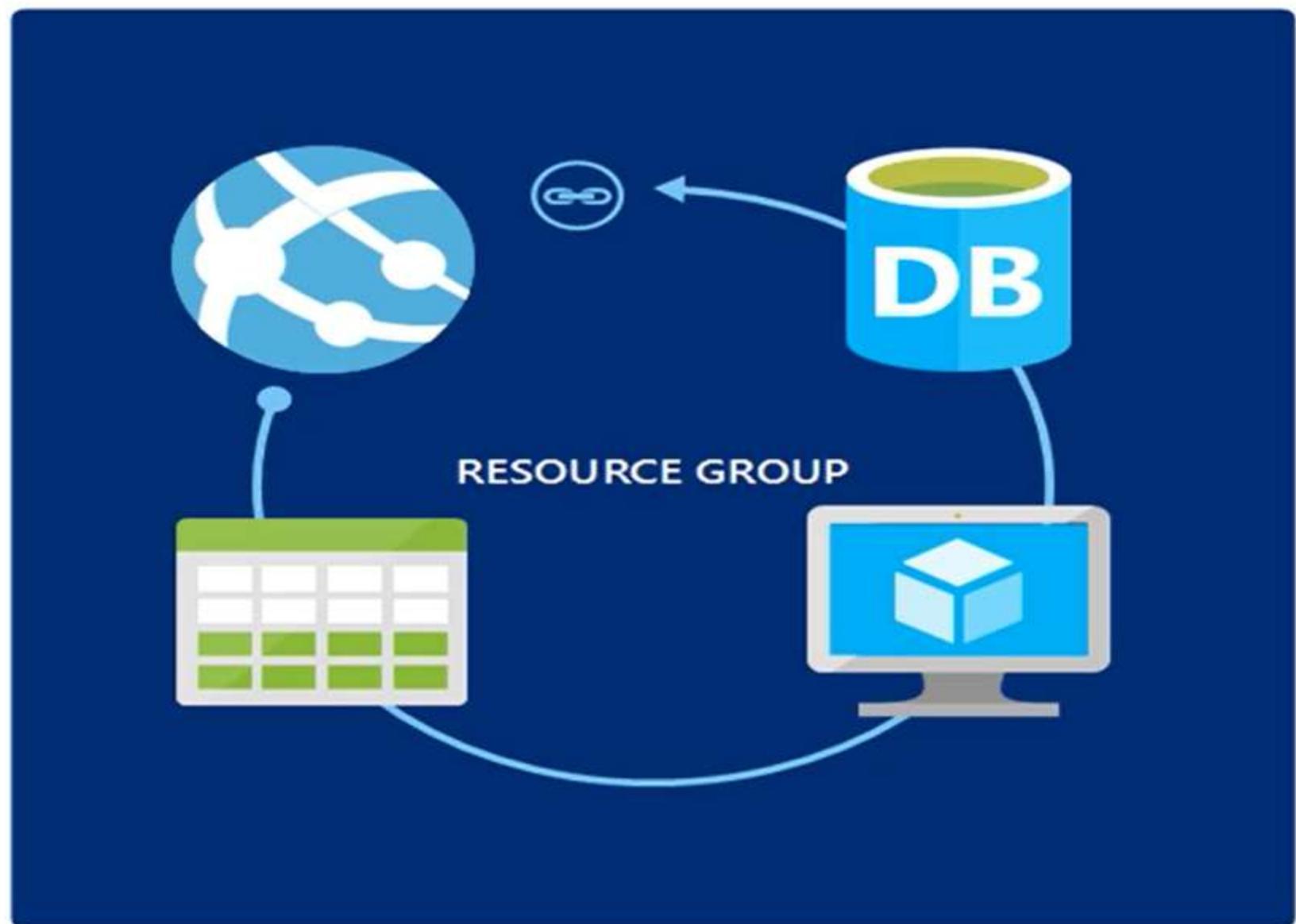
Availability sets

- Update domains(UD)
- Fault domains(FD)



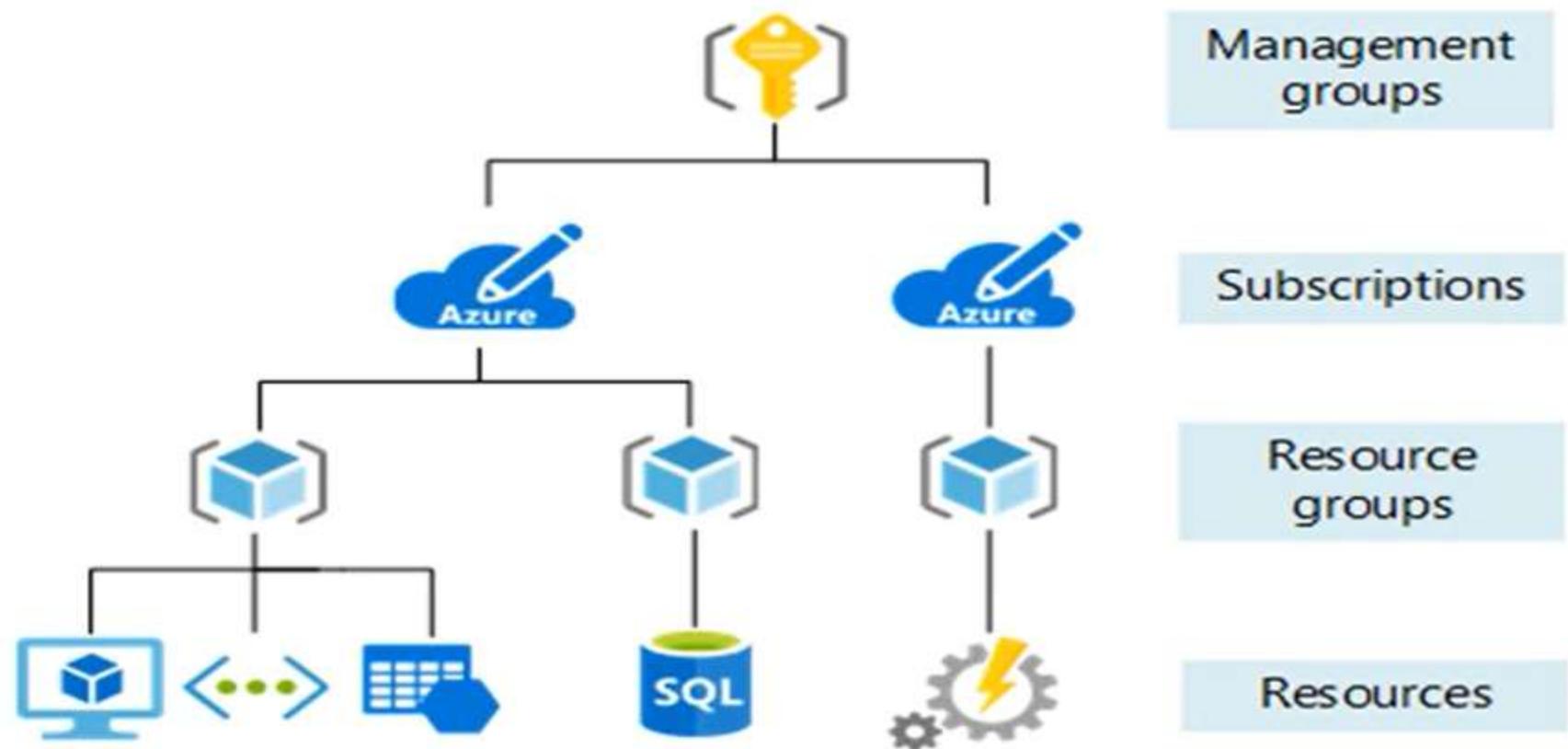
Resource Groups

- Container for aggregating all the resources required by an applications.



Azure resource manager

- Create, configure and delete resources.
- Organize resources
- Control access and resources
- Automate using different tools and SDKs



Summary

- Region
- Geographies
- Availability zones
- Availability sets
- Resource groups
- Resource manager

AZURE SERVICES



Objectives

- Virtual machine services
- Network services
- Storage services
- database services
- Marketplace
- Internet of things
- Big data analytics
- Artificial Intelligence
- Serverless computing
- DevOps
- Azure management tool
- Azure advisor



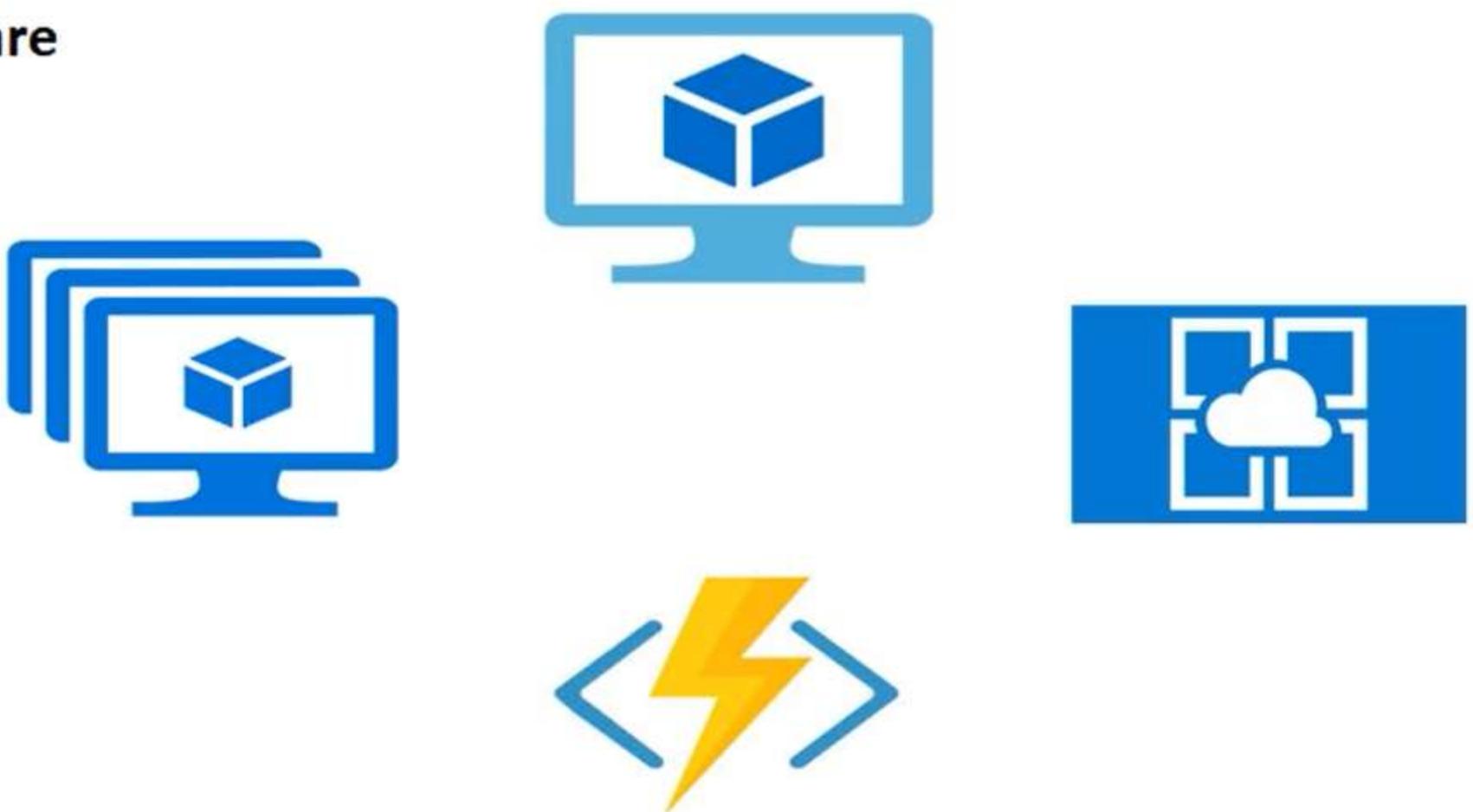
Azure Compute Service

- Compute service for hosting cloud-based application
- Compute resource available min minutes
- Pay-as-you-go model



Virtual Machine Services

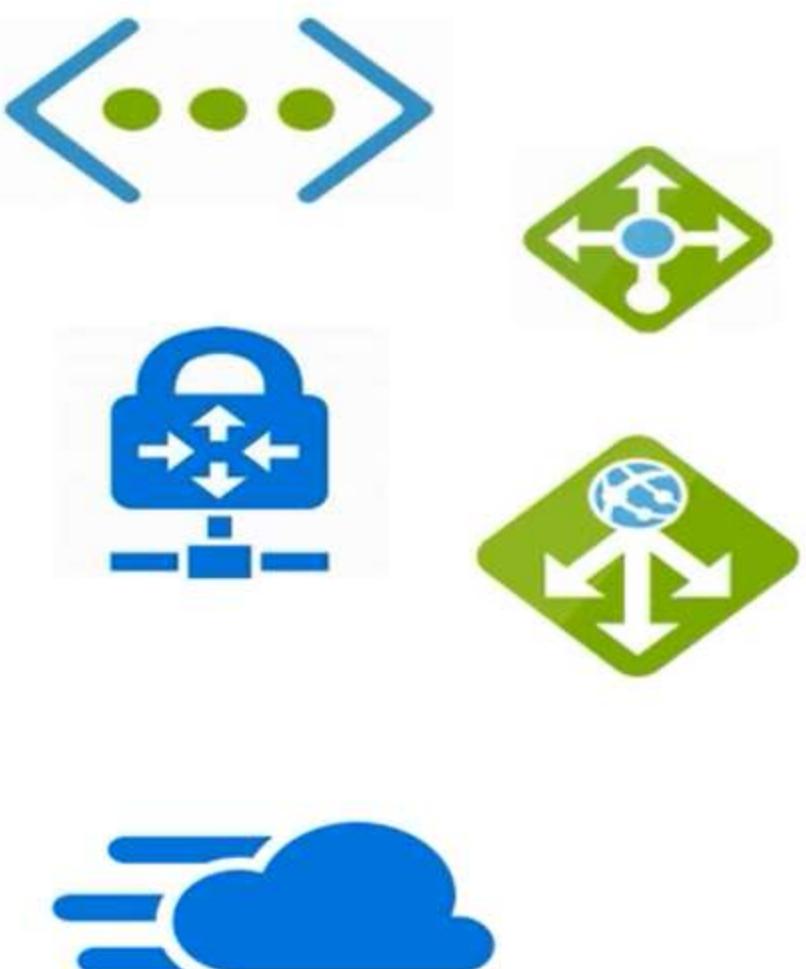
- Virtual version of physical computer
- Examples for azure virtual machines are
 - Azure VM
 - VM Scale Set
 - App Service
 - Functions



Azure Network Services

Networking on Azure allows you to connect cloud and on-premises infrastructure and services.

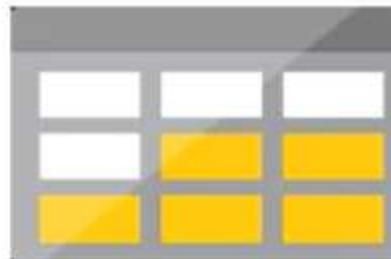
- Azure Virtual Network
- Azure Load Balancer
- VPN Gateway
- Azure Application Gateway
- Content Delivery Network



Azure Storage Services

Azure Storage is a service that you can use to store different types data like files, messages, tables, images, videos and other types of information.

- Blob storage
- Disk storage
- File storage
- Archive storage



Azure Database Services

Azure database services are fully-managed database services under PaaS model. Database servers are provisioned and managed by Azure.

- Azure Cosmos DB:
- Azure SQL Database
- Azure Database Migration



Azure Marketplace

- Microsoft partners, Independent Software Vendors (ISVs) offers services and solutions
- Cloud developers can try and use it.
- Close to 10,000 products and services



Internet of Things

The internet allows any item that's online-capable to access valuable information. This ability for devices to garner and then relay information for data analysis is referred to as the *Internet of Things* (IoT).

- IoT Central



- Azure IoT Hub



Big Data and Analytics

Big data refers to large volumes of structured or unstructured data that become difficult to process, or consequently make decisions. Some big data and analytic services in Azure are,

- Azure SQL Data Warehouse
- Azure HDInsight
- Azure Data Lake Analytics



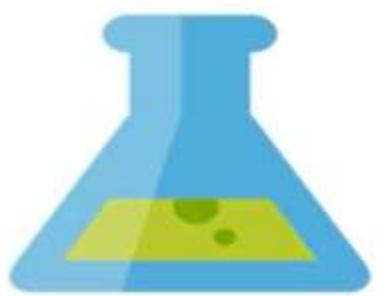
Artificial Intelligence

Artificial Intelligence (AI), in the context of cloud computing, is based around a broad range of applications, including Machine Learning, which use existing data to forecast future behaviors, outcomes, and trends. Using machine learning, computers learn without being explicitly programmed. Some AI services in Azure include,

- Azure Machine Learning service



- Azure Machine Learning Studio



Serverless Computing

Serverless computing is a cloud-hosted execution environment that runs your code but abstracts the underlying hosting environment. Some serverless services in Azure include:

- Azure Functions



- Azure Logic Apps



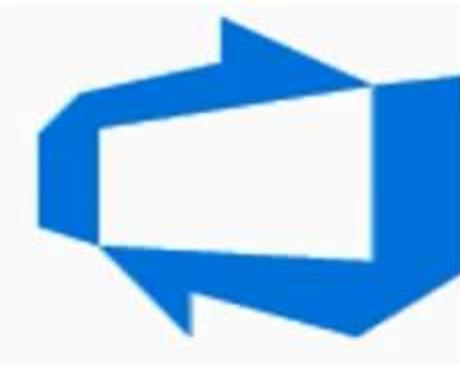
- Azure Event Grid



DevOps

DevOps allows you to create build and release pipelines that provide continuous integration, delivery, and deployment for applications.

- Azure DevOps services



- Azure DevTest Labs

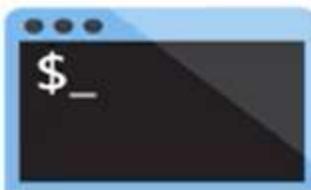


Azure Management Tools

Configure and manage Azure using a broad range of tools and platforms.

Azure management tools include:

- Azure Portal
- Azure PowerShell
- Azure Command-Line Interface (CLI)
- Azure Cloud Shell



Azure Advisor

Analyzes your deployed Azure resources and recommends ways to improve availability, security, performance, and costs.

