



Amazon Web Services

Physical and Virtual Computing Environment

Learning Objective

- ❖ **Computing Environments and Getting Started with Virtualization**

Topics Covered

- ❑ Computing Environments and Operating Systems
 - ❑ Personal Computing, Server- Client
- ❑ Understanding Virtualization and Advantages
- ❑ Understanding Hypervisor
 - ❑ Hosted
 - ❑ Baremetal

Hands-On

- ❑ Setting up a Virtual Machine with Windows OS Locally

Cloud Computing with AWS

Learning Objective

- ❖ **Cloud Computing and Introduction to AWS.**

Topics Covered

- ❑ What is Cloud Computing
- ❑ History & Comparison with Client Server computing

- ❑ Advantages of Cloud Computing
- ❑ Why AWS is different from other Vendors.
- ❑ Future of Cloud
- ❑ Service Model of Cloud
 - ❑ SAAS
 - ❑ PAAS
 - ❑ IAAS
- ❑ Deployment Model of Cloud
 - ❑ Public
 - ❑ Private
 - ❑ Hybrid
- ❑ AWS Infrastructure (Regions and Availability Zone)
- ❑ Design Diagram Tools for AWS - draw.io
- ❑ Accessing AWS
 - ❑ Management Console
 - ❑ AWS CLI
 - ❑ AWS SDK
- ❑ AWS Account Plans and Free Tier
- ❑ Overview of AWS Domain and Services

AWS Elastic Compute Cloud in Compute Domain

Learning Objective

- ❖ **Introduction to Compute Service in AWS**
- ❖ **Understanding and Mastering EC2 and it's Features**
- ❖ **Designing Highly Available, Scalable, Cost-efficient Systems**
- ❖ **Select the Appropriate Instance(s) Based on Compute, Storage, and Networking Requirements.**
- ❖ **Determine the Most Cost-effective Amazon EC2 Billing Options for Each Aspect of the Workload.**

Topics Covered:

- ❑ Understanding EC2, Instance, AMI, Security Group, KeyPair
- ❑ Launching EC2 Instance and Connect
 - ❑ Windows Instance

- Linux Instance
- Status Checks, Instance Userdata and Metadata
- Instance Lifecycle
- EC2 Instance Types and Family
 - General Purpose
 - Compute Optimized
 - Memory Optimized
 - Storage Optimized
 - Accelerated Computing
- EC2 Instance Pricing Options
 - On-Demand
 - Reserved
 - Scheduled Reserved
 - Spot
 - Shared Instances
 - Dedicated Instances
 - Dedicated Host
 - Capacity Reservation
 - Saving Plans
- Types of AMIs to Launch EC2 Instance
 - AWS Published
 - AWS Marketplace
 - Creating from Existing Instance
 - Upload Virtual Services
- AWS Service Limits and Support Plans
- Summary of EC2 Services
- Exam Essentials

Hand-on Lab:

- Launching EC2 Instance (Windows) with Standard SSD Storage, Connect to Windows Instance with Remote Desktop Protocol, and make Web Server.
- Launching EC2 Instance (Linux) with Standard SSD Storage, Connect to Linux instance with Secure Shell via Putty software and make Web Server.
- Managing Instance Lifecycle - Stopping, Rebooting and Terminating Instance

AWS Storage Service (Block Storage)

Learning Objective

- ❖ Understanding Cloud Storage and it's Advantages
- ❖ Mastering Block Storage
 - Instance Store
 - Elastic Block Store
- ❖ Mastering EBS Volumes, Snapshots and Images
- ❖ Select an Appropriate Compute and Storage Service Based on Requirements.

Topics Covered

- Understanding Cloud Storage and Advantages of Cloud Storage
- Understanding Terminologies of Cloud Storage
 - HDD/SSD
 - Physical Hard Disk
 - Virtual Hard Disk
 - Volume
 - IOPS
 - Disk I/O
 - Storage Memory in GiB, MiB, KiB
- AWS Instance Store vs Elastic Block Store
- EBS Volumes - Extending, Creating, Attaching, Detaching, Deleting
- EBS Volume Types - gp2, gp3, io1, io2, sc1, st1
- EBS Snapshots
- AMIs using EBS Snapshots
- Cross-region Copy of Snapshot and AMI
- EBS Snapshot LifeCycle Manager
- Summary of Cloud and EBS Storage
- Exam Essentials

Hands-On

- ❑ Launching Windows EC2 Instance with Root EBS Volume (Default Size), and later Increase the Size of EBS Volume (5GiB)
- ❑ Creating and Attaching New EBS Data Volume to Windows EC2 Instances as Additional Storage.
- ❑ Detaching and Deleting Unused Volumes
- ❑ Creating Image from Existing Instance Based on Volume or Instance
- ❑ Cross Region / Cross Account - Image/Snapshot Copy

