



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.
- 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

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 and Types
- ❑ 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

- ❑ Launch Windows EC2 Instance with Root EBS Volume (Default Size), and later Increase the size of EBS Volume (5GiB)
- ❑ Create and Attach new EBS Data Volumes to Windows EC2 Instances as Additional Storage.

- ❑ Detach and Delete unused Volumes
- ❑ Create Image from Existing Instance Based on Volume or Instance

AWS Storage Services (File and Object)

Learning Objective

- ❖ **Identify storage services that can be used with hybrid or non-cloud-native applications.**
- ❖ **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

- ❑ AWS File Storage using Elastic File System
- ❑ Create and Mount File Share in EFS
- ❑ 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 Permissions
 - ❑ Block Public Settings
 - ❑ ACL
 - ❑ Policy
 - ❑ CORS
- ❑ S3 Bucket Features
 - ❑ Versioning

- Server and Object access Logging
- Static Web Hosting
- Object lock and Tags
- Event and Encryption
- S3 Bucket Management
 - LifeCycle Policy
 - Replication
 - Metrics
 - Analytics
- S3 Glacier and Vault
- Snow family
- Summary and Exam Essentials

Hands-On

- Create EFS file Share and mount it to two Linux EC2 instances.
- Create your own S3 Bucket and use of Bucket Policies and Control List to Public Access
- Create your own Static Website
- Create Bucket enable Versioning and Server access Logging.
- Create Bucket with Lifecycle Policies and Cross Region Replication

AWS Virtual Private Cloud

Learning Objective

- ❖ Create your own Private Cloud and manage infrastructure in the cloud.
- ❖ Mastering Network Basics
 - IP addressing
 - LAN and WAN
 - Subnetting
 - Devices
 - Ping
- ❖ Designing a Local Area Network
- ❖ Mastering LAN concepts
- ❖ Understanding Networking in AWS Cloud
- ❖ Mastering Virtual Private Cloud
- ❖ Designing a secure Private Network in AWS cloud

- **Security Group**
- **Network Access Control List**
- ❖ **Connecting two different regions**
- ❖ **Implement NAT for Private Networks**
- ❖ **Implement VPN for On-premises**
- ❖ **Implement Transit Network**
- ❖ **Understanding Storage Gateway**
- ❖ **Troubleshooting Network Problems**

Topics Covered

- Virtual Private Cloud Basics
- Subnets
- Route Tables
- Internet Gateway
- Security Groups and Network ACLs
- Nat Instance and Nat Gateways
- EIP and E-NICs
- Virtual Private Gateway
- Customer Gateway
- Virtual Private Network
- VPC Peering
- AWS Direct Connect
- Transit Gateway
- Storage gateway
- Summary
- Exam Essentials

Hands-On

- Create VPC, Public Subnets and Route Table and Launch EC2 Instance.
- Create VPC Public and Private Subnets, Route table and Launch EC2 instance Windows in Public and Linux in Private.
- Create Nat Gateway and allow internet access to Private Subnet.
- Create two different VPC in different regions and use VPC Peering Connection to Connect.
- Build Network and Instance Security Between Instances using Security Group and Network ACL

- ❑ Create Customer and VPN Gateway to describe VPN Connection.
- ❑ Create a Transit Gateway and add attachments(VPC or VPN)

AWS Management Tools

Learning Objective

- ❖ **Learn how to Monitor and Audit AWS services using CloudWatch**
- ❖ **Understanding CloudWatch basic monitoring**
- ❖ **Understanding CloudWatch 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
- ❑ CloudWatch Metrics
- ❑ Monitor EC2 Instance
- ❑ Create Alarm on EC2
- ❑ Monitor VPC Flow Logs
- ❑ CloudWatch 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

- ❑ Monitor EC2 instance with Detailed Monitoring
- ❑ 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

DevOps

DevOps Foundation

Learning Objective

- ❖ Understanding of DevOps

Topics Covered

- ❑ What is DevOps?
- ❑ Why DevOps?
- ❑ Evolution of Software Methodologies
- ❑ Dev Challenges v/s DevOps Solution
- ❑ Ops Challenges v/s DevOps Solution
- ❑ Stages Of DevOps Lifecycle
 - ❑ Continuous Development
 - ❑ Continuous Testing
 - ❑ Continuous Integration
 - ❑ Continuous Deployment
 - ❑ Continuous Monitoring
- ❑ The Various DevOps Tools

Getting started with Linux

Learning Objective

- ❖ Understanding Linux Basics

Topics Covered

- ❑ What is Linux and Open Source
- ❑ Linux distributions

- ❑ Understanding Shell
- ❑ Understanding basic commands in Linux
- ❑ Understanding absolute and relative path
- ❑ Creating files and directory using CLI
- ❑ Understanding linux command and using options for linux commands

VCS with Git

Learning Objective

- ❖ Understanding Git & GitHub (Managing Source Code and What is Version Control System(VCS)?
- ❖ Understanding AWS Code Commit

Topics Covered

- ❑ Why VCS?
- ❑ VCS tools
- ❑ Distributed VCS
- ❑ What is Git & Why Git?
- ❑ Features Of Git
- ❑ Git Workflow
- ❑ Git Configurations
- ❑ Creating Git Repository
- ❑ Syncing Repositories
- ❑ Adding Origin
- ❑ Pushing changes
- ❑ Pulling changes
- ❑ Clone operation

Continuous Integration with Jenkins

Learning Objective

- ❖ **Understanding Integration with Jenkins**

Topics Covered

- Challenges before Continuous Integration
- What is Continuous Integration?
- Benefits of Continuous Integration
- Tools of Continuous Integration
- Introduction to Jenkins
- Configuring Jenkins
- Build Setup in Jenkins
- Jenkins Dashboard
- Creating jobs in Jenkins
- Configuring Security in Jenkins
- Plugin Management in Jenkins
- Notification System
- Jenkins Best Practices

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

Continuous Deployment

Learning Objective

- ❖ Understanding automation and automation tools used on premises and in aws
- ❖ Using the automation tool in the devops pipeline
- ❖ Understanding Cloudformation

Topics Covered

- Before Continuous deployment
- What is ansible
- Terminologies
 - Control Node

- Managed Node
- Inventory
- Modules
- Play and Playbook
- Initial setup and ad-hoc commands
- Understanding YAML and Writing Simple Playbook
- Using Cloudformation and create a simple stack
 - Stack
 - Template
 - Stackset
 - Drift detection