With Azure Advisor, you can:



- Get proactive, actionable, and personalized best practice recommendations.
- Improve the performance, security, and availability of your resources.
- Identify opportunities to reduce your Azure costs.

Summary

- Virtual machine services
- Network services
- Storage services
- database services
- Marketplace
- Internet of things
- Big data analytics
- Artificial Intelligence
- Serverless computing
- DevOps
- Azure management tool
- Azure advisor



AZURE CLOUD MIGRATION



Objective

- On-premise Vs Cloud
- Why transition to the cloud
- Evaluate your costs and needs
- Choose a cloud services provider
- When to migrate?
- Risk mitigation
- Cloud migration strategy
- Choose a cloud services provider

On-premise Vs Cloud

On-Premise

- You keep the data secure on local servers
- LAN that connects servers and workstations
- IT administrators need to manage their local servers

But as issues arise with on-premise are

- Availability
- Scalability
- High maintenance cost
- Physical and virtual security



Microsoft Azure benefits

Microsoft Azure benefits

- Microsoft Azure is Fast
- Business Agility with Azure
- Azure Global Reach
- Integrated Development Environment
- Integrated Delivery Pipeline
- Security
- Flexible Expenditure



Why transition to the cloud

- higher efficiency, better flexibility, lower costs and better performance
- On-premise data center to Azure
- One cloud provider to another
- Requires careful planning and strategy



Evaluate your costs and needs

- Evaluate your existing investment
- Consider your applications and data
- Determine how much resources each application uses



Choose the Deployment model

Choose the deployment model for application migration.

- Public Cloud
- Private Cloud
- Hybrid Cloud

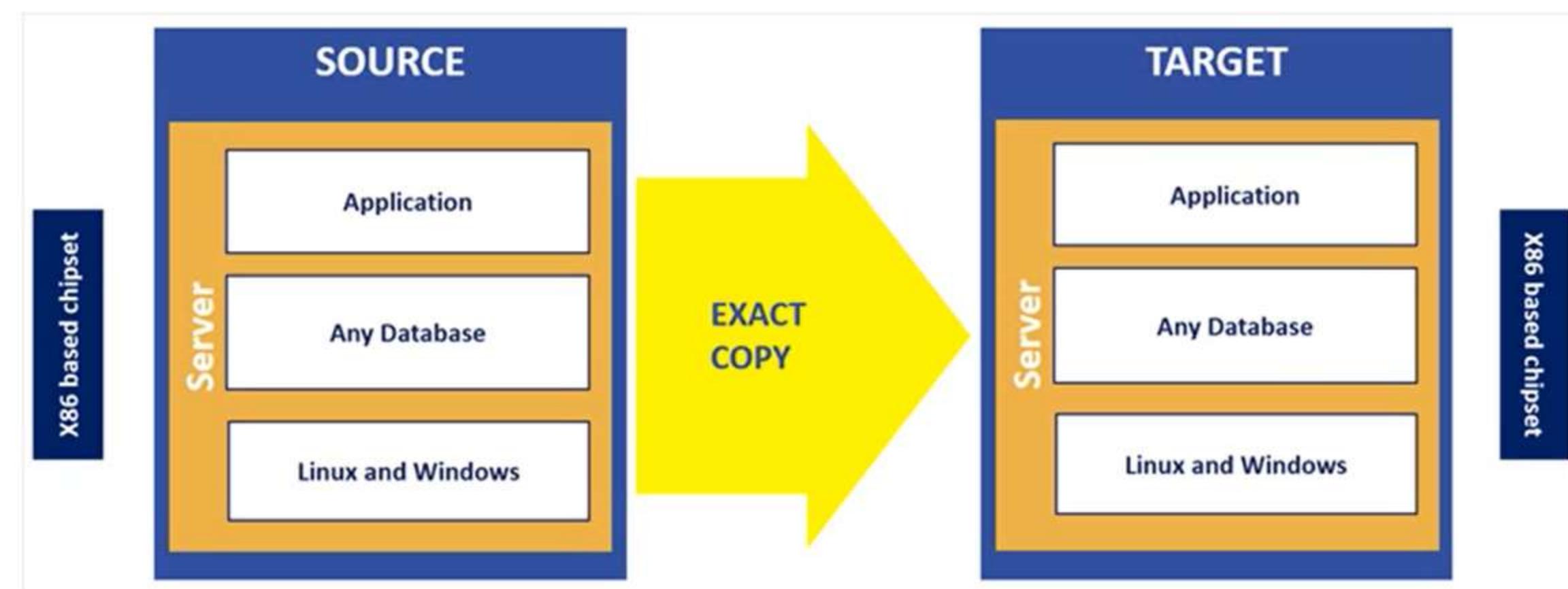
When to migrate?

Right time to consider for migration to cloud

- Server hardware is reaching end of its lifecycle
- Need additional capacity to your data center
- Time to upgrade latest version of software that is critical for business.

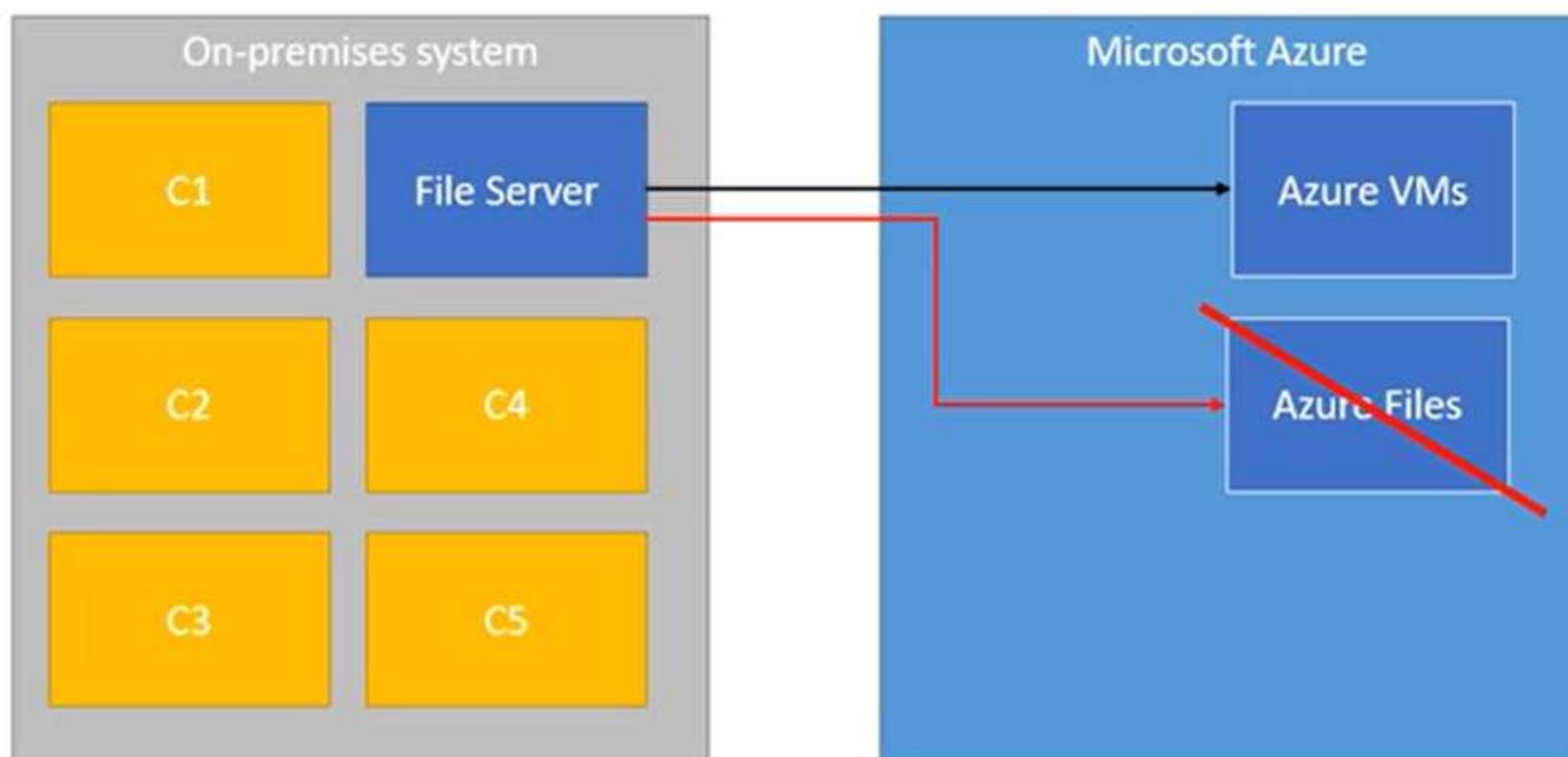
Cloud migration strategy

- For smoother transition cloud migration, consider working with
 - A third-party can help you formulate a cloud migration strategy
 - Technology partners build ready-made solution cloud
 - Your cloud service provider to implement a solution for your organization



Consider starting small

- Migration timeline for moving to the cloud
- Move everything at once
- Move Less critical workloads like dev/test environment



Migrating from one cloud to another

Transition from one cloud to another

- Another cloud provider offers unique features and capabilities



Google Cloud Platform



DigitalOcean

vmware
VMware vCloud® Air™



Microsoft Azure

Choose a cloud services provider

Take care of these points while choosing a cloud service

- Business health and processes
- Administration support
- Technical capabilities and processes
- Security practices



Summary

- On-premise Vs Cloud
- Why transition to the cloud
- Evaluate your costs and needs
- Choose a cloud services provider
- When to migrate?
- Risk mitigation
- Cloud migration strategy
- Choose a cloud services provider

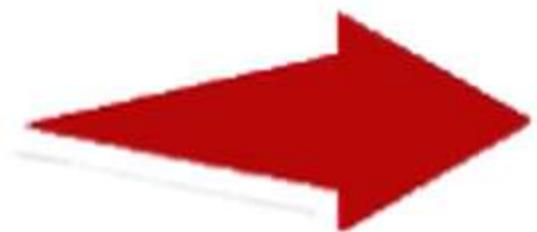


Cloud Computing Platform





**Small
Manufacturing Organization**



Expand Business



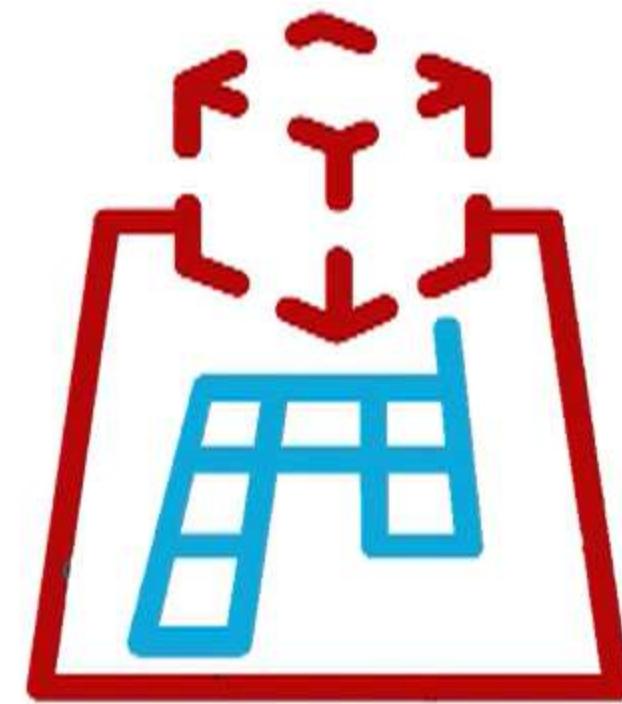
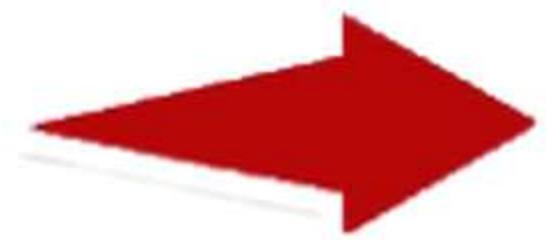
Large Enterprise



Deliver Training



Architecture Company



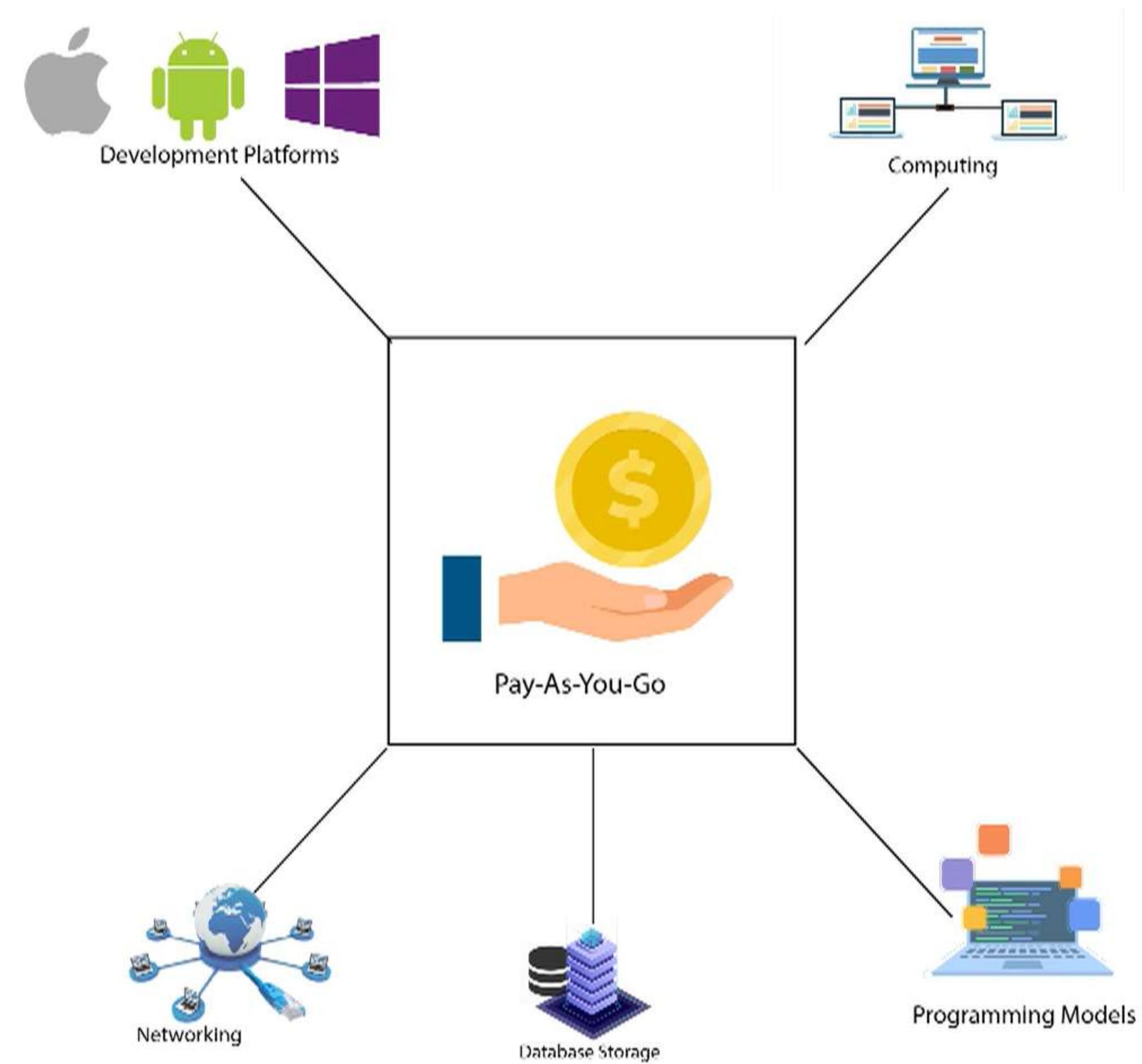
**Get High-Compute Rendering
of Construction Prototypes**