AWS Storage Services (File and Object)

Learning Objective

- ❖ **Identify Storage Services that can be used with Hybrid or Non-Cloud-Native Applications.**
- ❖ **Select a Storage Service and Configuration that meets Performance Demands**
- ❖ **Determine Storage Services that can Scale to Accommodate Future Needs**
- ❖ **Understanding File storage using NFS and SMB**
- ❖ **Mastering File Storage with Elastic File System**
- ❖ **Mastering File Storage with FSx**
- ❖ **Understanding Object Storage**
- ❖ **Mastering Object Storage with Simple Storage Services**

Topics Covered

- ❑ Understanding Traditional File Sharing Using NFS and SMB
- ❑ AWS File Storage using Elastic File System
- ❑ Create and Mount File Share in EFS
- ❑ Understanding the EFS Performance Mode, Storage LifeCycle
- ❑ AWS Fsx Console Walkthrough
- ❑ Object vs Block vs File Storage
- ❑ AWS Simple Storage Service (S3)
- ❑ S3 Benefits and Uses
- ❑ S3 Storage Classes
 - ❑ Standard

- Standard-IA
- One-Zone IA
- Intelligent Tiering
- Reduced Redundancy
- Glacier Instant Retrieval, Flexible Retrieval, Deep Archive
- S3 Pricing
- S3 Bucket Properties
 - Presigned URL
 - Versioning
 - Encryption
 - Intelligent-Tiering Archive Configuration
 - Static Web Hosting
 - Server and Object Access Logging
 - Requesters Pay
 - Transfer Acceleration and Object Lock
- S3 Bucket Permissions
 - Block Public Settings
 - ACL
 - Policy
 - CORS
- S3 Bucket Management
 - LifeCycle Rule
 - Replication Rule
- Summary and Exam Essentials

Hands-On

- Creating an EFS File System and Mounting it to two Linux EC2 Instances.
- Creating S3 Bucket and Uploading Objects, Creating Presigned URL, Enabling Versioning
- Creating a S3 Static Website and Configure Access Logging
- Creating Bucket with Lifecycle Rule and Cross Region Replication Rule

AWS Virtual Private Cloud

Learning Objective

- ❖ Mastering Network Basics

- IP addressing
- Devices - Switch and Router
- LAN and WAN
- Subnetting
- ❖ Designing a Local Area Network
- ❖ Understanding Networking in AWS Cloud
- ❖ Mastering Virtual Private Cloud
- ❖ Determine a Network Segmentation Strategy Using Public and Private Subnets and NAT Instance/Gateway.
- ❖ Implement VPN for On-premises
- ❖ Implement Transit Network
- ❖ Understanding Storage Gateway
- ❖ Given Traffic Control Requirements, Determine When and How to Use Security Groups and Network ACLs.
- ❖ Select the Appropriate Routing Mechanism to Securely Access AWS Service Endpoints or Internet-based Resources from Amazon VPC.
- ❖ Troubleshooting Network Problems

Topics Covered

- Virtual Private Cloud
- Subnets
- Route Tables
- Internet Gateway
- Private, Public and Elastic IP and Elastic Network Interface
- Private and Public Subnets
- Nat Instance and Nat Gateways
- VPC Peering - Intra, Inter Region and Same, Cross Account
- Virtual Private Gateway
- Customer Gateway
- Virtual Private Network - Customer Gateway and Virtual Private Gateway
- Transit Gateway - Attachments, RouteTable and Associations
- AWS Direct Connect
- Storage Gateway
- Security Group and Network Access Control List
- Summary
- Exam Essentials

Hands-On

- ❑ Verifying Default VPC, Subnets, Route Table and Internet Gateway, Deleting and Recreating Default VPC
- ❑ Creating a Custom VPC, Subnet, Internet Gateway, Managing Route Table and Launching EC2 Instance.
- ❑ Verifying Private and Public IP and Allocate, Associate, Disassociate and Release Elastic IP
- ❑ Creating Public and Private Subnets and Managing Route Tables, Launching Instance in Public and Private Subnets and Use Public Subnet Instance(Bastion) to Login to Private Subnet Instance
- ❑ Creating Nat Gateway and Allow Internet Access to Private Subnet Instances .
- ❑ Creating VPC Peering Connection between two Regions and Manage Route Tables
- ❑ Creating a VPN Connection between Openswan Customer Gateway and Virtual Private Gateway
- ❑ Creating a Transit Gateway and add attachments(VPC or VPN)
- ❑ Managing security Groups and Network Access Control List