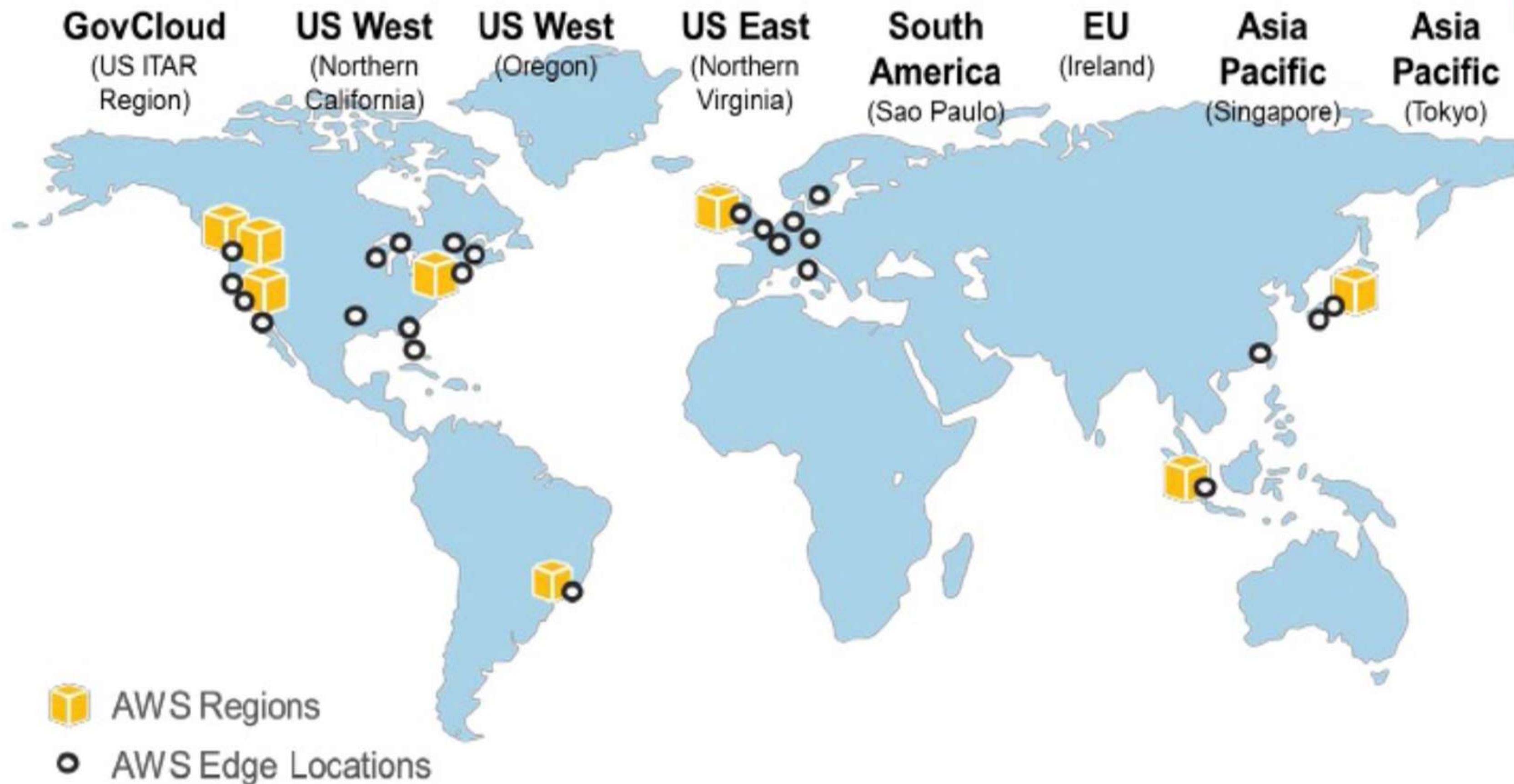


Media Company



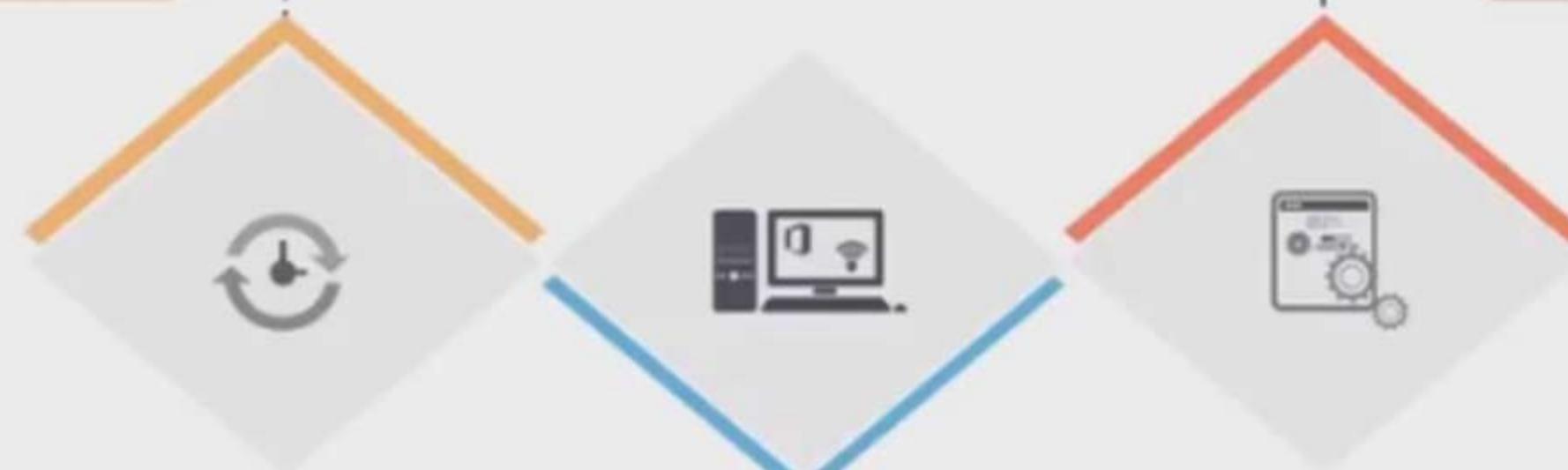
**Provide Different
Type of Content**





Flexibility

You get more time for core business tasks through the instant availability of new features and services.



You get a choice in running services and applications. You can choose to run a part of your IT infrastructure in AWS and the remaining in your data centers.

You enjoy effortless hosting of legacy applications.

Cost-Effectiveness



No Upfront Investment

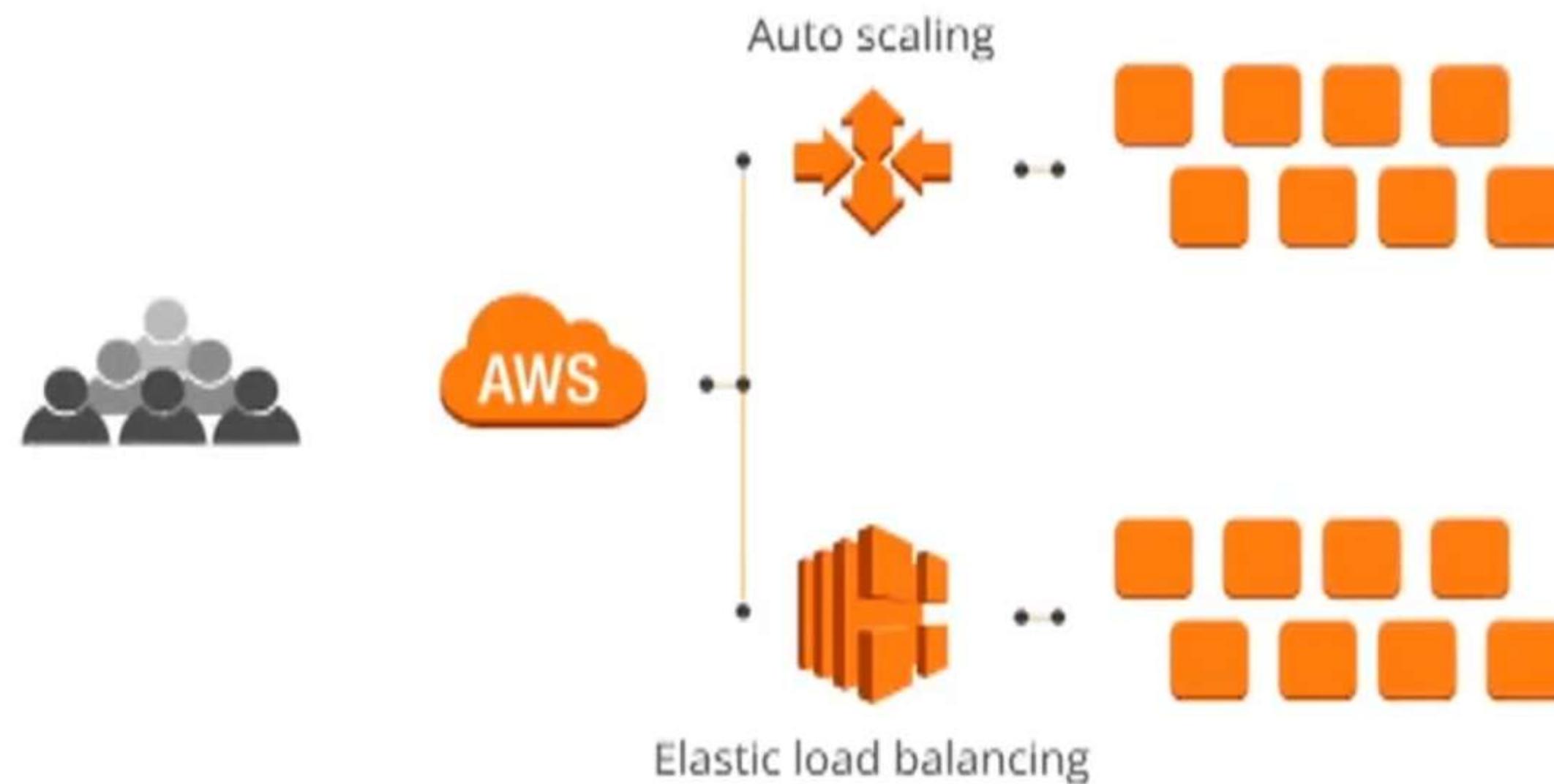


Long-term commitment

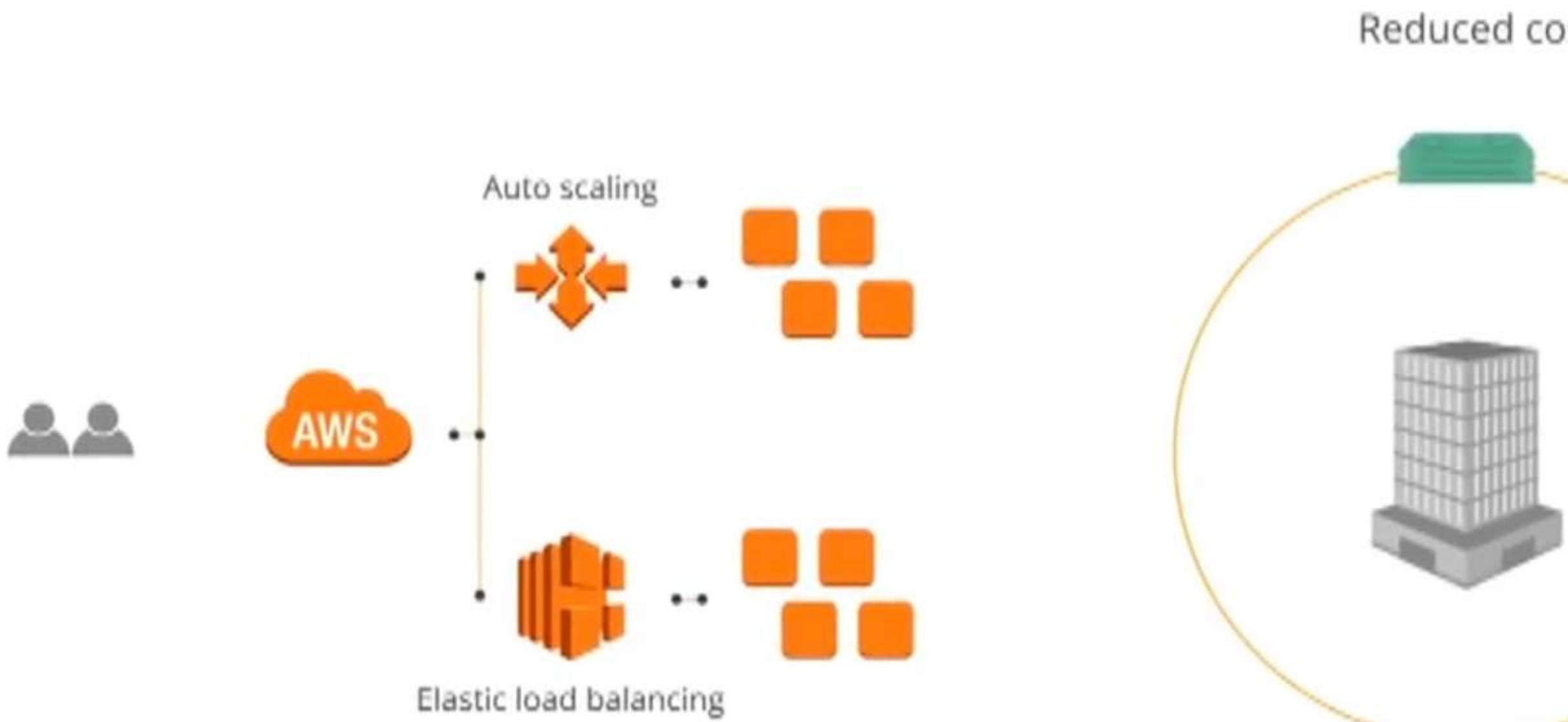


Minimum Expense

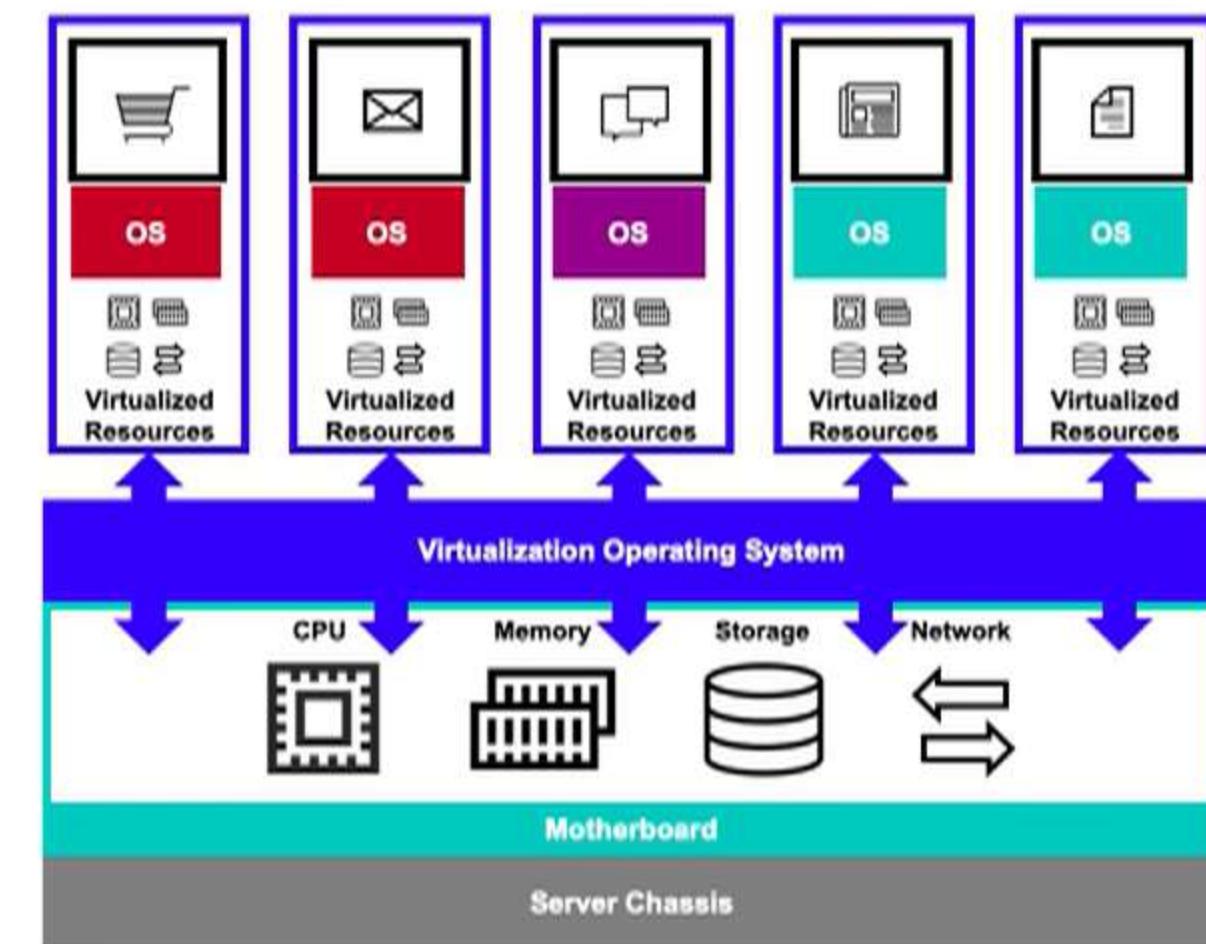
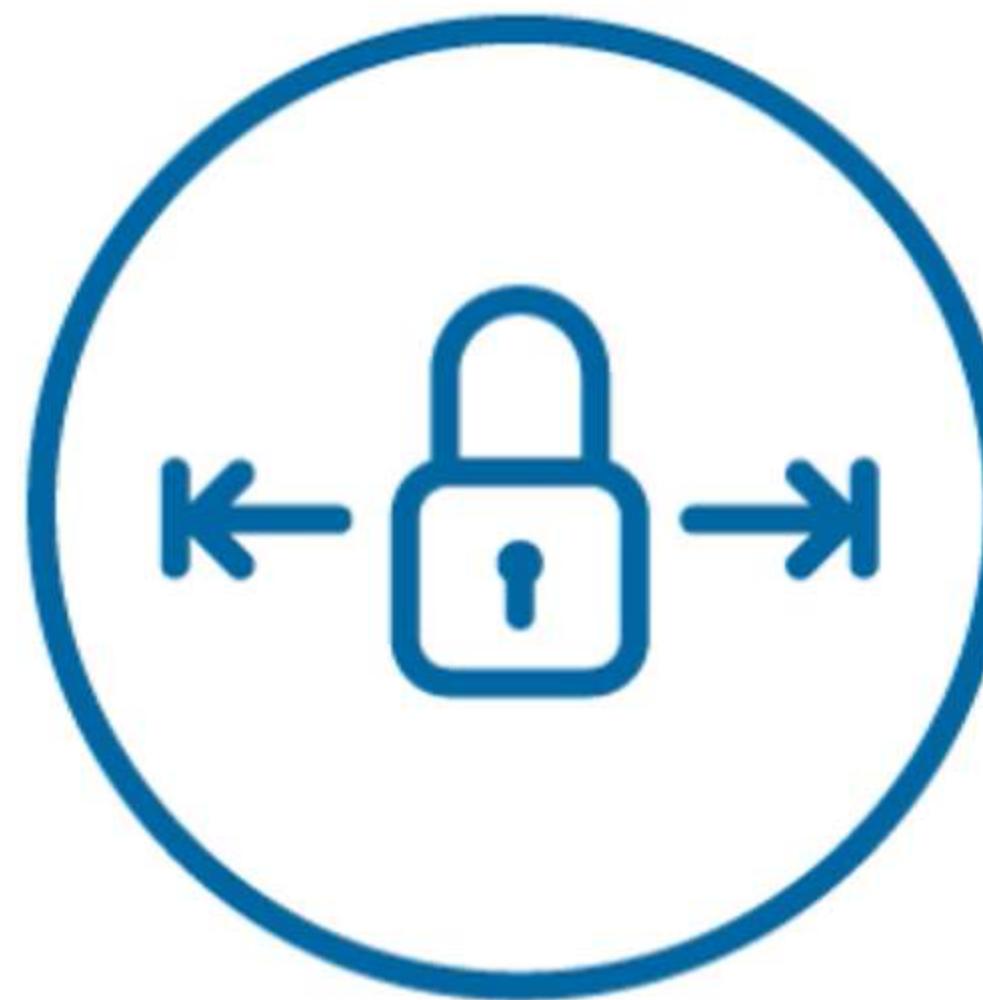
Scalability and Elasticity



Scalability and Elasticity



Security



Security

Customers can expect high physical security, and this is due to Amazon's several years of experience in designing, developing, and running large-scale IT operation centers.