AWS Management Tools

Learning Objective

- ❖ **Learn How to Monitor and Audit AWS services using CloudWatch**
- ❖ **Understanding CloudWatch Basic Monitoring and Detailed Monitoring**
- ❖ **Setting CloudWatch Alarms on EC2 instance**
- ❖ **Understanding CloudTrail.**
- ❖ **Create and Logs all events using CloudTrail**
- ❖ **Learn how to set a budget for Cost Management, Cost Explore.**
- ❖ **Learn how to get SNS notification for any activity that happens in AWS Resources.**

Topics Covered

- ❑ CloudWatch Metrics, Dashboards
- ❑ Monitor EC2 Instance - CPU, Disk IO, Network IO
- ❑ CloudWatch Unified Agent

- ❑ CloudWatch Logs
- ❑ Monitor VPC Flow Logs
- ❑ CloudWatch Rules
- ❑ CloudWatch Billing Alerts
- ❑ Cost Management
- ❑ CloudTrail
- ❑ CloudTrail Logs in S3 Bucket for all API Calls
- ❑ Simple Notification Service
- ❑ Summary
- ❑ Exam Essentials

Hands-on

- ❑ Launch an EC2 Linux Instance and Monitor the CPU, Disk IO and Network IO with Basic Monitoring and Configure Stress to Increase the CPU Utilization within Linux and Monitor
- ❑ Installing CloudWatch Unified Agent for Pushing Custom Metric to CloudWatch
- ❑ Monitor VPC flow logs using CloudWatch Logs
- ❑ Audit event cloudtrail for 90 days
- ❑ Create Trail to log all events
- ❑ Create SNS Topic and Subscribe Email to get Notifications

Load Balancing and Auto Scaling of EC2 Instance and Traffic

Learning Objective

- ❖ Understanding High Availability
- ❖ Use load balancing in the creation of highly available systems.
- ❖ Understanding Scaling AWS Resources
 - Manual
 - Scheduled
 - Dynamic
- ❖ Learn scaling Applications/Systems with AutoScaling and its use in Building Fault Tolerant Networks.
- ❖ Understanding components of AutoScaling
 - Launch Configuration
 - Launch Template

➤ Autoscaling Group

Topics Covered

- Load Balancers Types
- Application
- Network
- Target Groups
- Load Balancer Configuration
- Service Health Check
- Path Based Routing
- Launch Configurations
- Launch Templates
- Scaling Groups
- Scaling Policies
- Building Fault Tolerant and Highly Available Applications
- Summary of Auto Scaling and Load Balancers
- Exam Essentials

Hands-On

- Create an Application Load balancer and register targets
- Create path based routing rules
- Create a Network load balancer and compare with application load balancer
- Launch EC2 instances and use Auto Scaling Group to build High Available Applications.

AWS Route53

Learning Objective

- ❖ Understanding Name Resolution, DNS and Amazon Route 53
- ❖ Mastering DNS Name Resolution
- ❖ Mastering DNS records
 - Name Server
 - Start of Authority
 - Host
 - Alias

- ❖ **Understanding Domain Registration**
 - **Domain Registrar**
 - **Domain Names**
 - **Subdomain Names**
- ❖ **Mastering Route53**

Topics Covered

- Domain Name Service
- AWS Route53
- Domain Registration
- Hosted Zones
- Record Sets
- Routing Policies
- DNS Failover with S3 and CDN
- Summary
- Exam Essentials

Hands-On

- Route53, Routing Policy and DNS Failover
- Implement Name Resolution for two different VPC to access web pages.

AWS CloudFront

Learning Objective

- ❖ **Understanding Content Delivery Network for Videos and media files.**

Topics Covered

- Content Delivery Network
- AWS Edge Locations
- Distributions
- CloudFront
- Summary
- Exam Essentials

Hands-On

- ❑ Create S3 Bucket and upload Video files and make them public.
- ❑ Create distribution in CloudFront to distribute videos to all Edge locations.