Confidentiality



Integrity



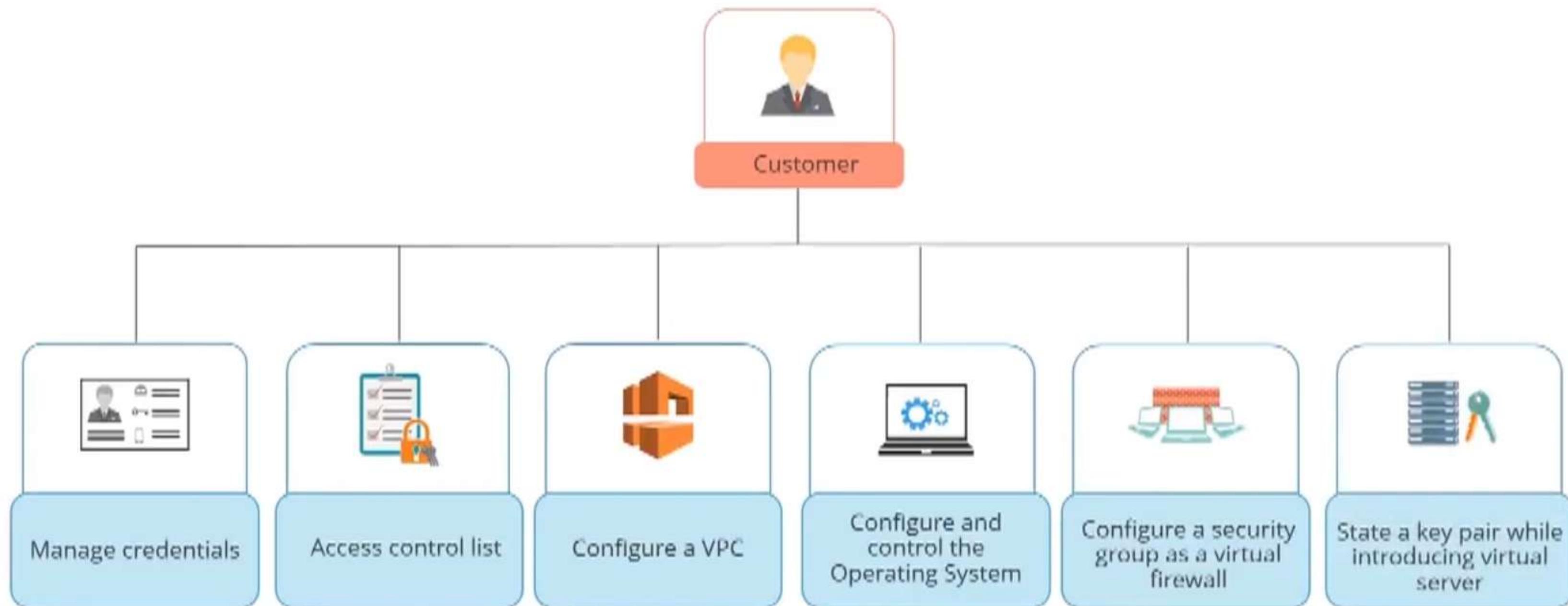
Availability

The purpose of AWS Compliance is to enable you to understand its powerful controls in action and maintain security and data protection.

Security

AWS provides security to their global infrastructure, along with a variety of features for securing critical data in cloud.

Security



INTRODUCTION TO AWS



Module Overview

In this session, you will learn about

- Cloud Computing
- Advantages of AWS Cloud
- AWS WAF
- AWS Global Infrastructure



What is Cloud Computing ?

Cloud computing is the on-demand delivery of compute power, database, storage resources through a cloud services platform via the Internet with pay-as-you-go pricing.

- Low cost
- Security
- Scalability
- High Availability
- Easy Management

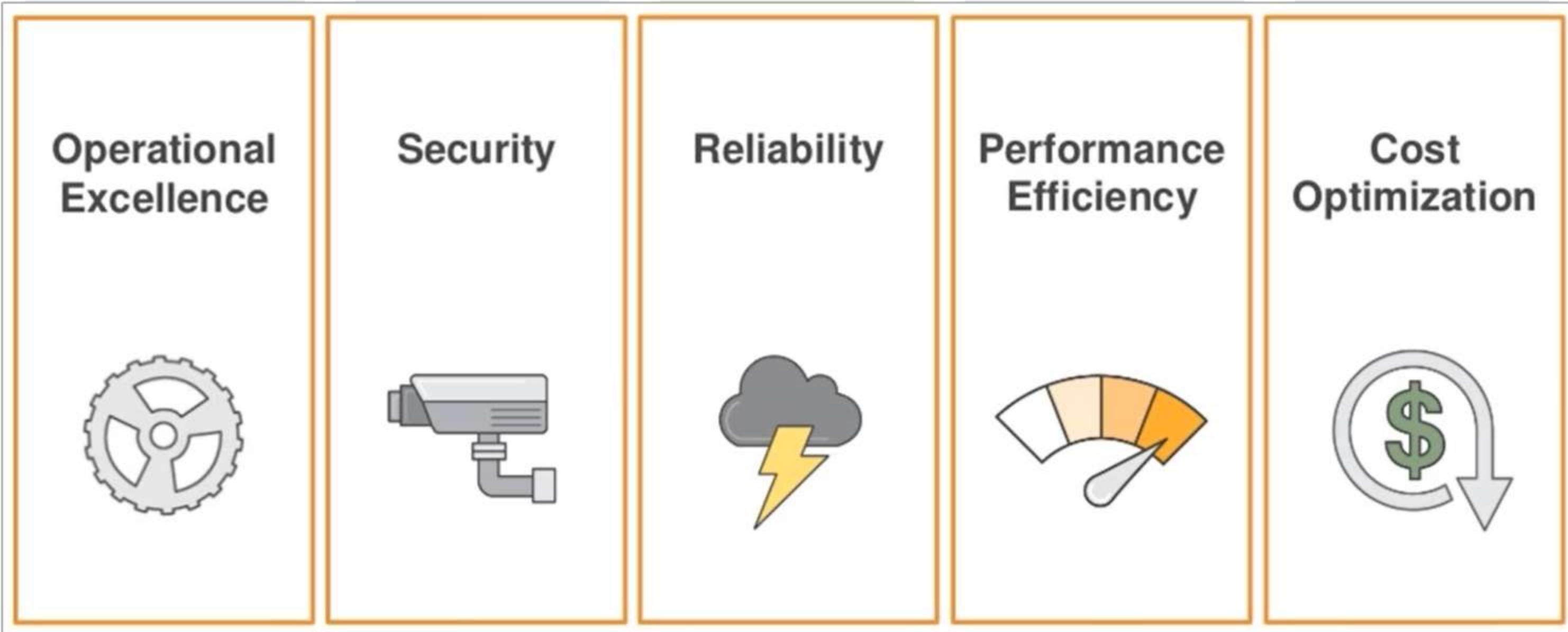


Advantages of AWS

- Trade capital expense for variable expense
- Benefit from massive economies of scale
- Stop guessing capacity
- Increase speed and agility
- Focus on what matters
- Go global in minutes

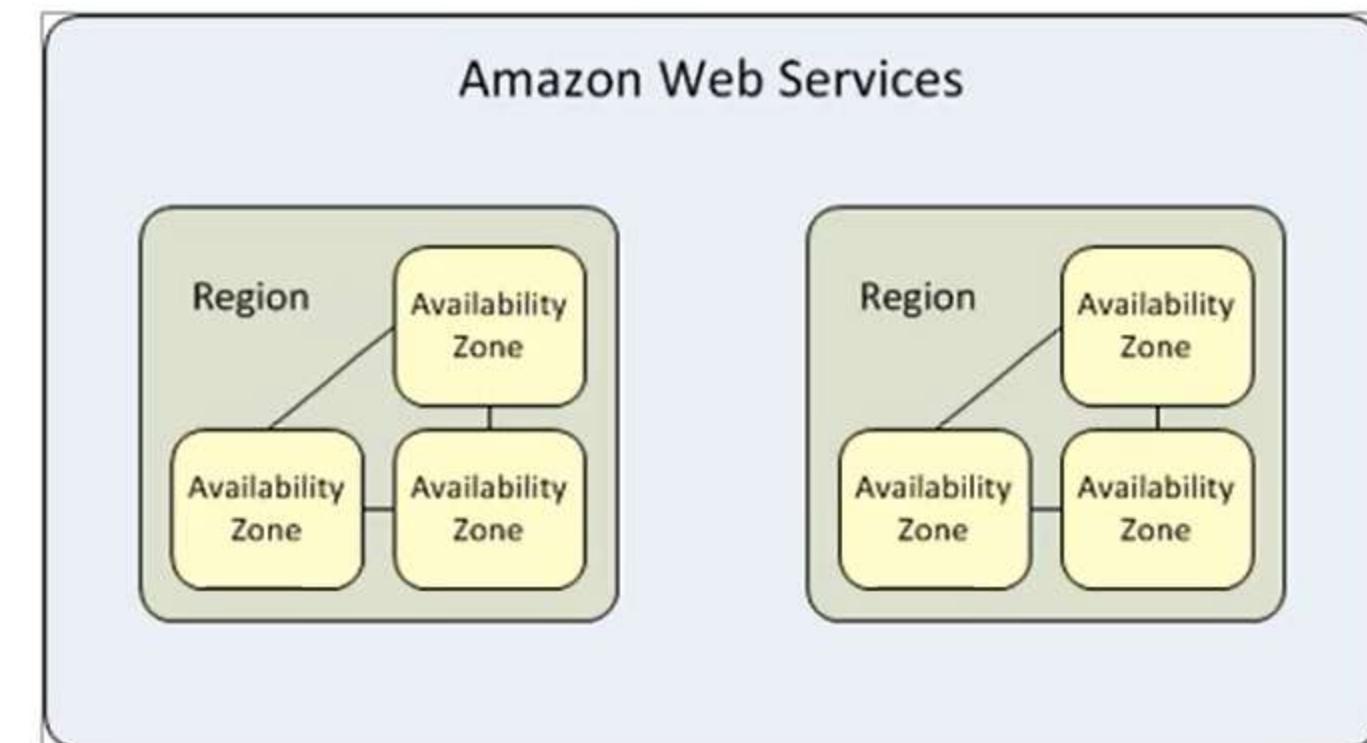


AWS Well-Architected Framework



AWS Global Infrastructure

- 22 AWS Regions
- 69 Availability Zones



Summary

In this session, you learnt about

- Cloud Computing
- Advantages of AWS Cloud
- AWS WAF
- AWS Global Infrastructure



AMAZON SIMPLE STORAGE SERVICE



Module Overview

In this session, you will learn about

- Amazon Simple Storage Service (Amazon S3)
- Bucket Policies and Access Control List
- Storage Types
- S3 Pricing options



Simple Storage Service (S3)

What is Amazon S3?

- Object based storage
- Low cost storage
- Designed for large capacity
- Scalable, durable, secure storage
- Designed for 11 9's durability



Amazon S3 Bucket

- Logical Unit of storage for Amazon S3
- Data stored as objects
- Object includes data and metadata

Amazon S3 Bucket Properties

- Versioning
- Server Access Logs
- Static Website
- Object level logs
- Encryption



Amazon S3 Bucket Advance Properties

- Tags
- Object Lock
- Transfer Acceleration



Amazon S3 Bucket Advance Properties

- Events
- Request pays



Amazon S3 Bucket Permissions



- Block Public Access
- Access Control List
- Bucket Policy
- CORS Configuration

Block Public Access Permission

- Block public access to buckets and objects granted through *new* access control lists (ACLs)
 - Off
- Block public access to buckets and objects granted through *any* access control lists (ACLs)
 - Off
- Block public access to buckets and objects granted through *new* public bucket policies
 - Off
- Block public and cross-account access to buckets and objects through *any* public bucket policies
 - Off

ACL

Access for bucket owner

Canonical ID i	List objects i	Write objects i	Read bucket permissions i	Write bucket permissions i
<input type="radio"/> 2b33c0ea8a76c25640042a96bdb78c2427228a1de 0d8ab1b9b6857943c1e3fe1 (Your AWS account)	Yes	Yes	Yes	Yes

Access for other AWS accounts

[+ Add account](#) [Delete](#)

Canonical ID i	List objects i	Write objects i	Read bucket permissions i	Write bucket permissions i

Public access

Group i	List objects i	Write objects i	Read bucket permissions i	Write bucket permissions i
<input type="radio"/> Everyone	-	-	-	-

S3 log delivery group

Group i	List objects i	Write objects i	Read bucket permissions i	Write bucket permissions i
<input type="radio"/> Log Delivery	-	-	-	-

S3 Bucket Policy

Bucket policy editor ARN: arn:aws:s3:::mybucket082019

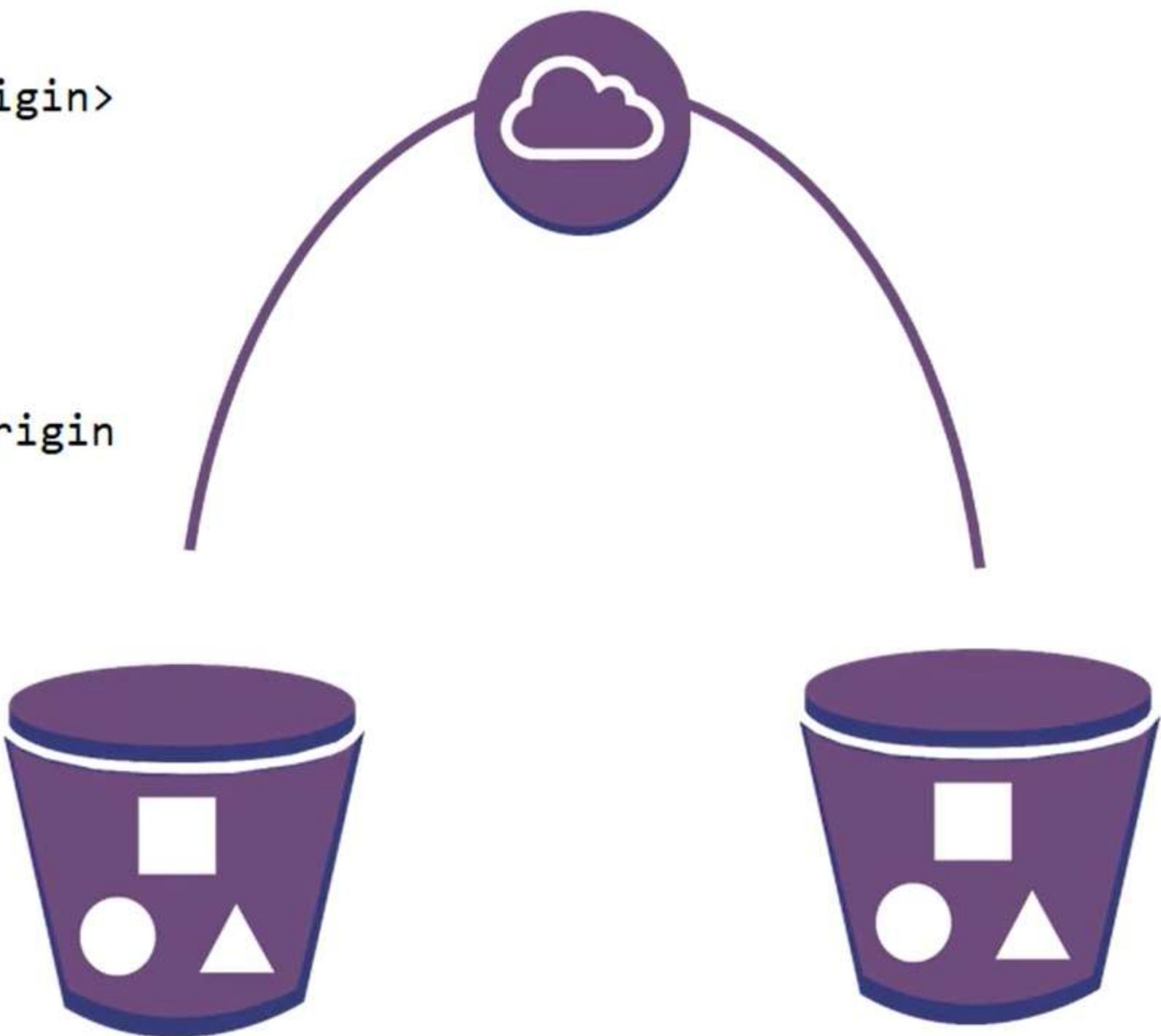
Type to add a new policy or edit an existing policy in the text area below.

[Delete](#) [Cancel](#) [Save](#)

```
1  {
2      "Id": "Policy1566880686278",
3      "Version": "2012-10-17",
4      "Statement": [
5          {
6              "Sid": "Stmt1566880685108",
7              "Action": "s3:*",
8              "Effect": "Allow",
9              "Resource": "arn:aws:s3:::mybucket082019",
10             "Principal": {
11                 "AWS": [
12                     "arn:aws:iam::862690015328:user/s3user"
13                 ]
14             }
15         }
16     ]
17 }
```

CORS Configuration

```
<corsConfiguration> <corsRule>
<allowedOrigin>http://www.sample1.com</allowedOrigin>
<allowedMethod>PUT</allowedMethod>
<allowedMethod>POST</allowedMethod>
<allowedMethod>DELETE</allowedMethod>
<allowedHeader>*</allowedHeader> </corsRule>
<corsRule>
<allowedOrigin>http://www.sample22.com</allowedOrigin>
> <allowedMethod>PUT</allowedMethod>
<allowedMethod>POST</allowedMethod>
<allowedMethod>DELETE</allowedMethod>
<allowedHeader>*</allowedHeader> </corsRule>
<corsRule> <allowedOrigin>*</allowedOrigin>
<allowedMethod>GET</allowedMethod> </corsRule>
</corsConfiguration>
```



Amazon S3 Storage Types

- Amazon S3 Standard
- Amazon S3 Standard Infrequent Access
- Amazon S3 One Zone Infrequent Access

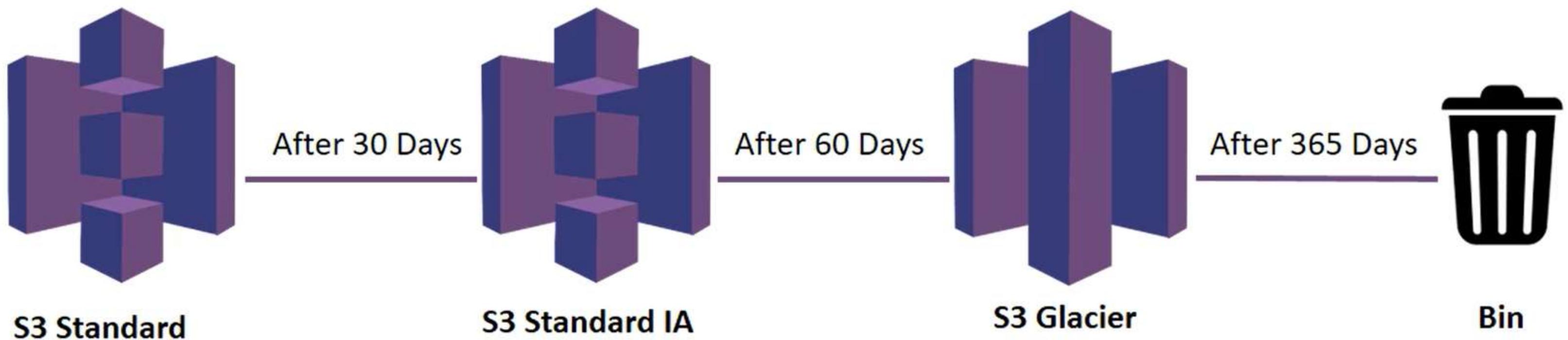


Amazon S3 Archive Storage

- Amazon S3 Glacier
- Amazon S3 Glacier Deep Archive



S3 Life Cycle Policy



S3 Pricing

Pay for the given requests

- Transfer data to other regions or in the internet
- PUT, GET, POST, COPY, LIST Requests
- GB per month

Don't pay for the given requests

- Receiving data to S3
- Transfer data to EC2 Service in the same region or in the Cloud Front

Summary

In this session, you learnt about

- Amazon Simple Storage Service (Amazon S3)
- Bucket Policies and Access Control List
- Storage Types
- S3 Pricing options



VIRTUAL PRIVATE CLOUD (VPC)



Module Overview

In this module, you will learn about

- Benefits of VPC
- Types of VPC
- VPC Components



Benefits of AWS VPC

- Security
- Easy to Set-up and Use
- Application Performance



Types of VPCs

Two types of VPCs

1. Default VPC

- Default VPC that is by default created by Amazon

2. Custom VPC

- Non-Default VPC that is created by you



VPC Networking Components

- Subnet
- Internet Gateway
- Route tables
- NAT Gateway
- EIP

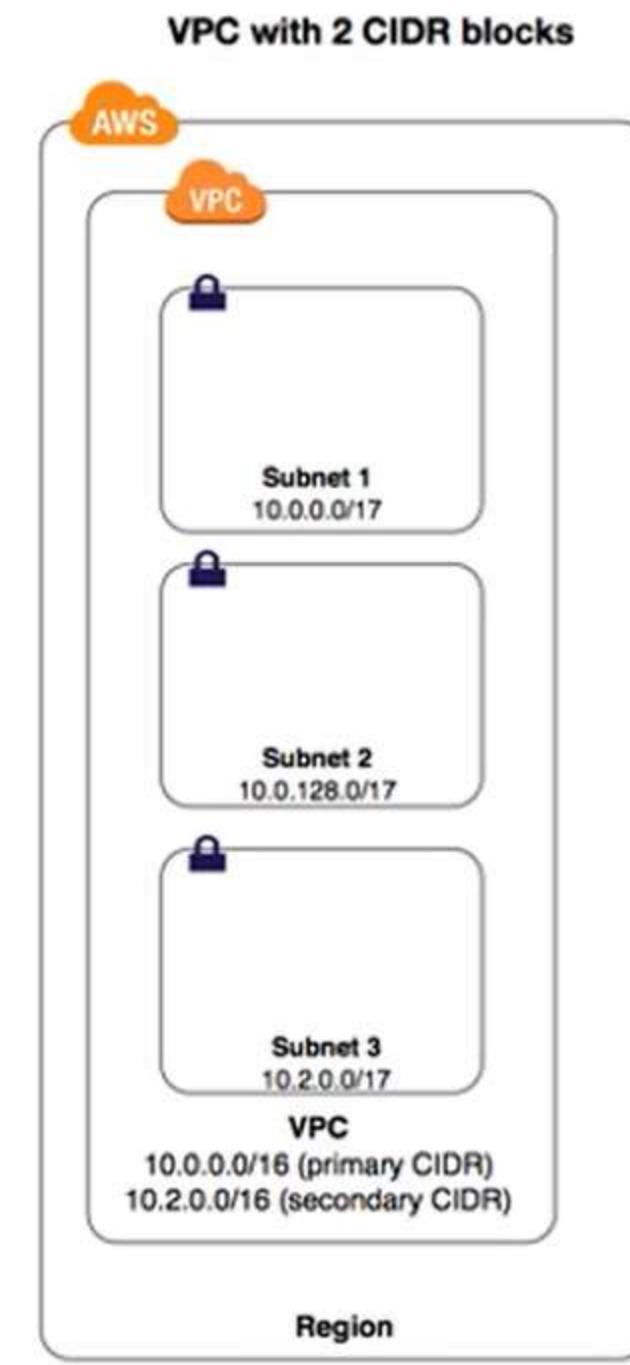
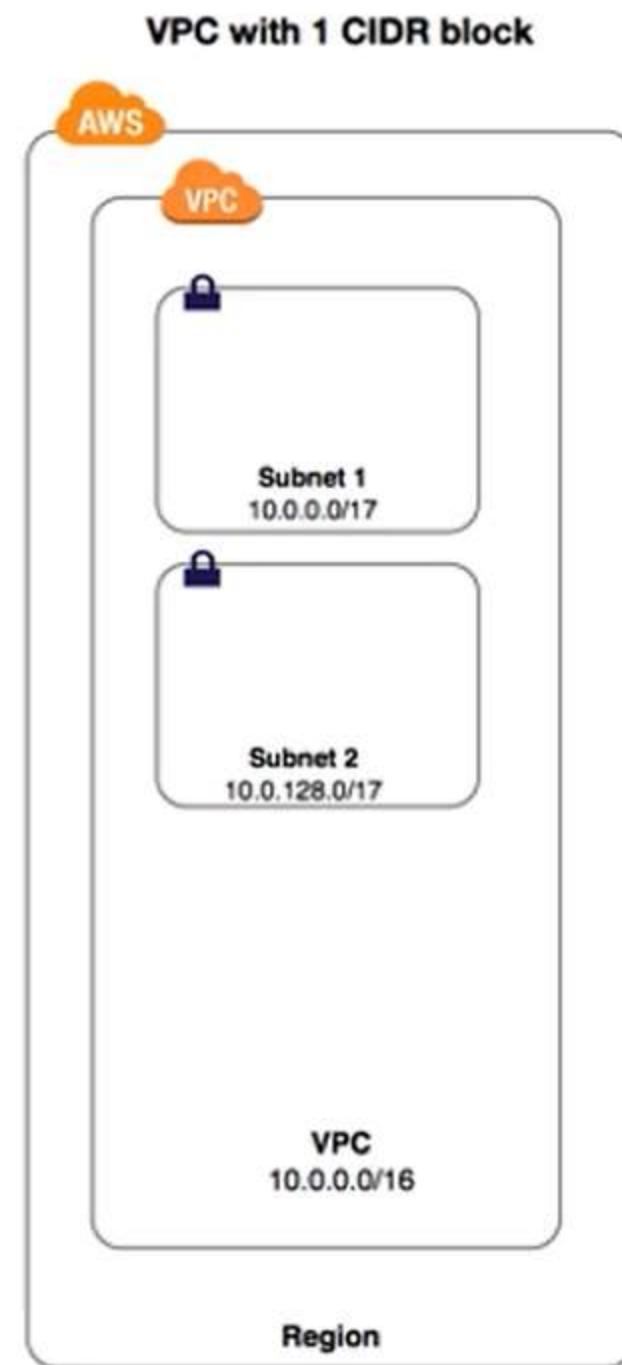


VPC Networking Components

- Virtual private gateway
- Peering Connection
- VPC Endpoints
- Egress-only Internet Gateway
- Elastic network interfaces