AWS Command Line Interface

Learning Objective

- ❖ Understanding AWS Command Line Tool
- ❖ Install AWS Command Line Tool
- ❖ AWS CLI Configuration
- ❖ Launch AWS Resources using CLI Tool

Topics Covered

- ❑ Install and Configure AWS CLI
- ❑ AWS CLI Reference
- ❑ Build AWS Resources using AWS CLI
- ❑ S3 presigned URL, Multi-part upload, MFA Delete

Hands-On

- ❑ Manage s3 using aws CLI
- ❑ Manage EC2 using aws CLI

Identity and Access Management

Learning Objective

- ❖ Understanding Fundamentals of AWS IAM
- ❖ Understanding IAM Principles
- ❖ Build Secure Administration using IAM Components
 - Users
 - Groups

- **Policies**
- **Roles**

Topics Covered

- IAM Principles
- Creating Users
- MFA
- Creating Groups
- Understanding Policies
- Understanding Console and Programmatic Access
- Access Keys and Secret Key
- IAM Roles
- Security and Policies
- VPC Endpoint for S3
- Cross AWS Account Access Using IAM User and Role
- Summary
- Exam Essentials

Hands-On

- Create Users and allow EC2 Read-Only
- Create Users and allow S3 Bucket Read-only
- Allow Specific bucket to Access Fully
- Create user access AWS Resources CLI
- Create and assign Roles to Resource

Serverless and PAAS

Learning Objective

- ❖ **Understanding What is Serverless**
- ❖ **Understanding Lambda**
- ❖ **Manual invoke and Cloud Watch(Event bridge trigger)**
- ❖ **Understanding PAAS and Elastic Beanstalk**

Topics Covered

- ❑ Lambda functions
- ❑ Configuration limitations and pricing
- ❑ Configuring Elastic Beanstalk
- ❑ Understand the deployment types

Hands-On

- ❑ Create a lambda function for stopping and starting ec2 instance
- ❑ Integrate with cloudwatch event and trigger lambda
- ❑ Create a simple sample application and deploy using elastic beanstalk

Database Services

Learning Objective

- ❖ **Understanding Database**
- ❖ **Understanding Relational and Non Relational Database Services**
- ❖ **Understanding Transactional and Analytical databases**
- ❖ **Understanding AWS Database services and their use case**
- ❖ **Build LAMP stack using AWS RDS (online application)**
- ❖ **Understanding the difference between RDS MYSQL and Aurora**
- ❖ **Understanding dynamodb and dax cluster**

Topics Covered

- ❑ AWS RDS
- ❑ Encryptions
- ❑ LAMP Stack
- ❑ Multi-AZ Deployment
- ❑ Read Replica
- ❑ Snapshots
- ❑ Restoring Snapshots
- ❑ Aurora
- ❑ What is multi-master database
- ❑ Aurora Serverless
- ❑ Non Relational database - dynamodb

- ❑ DAX
- ❑ Summary of Database services
- ❑ Exam Essentials

Hands-On

- ❑ Create MySql Database to implement LAMP Stack.
- ❑ Create multi-AZ and read replicas
- ❑ Create an Aurora DB Cluster
- ❑ Create a simple dynamodb table and global tables
- ❑ Create a dax cluster

Organization, Directory Services, Workspaces and AWS SSO

Learning Objective

- ❖ Understanding AWS Organization
- ❖ Understanding AWS Organizational Hierarchy Using Organizational Unit
- ❖ Understanding Service Control Permission
- ❖ Understanding Active Directory
- ❖ Install and Configure Windows Active Directory
- ❖ Mastering Windows Active Directory
 - Installing
 - Configuration
 - Domain
 - Domain Controller
 - Domain Members
- ❖ Understanding Directory Services in AWS
- ❖ Understanding the need of AWS SSO

Topics Covered

- ❑ Organization and Invitations
- ❑ Organizational Unit and SCP
- ❑ Authentication and Authorization
- ❑ Workgroup and Domain Model
- ❑ Windows Active Directory

- ❑ Directory Services
- ❑ Types of Directory Services in AWS
- ❑ Virtual Desktop Infrastructure
- ❑ AWS Workspaces
- ❑ AWS SSO
- ❑ Summary
- ❑ Exam Essentials

Hands-On

- ❑ Create a aws organization and add member accounts
- ❑ Create a SCP from the management account to manage member accounts
- ❑ Create AWS Managed Directory and add Windows Client
- ❑ Create and Launch Workspace to know how to implement VDI
- ❑ Create AWS SSO and allow AD user to login to AWS Accounts in AWS Organization

Containerization

Learning Objective

- ❖ **Understanding Traditional(Physical and Virtual) Application Deployment Methods) and Containerization**
- ❖ **Advantages**
- ❖ **Understanding docker and components**
- ❖ **Understanding Container Orchestration**
- ❖ **Understanding ECS and Launch Types**

Topics Covered

- ❑ Docker Engine
- ❑ Images
- ❑ Registry
- ❑ Containers
- ❑ ECS
 - ❑ Container Definition
 - ❑ Task

- Task Definition
- Service
- EC2 Launch Type
- Fargate

Hands-On

- Launch an EC2 instance and install docker engine and start docker
- Pull image and run httpd container on ec2 instance
- Creating a ECS Cluster using ec2 and fargate launch type