Subnet



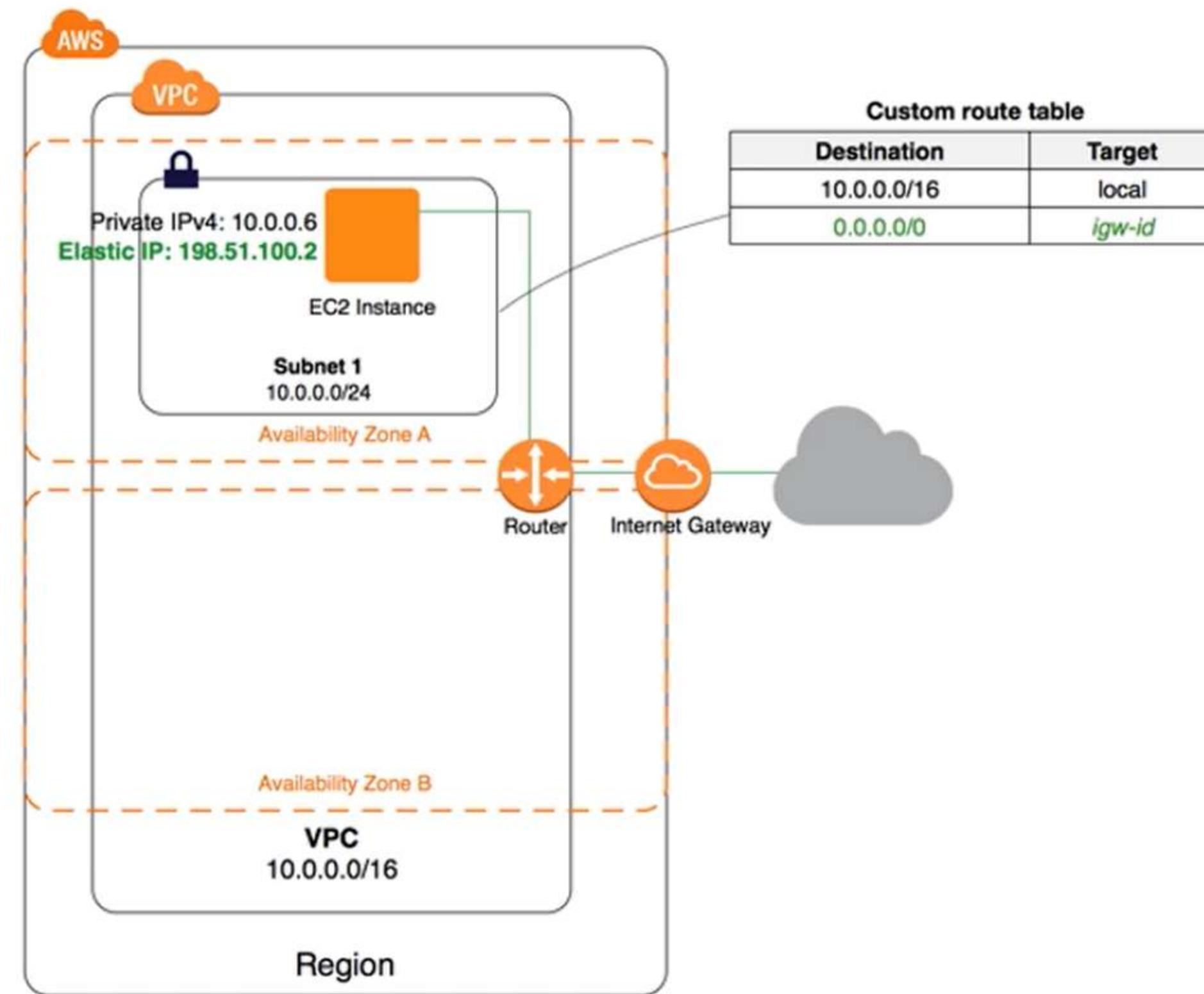
Main route table

Destination	Target
10.0.0.0/16	local

Main route table

Destination	Target
10.0.0.0/16	local
10.2.0.0/16	local

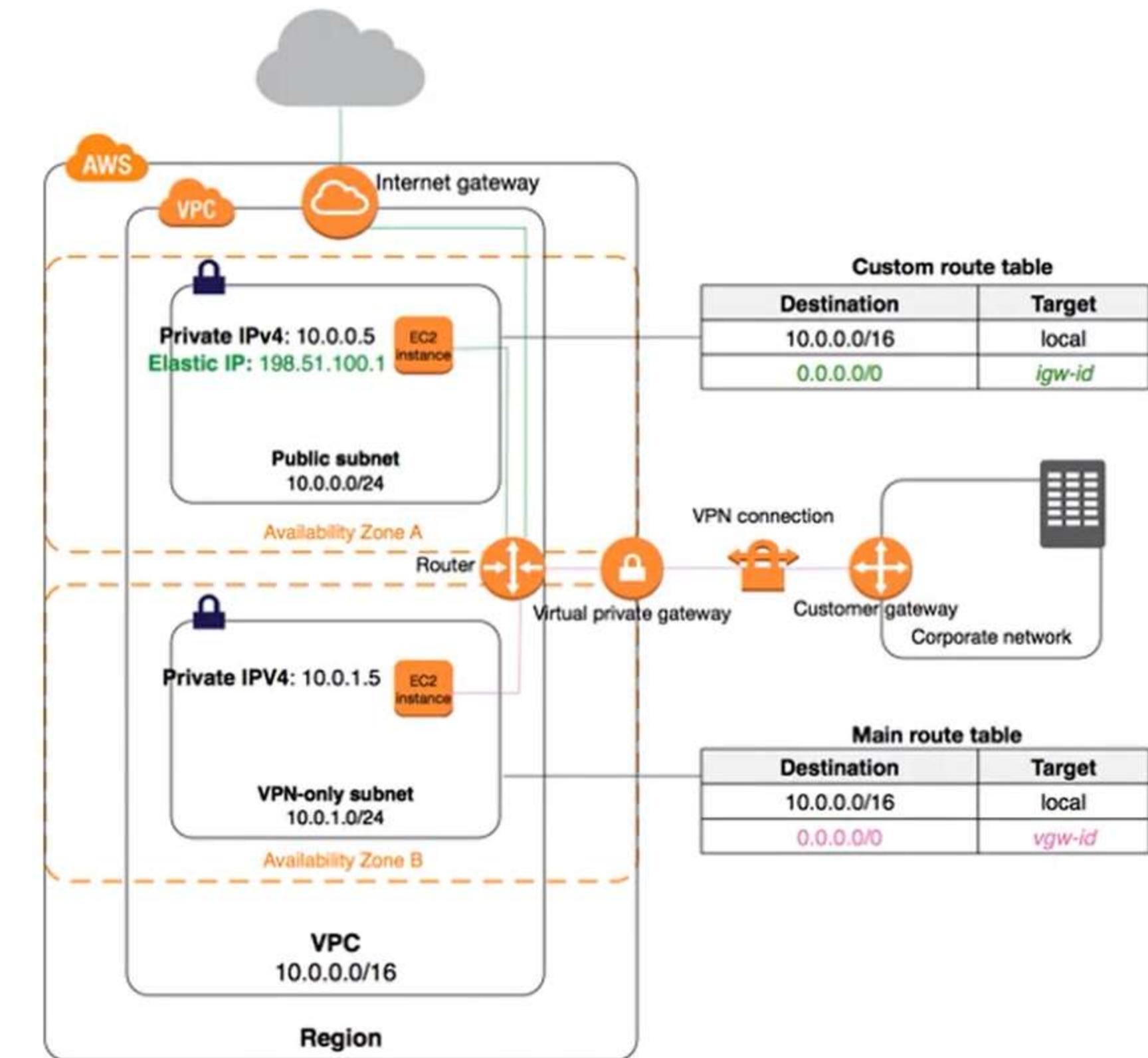
Internet Gateway



Route Tables

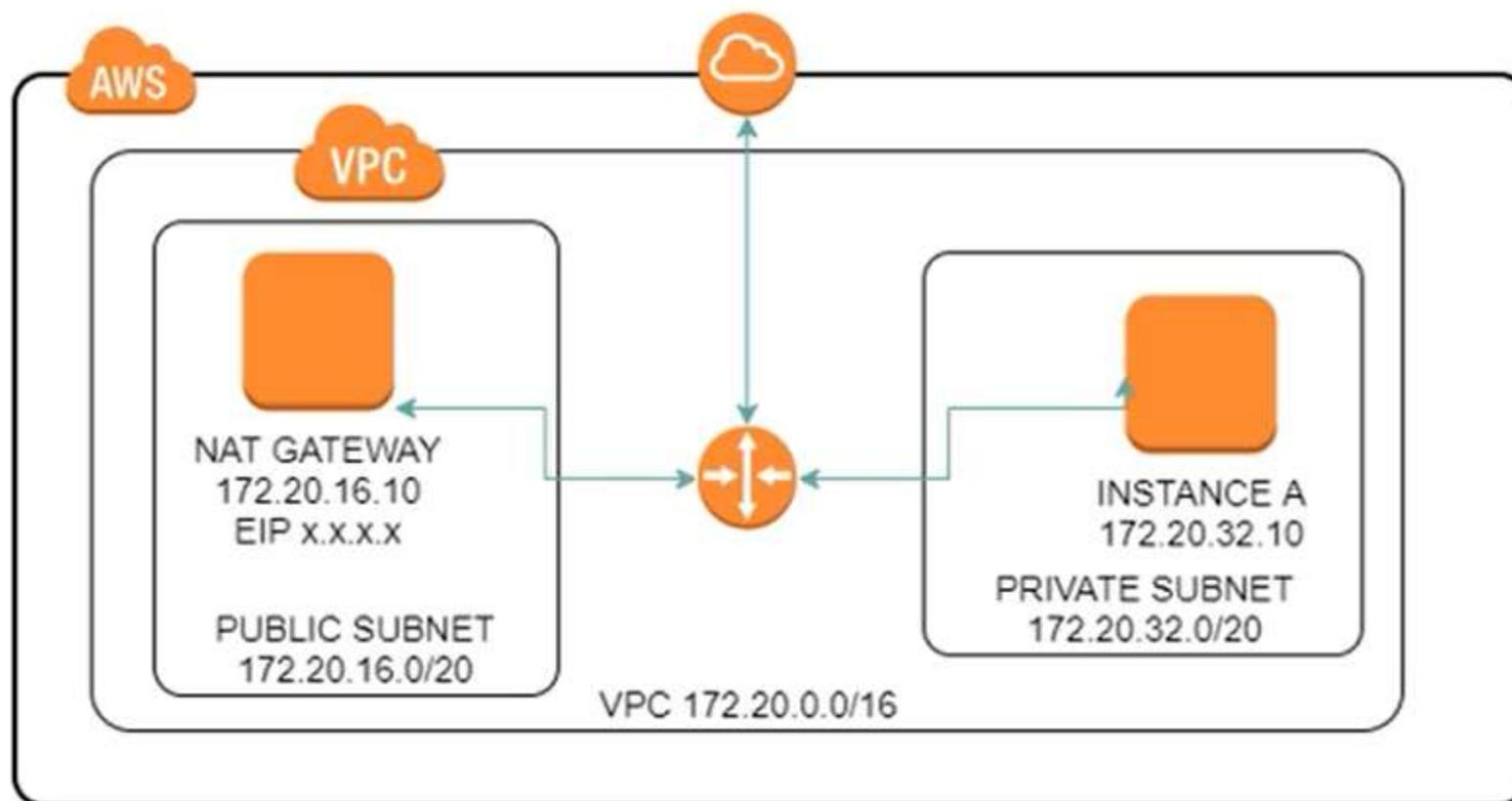
Route Table

- Main Route Tables
- Custom Route Tables

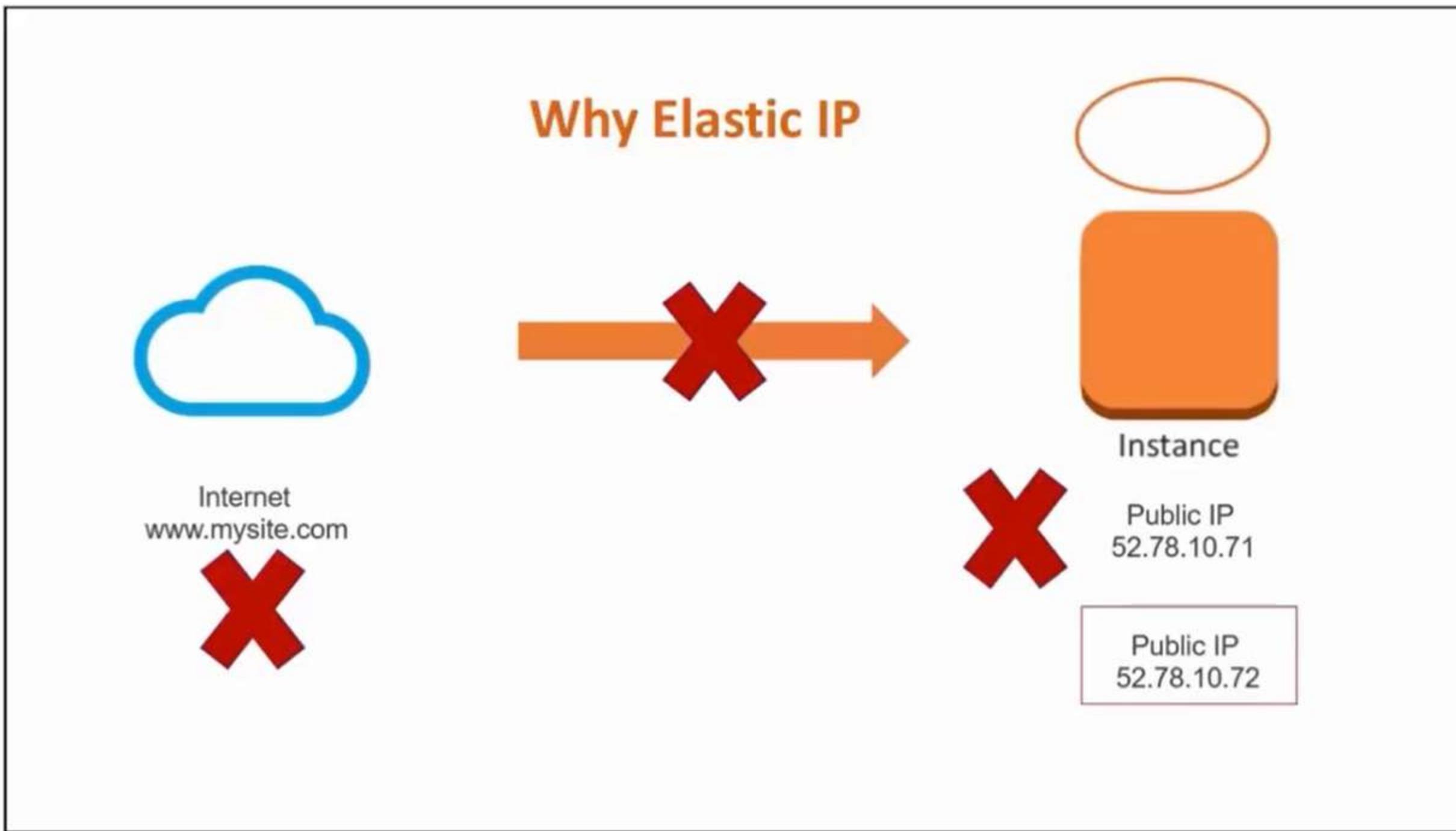


NAT Gateway

- NAT Gateway
- NAT Instance
- Bastion Host



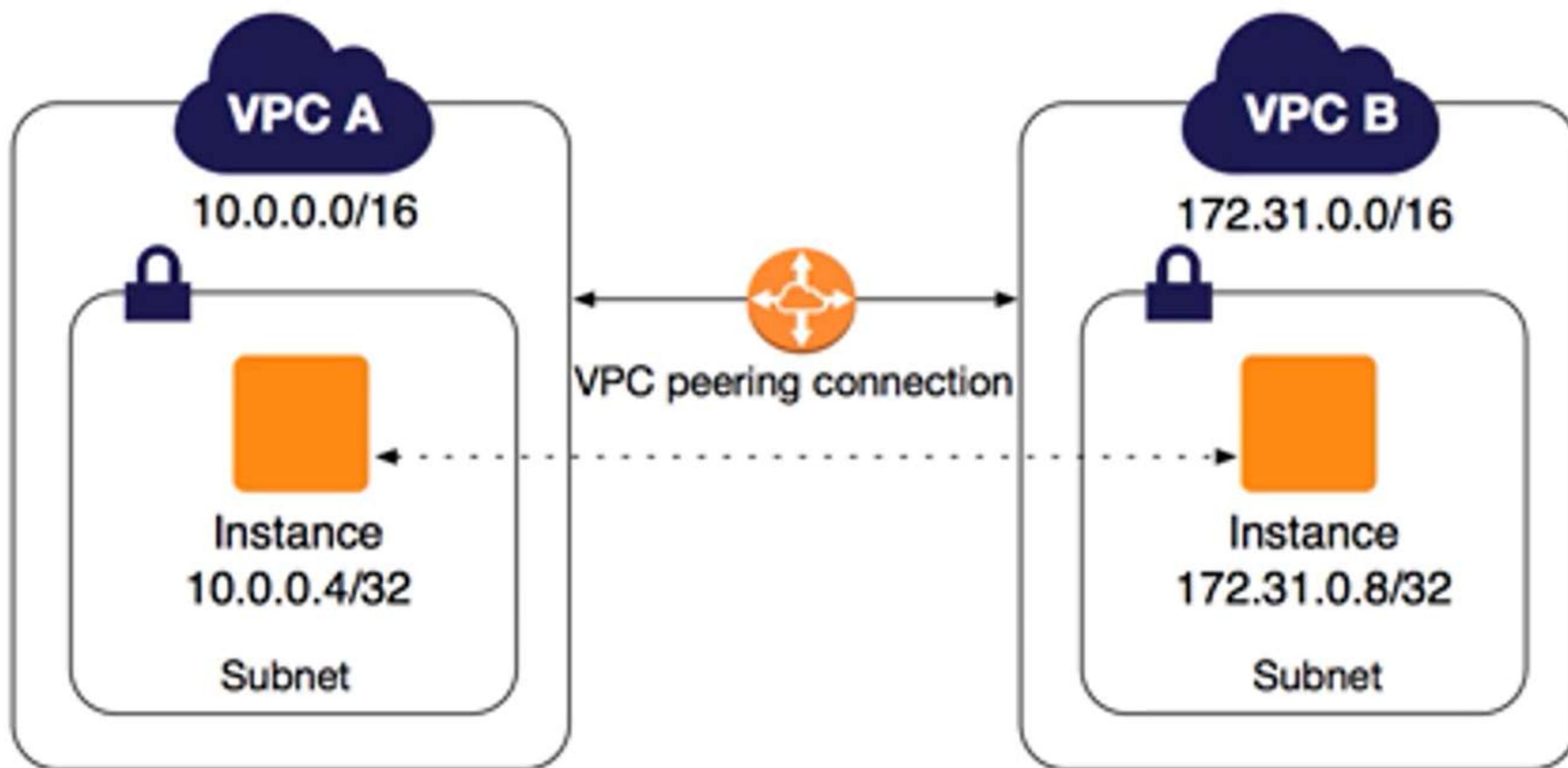
Elastic IP Address (EIP)



Virtual Private Gateway

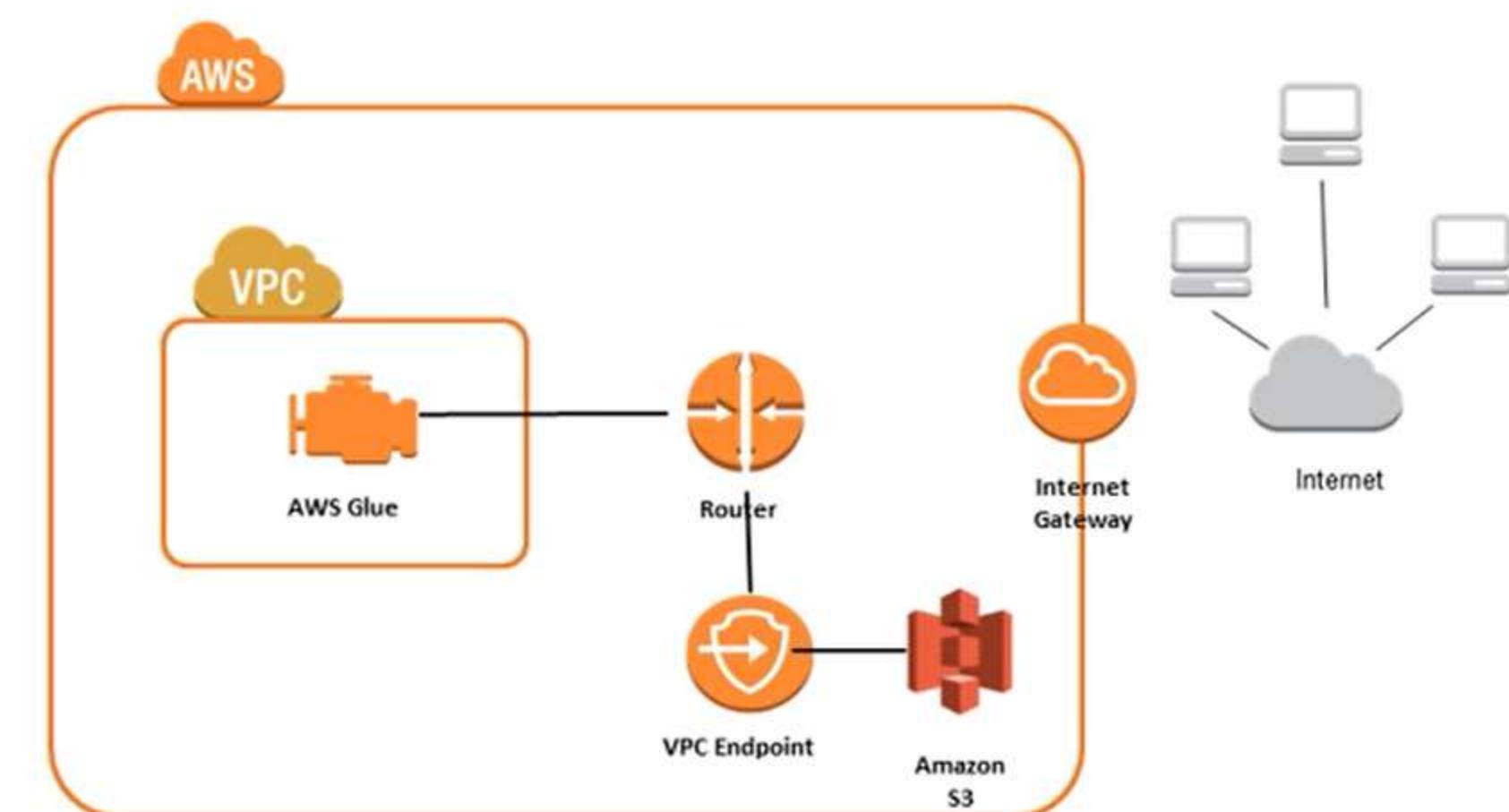
- VPN connection
- VPN tunnel
- Customer gateway
- Customer gateway device

Peering Connection

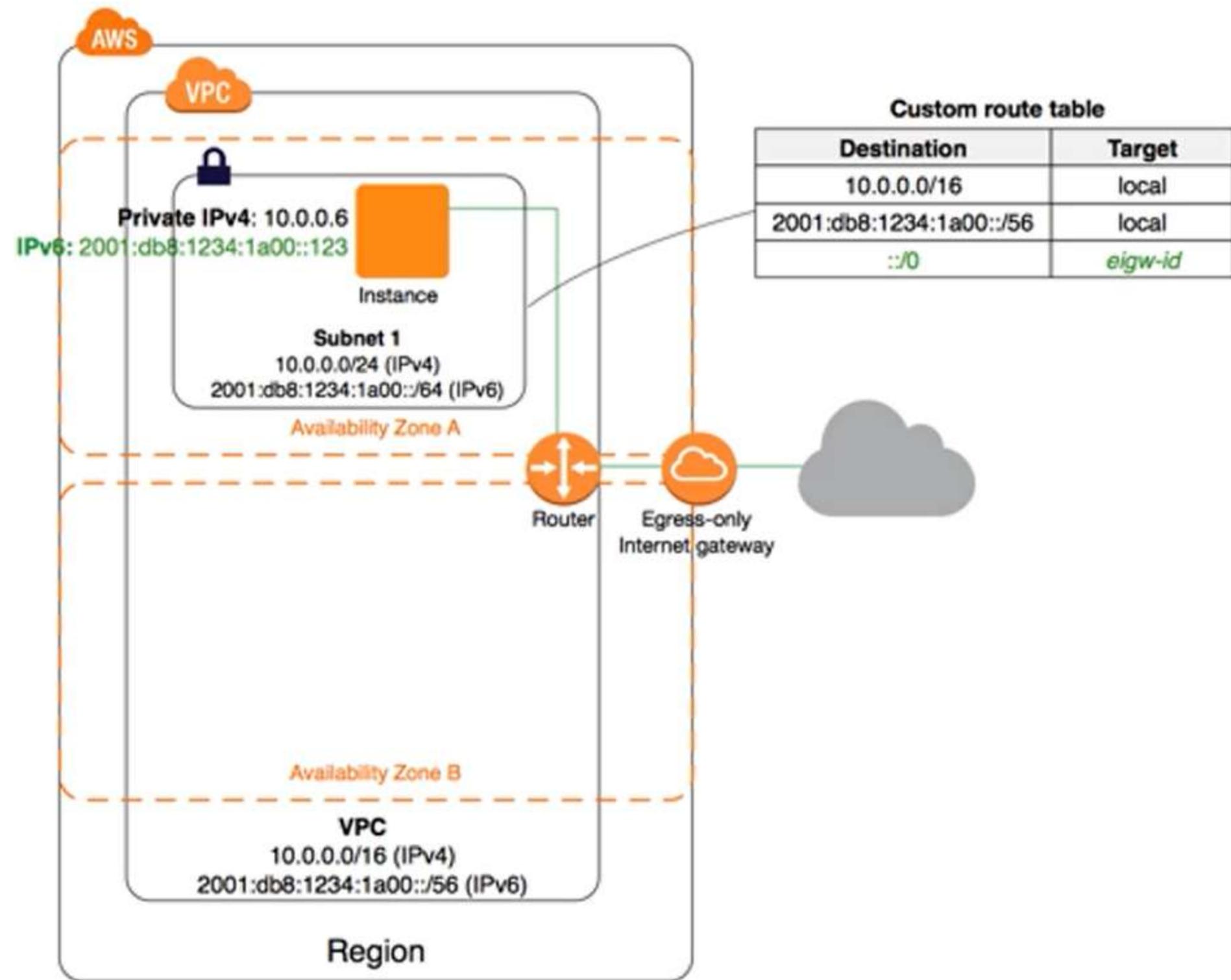


VPC Endpoints

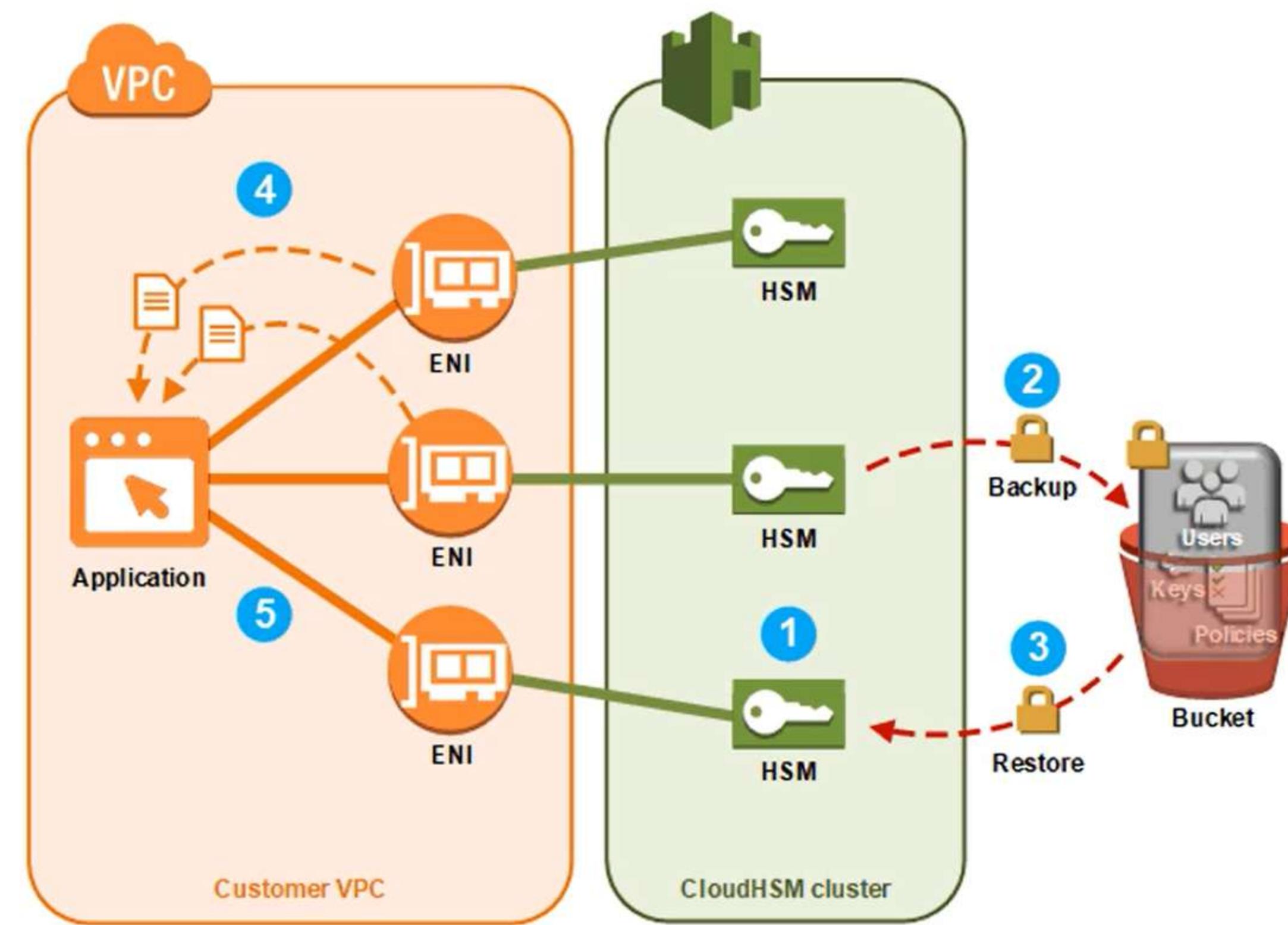
- Interface Endpoints
- Gateway Endpoints



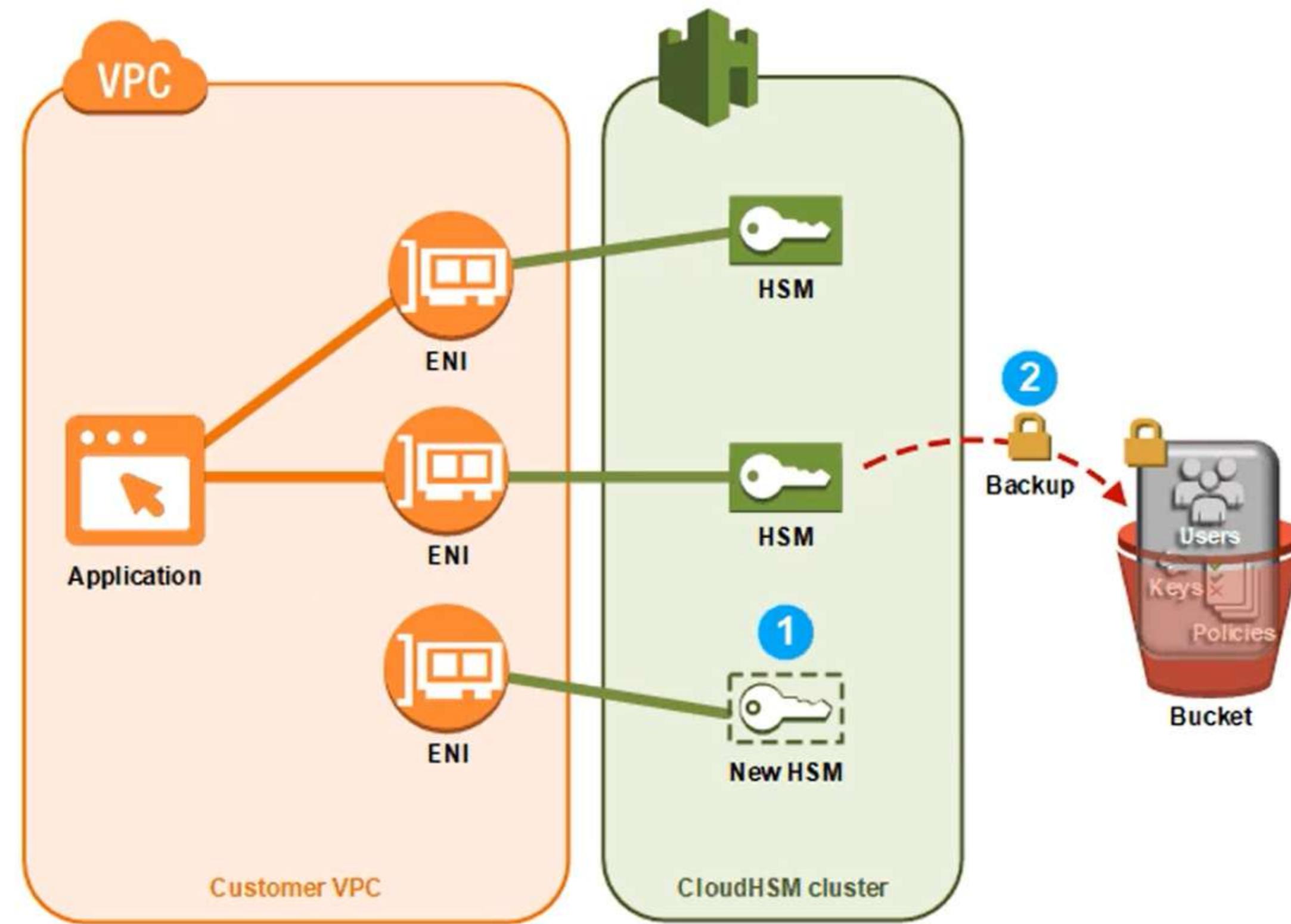
Egress-Only Internet Gateway



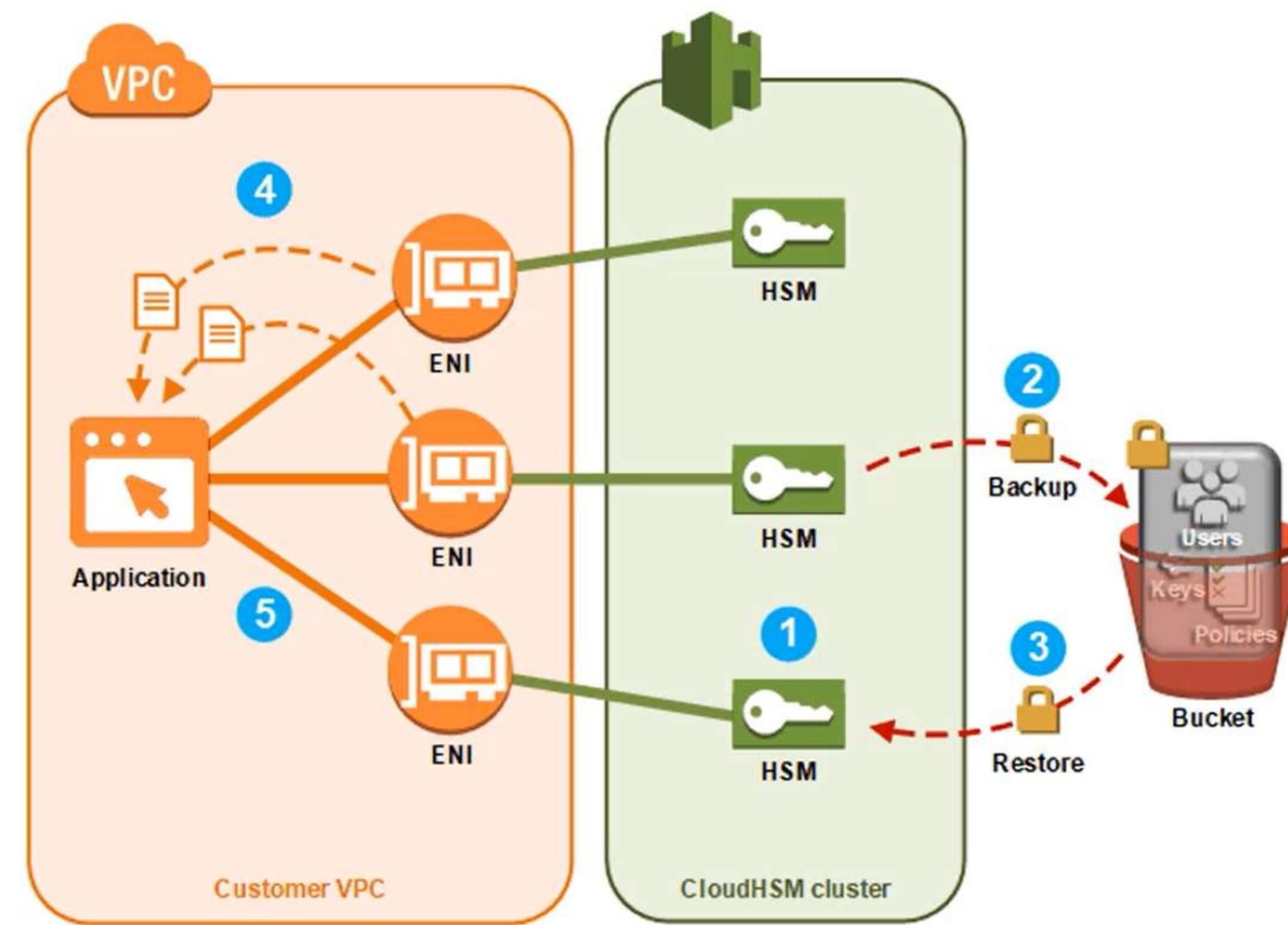
Elastic Network Interface



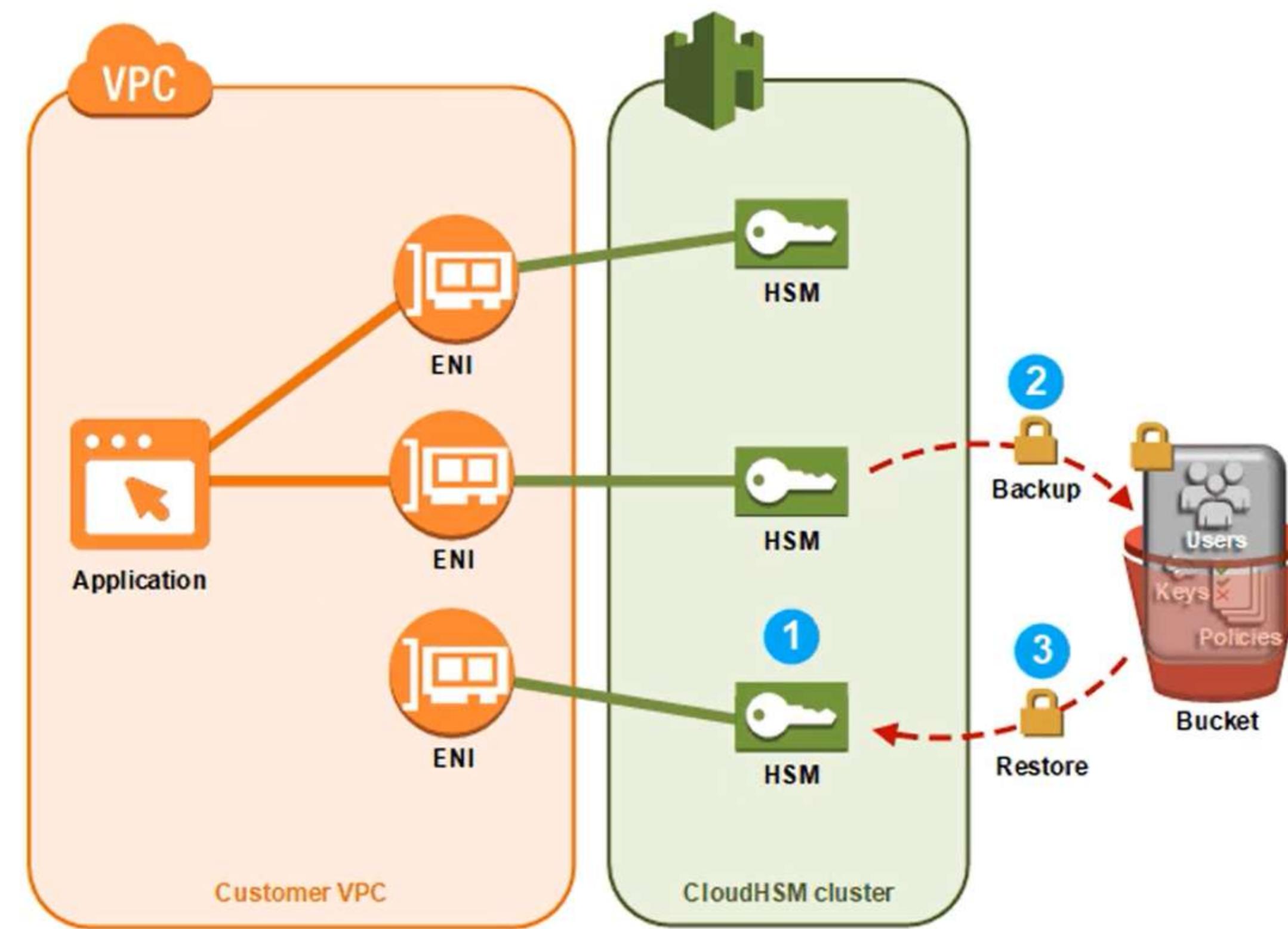
Elastic Network Interface



Elastic Network Interface



Elastic Network Interface



VPC Security



- Network Access Control List
- Security Group

AMAZON ELASTIC CLOUD COMPUTING

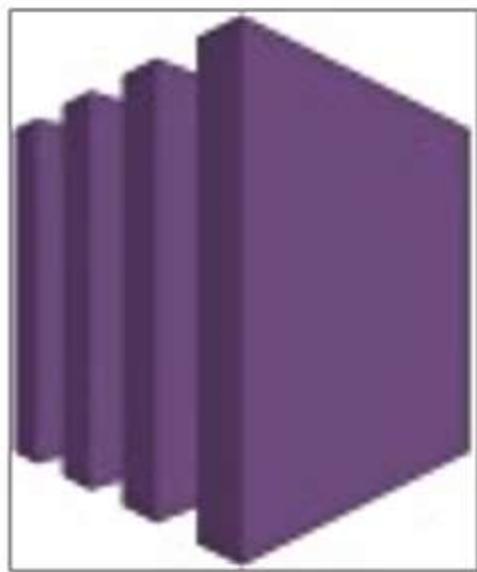


Objective

In this session, you will learn about

- Amazon Elastic Compute Cloud (Amazon EC2)
- EC2 Instance types
- Amazon Elastic Block Store (Amazon EBS) volumes





EC2 Instance

EC2 Instance

With EC2 Instances, we can configure

- Website Hosting Server
- Authentication Server
- Database Server

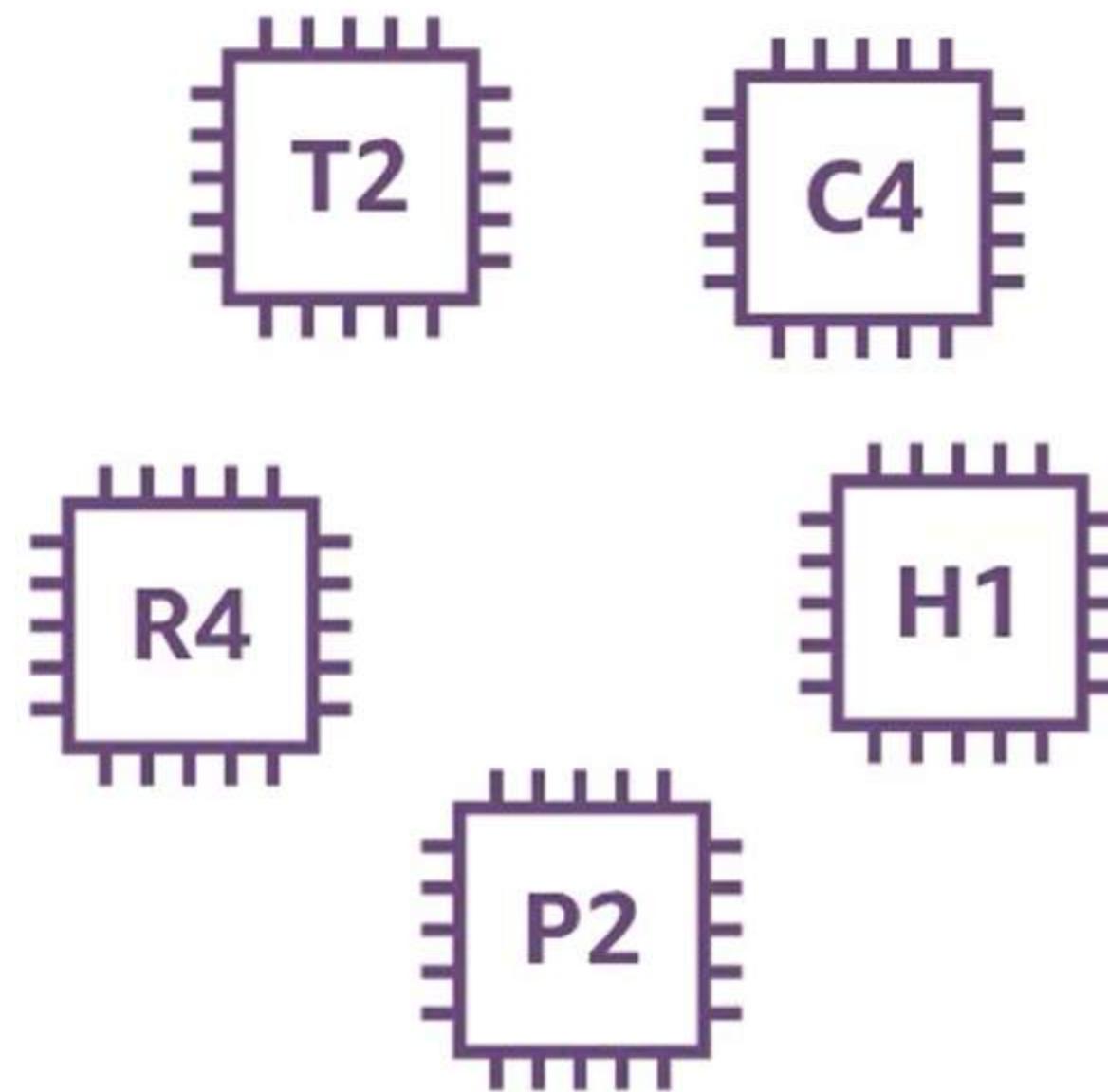




EC2 Instance Types

EC2 Instance Types

- General Purpose
- Compute Optimized
- Memory Optimized
- Storage Optimized
- Accelerated Computing





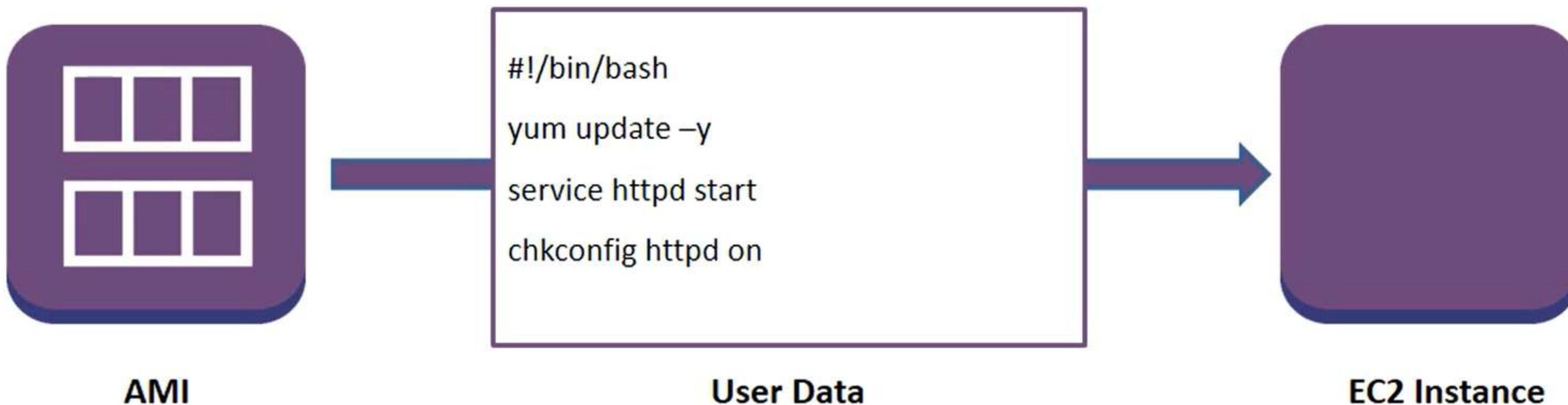
EC2 Tenancy

EC2 Tenancy Types

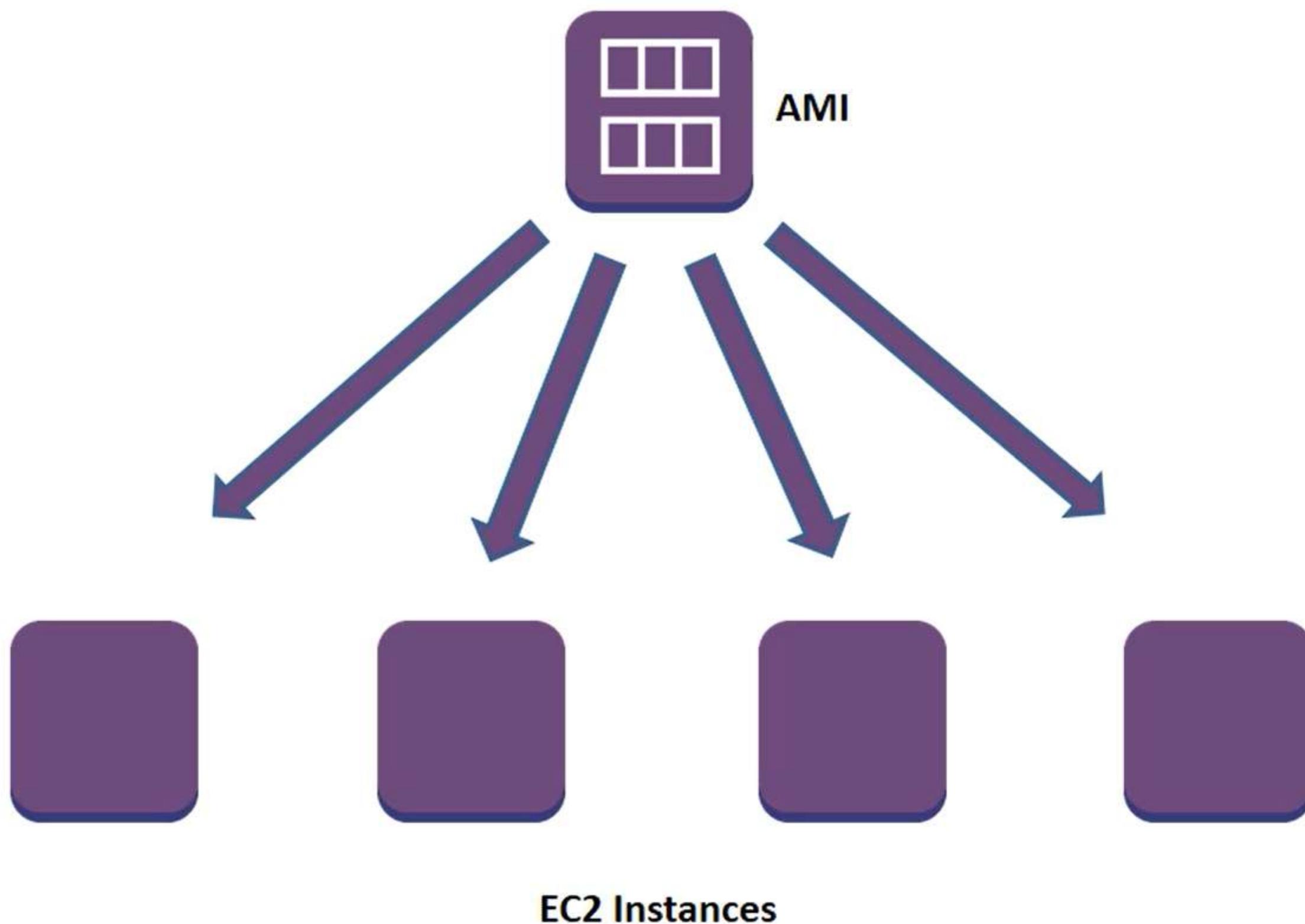


- **Shared Tenancy – Default**
- **Dedicated Tenancy**
 - Dedicated Hosts
 - Dedicated Instances

EC2 Instance User Data



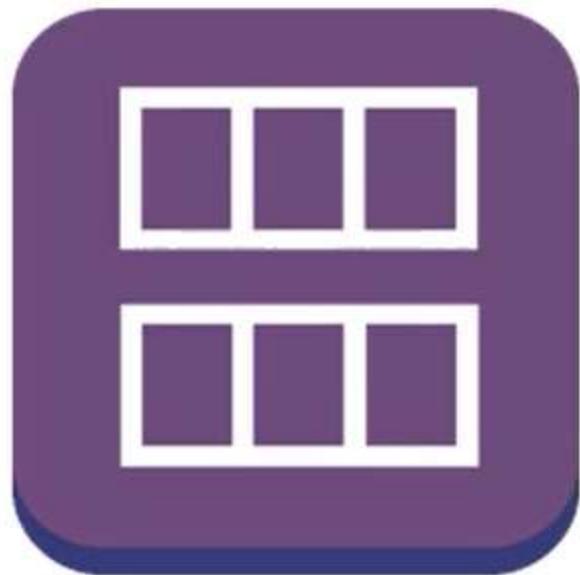
Amazon Machine Image (AMI)



Amazon Machine Image (AMI)

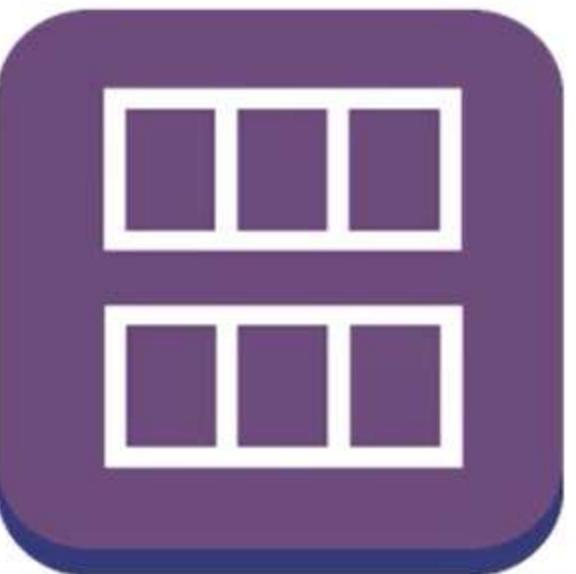
How to get the AMI?

- Create your own AMI
- Pre-built
- AWS Marketplace



Advantages of AMI

- Reusability
- Repeatability
- Recoverability
- Backup



What is EBS?

EBS Volumes provide

- Durability
- Detachability
- Directly attached to instances



EBS Volume Types

Solid State Backed

- General Purpose SSD
- Provisioned IOPS SSD

Hard Disk Backed

- Throughput Optimized HDD
- Cool HDD



EBS vs S3 vs EFS

- Amazon EBS
- Amazon S3
- Amazon EFS



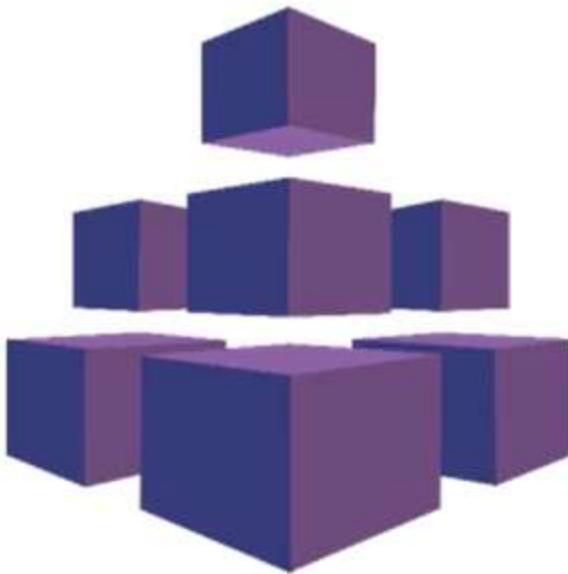
Elastic File System (EFS)

Amazon EFS (Linux Platform)

- Shared across AZ
- VPC
- Region

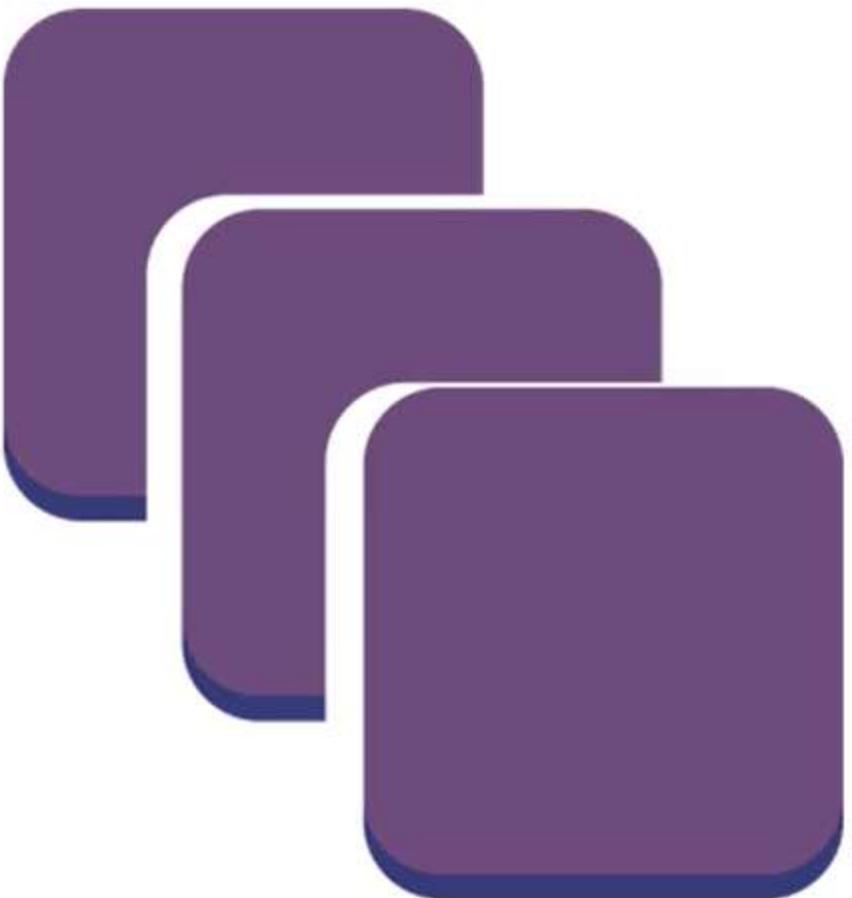
Amazon FSX (Windows Platform)

- Shared across AZ



EC2 Pricing

- On-Demand Instance
- Reserved Instance
- Spot Instance



Module Summary

In this session, you learnt about

- Amazon Elastic Compute Cloud (Amazon EC2)
- EC2 Instance types
- Amazon Elastic Block Store (Amazon EBS) volumes



AMAZON DATABASE SERVICE



Module Overview

In this session, you will learn about

- Database Services
- RDS Database Engines
- Benefits of RDS
- RDS Components
- Dynamo DB
- Pricing



Amazon Database Service



RELATIONAL



KEY-VALUE



IN-MEMORY



DOCUMENT



GRAPH

RDS Database Engines

- Amazon Aurora
- PostgreSQL
- MySQL
- MariaDB
- Oracle Database
- SQL Server



Amazon Aurora

Amazon Aurora is a MySQL and PostgreSQL compatible relational database which is built for the cloud for providing simplicity and cost-effectiveness of open-source databases with the availability and performance of traditional enterprise databases.

- 5 times faster than standard MySQL
- 3 times faster than standard PostgreSQL



PostgreSQL

- You can deploy scalable and highly available PostgreSQL relational databases using RDS and connect them. It only takes minutes to deploy a PostgreSQL instance. RDS PostgreSQL provides the same functionalities as the traditional PostgreSQL, so you can just dump or upload your local database into the RDS.
- **Pricing**
- Database Storage: \$0.115/GB/month
- Backup Storage: \$0.095/GB/month



MySQL

- MySQL is the world's most used and popular relational database, and Amazon RDS provides an easy way to set-up, operate, and scale. You can use the code which you are writing because RDS for MySQL covers all versions of MySQL.
- **Pricing**
- Database Storage: \$0.115/GB/month
- Backup Storage: \$0.095/GB/month



MariaDB



- MariaDB is created by original creators of MySQL and it is very popular in creating PHP based applications. All versions of MariaDB is covered by Amazon EDS.
- **Pricing**
 - Database Storage: \$0.115/GB/month
 - Backup Storage: \$0.095/GB/month



Oracle

- Oracle's relational database is called Oracle Database.
- **Pricing**
- Database Storage: \$0.115/GB/month
- Backup Storage: \$0.095/GB/month



Microsoft SQL Server

- Microsoft's relational database is called the SQL Server. Multiple editions of SQL Server (2008 R2, 2012, 2014, 2016, and 2017), including Express, Web, Standard, and Enterprise, are merged with Amazon RDS, so whatever code your application is built with can be applicable in the RDS.
- **Pricing**
- Database Storage: \$0.115/GB/month
- Backup Storage: \$0.095/GB/month
- But for all database engines, 'data in' from the Internet is free, only 'data out' requires a payment.

MS SQL

Benefits of RDS

- Easy to administer
- Highly scalable
- Available and durable
- Fast
- Secure
- Inexpensive



AWS RDS Components

- DB Instances
- Regions and Availability Zones
- Security Groups
- DB Parameter Groups
- DB Option Groups

Amazon DynamoDB

- Amazon DynamoDB is a key-value and document database that delivers single-digit millisecond performance at any scale.



Amazon DynamoDB

Pricing

RDS AWS is billed based on the following parameters:

- Instance Class
- Running Time
- Storage
- I/O Requests per Month
- Data Transfer

Summary

In this session, you learnt about

- Database Services
- RDS Database Engines
- Benefits of RDS
- RDS Components
- Dynamo DB
- Pricing



IDENTITY AND ACCESS MANAGEMENT (IAM)



MODULE OVERVIEW

In this session, you will learn about

- IAM Features
- Authorization and authentication
- Users and Groups
- Roles and Policies



Learning Objectives

IAM FEATURES

- Shared access to your AWS account
- Granular permissions
- Secure access to AWS resources for applications that run on Amazon EC2
- Multi-factor authentication (MFA)
- Identity federation

ACCESSING IAM

- AWS Management Console
- AWS Command Line Tools
- AWS SDKs
- IAM HTTPS API



AUTHENTICATION AND AUTHORIZATION

- Principal
- Authentication
- Authorization



USERS

- Root User
- IAM Users
- Federated Users



PERMISSIONS AND POLICIES

- Policies and Accounts
- Policies and Users
- Policies and Groups
- Federated Users and Roles



IDENTITY-BASED AND RESOURCE-BASED POLICIES

- Identity-based policies
 - Managed policies
 - AWS managed policies
 - Customer managed policies
 - Inline policies
- Resource-based policies

SUMMARY

In this session, you learnt about.

- IAM Features
- Authorization and authentication
- Users and Groups
- Roles and Policies

Summary



[BACK TO LEARNING PATH](#)[HANDBOOK](#)[WEBINAR & MICRO CERTIFICATION SCHEDULE](#)[Dashboard](#) / [Cloud](#) / [Introduction to AWS](#) / [Amazon IAM Presentation Deck](#)

THANK YOU...!!!