

# AWS Certified Solutions Architect 2020 Associate Level Curriculum (SAA-C02)

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## Module 1: Introduction to Cloud Computing

- Cloud Computing Fundamentals
  - What is the Cloud?
  - Underlying technologies that power the cloud
  - NIST Definition of the word “Cloud”
  - Cloud Computing Models
  - Cloud Service Model
    - IAAS
    - PASS
    - SAAS
  - Cloud Deployment Model
    - Private
    - Public
    - Hybrid
  - Cloud Providers Quick Comparison
- History & Introduction to AWS
  - What is AWS?
  - AWS Pace of Innovation
  - Gartner Magic Quadrant IAAS Leader
  - AWS Services Stack Overview
  - Regions
  - Availability Zones
  - Point of Presence
  - Concept of High Availability
  - Multi-AZ configuration Models
  - AWS Shared Responsibility Model

## Module 2: Compute – EC2 Instances

- Concept of Virtualization
- Virtual Servers & EC2 Instances
- Features of EC2 Instances
- EC2 Instance Families
- Bare Metal
- Elastic GPUs
- VMWare on AWS
- Naming Convention & Comparison
- Billing Models
  - On-Demand
  - Reserved Instance
  - Spot Instance
  - Savings Plan
  - Capacity Reservation
- Mixed usage of billing Models
- Instance Tenancy Models
  - Shared Host Instance
  - Dedicated Host
  - Dedicated Instance
- AWS Nitro System
- AWS Outposts
- EC2 Labs
  - AWS Console Overview
  - Creating EC2 Instances
  - Creating Key Pairs

- Login options to EC2 instances (Putty/Win/Mac/Linux)
- Configuring an application inside EC2 Instance
- Stopping & Starting EC2 Instances
- Terminating EC2 Instances
- EC2 Bootstrap configurations
- EC2 Instance Data & Metadata
- EC2 Hibernate
- Assigning Private & Elastic IPs
- EC2 Placement Groups

## **Module 3: Storage – EBS Volumes**

- AWS Storage Portfolio
- What is Block Storage?
- Features of EBS
- EBS connectivity Models
- EBS Architecture
- Instance Store / Ephemeral storage
- Types of EBS Volumes
- HDD vs SSD
- EBS volumes Comparison
- Snapshots & AMIs
- EBS Labs
  - Configuring EC2 instances with EBS & Instance Store.
  - Modify Existing Volume Size.
  - Add additional EBS volume to EC2.
  - Create Snapshots.

- Automating Snapshot Creation.
- Create EC2 Launch Templates.

## **Module 4: Elastic Load Balancing (ELB)**

- Concept and need for Load Balancing
- Classic Load Balancer
- Application Load Balancer
- Network Load Balancer
- ELB Comparison
- Load Balancer Capacity Units (Billing Model)
- ELB Labs
  - Create Classic Load Balancer
  - Configuring EC2 instances with ELB.
  - Add pages and to check round robin routing.
  - Application Load balancer working Demo.

## **Module 5: Storage – S3, Glacier & Storage Gateway**

- What is Object Storage?
- S3 Features
- Buckets & Objects
- Structure of S3
- Internal Storage Architecture of S3
- S3 Charge Methodologies
- S3 Storage Classes Pricing
- Use Cases
- Archival Storage

- Features of Glacier
- Glacier Retrievals
- Multi-part Upload
- S3 Access Points
- Labs
  - Create buckets
  - Uploading objects into bucket
  - Object and Bucket Permission
  - Bucket properties
  - Host static website on S3
  - S3 Versioning
  - S3 Bucket Replication
  - S3 Lifecycle Policy
  - S3 Encryption
  - Transfer Acceleration
  - S3 Logging
  - S3 Analytics & Metrics
  - Additional Features Walkthrough
  - 3<sup>rd</sup> Party Apps for S3 uploads
  - Glacier Vaults
  - Glacier Vault Lock

## **Module 6: Storage – EFS, FSx, Storage GW, Data Transports & AWS Backup**

- What is File Storage?
  - File Storage classifications
  - Sharing data across multiple EC2s
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- Features of EFS
- Traditional NFS vs EFS
- FSx for Windows & FSx for Lustre
- AWS Storage GW
  - File Gateway
  - Volume Gateway
  - Tape Gateway
- AWS DataSync
- AWS Transfer for SFTP
- AWS Snow Family
  - Snowball & Snowball Edge
  - Snowcone
  - Snowmobile
- AWS Backup
- Labs
  - Create EFS Share
  - Attaching EFS to EC2 instances
  - Sharing data between instances using EFS
  - Creating FSx for Windows Share
  - Attach Windows & Linux systems to FSx Share
  - Connect On-prem to FSx share over VPN
  - Configuring Storage Gateway – File Storage
  - Configure Storage GW with On-prem
  - Backup Jobs, Vaults & Protected Resources
  - Configure and automated AWS Backups for EC2 instances & Other resources

## Module 7: Networking – VPC

- Life Before VPC
- VPC Concepts & Architecture
- Components of VPC
- Networking Basics – IP Addressing
- Subnetting
- Private IP Ranges & Reserved IPs
- VPC Routing
- NAT Gateway
- VPC Endpoints & Interface Endpoints
- VPC Security & Logging
- Security Groups vs NACLs
- Labs
  - Creating a VPC
  - Create Subnets
  - Create Internet Gateway
  - Create & Configure Route Tables
  - Using a VPC for EC2 instances
  - NACLs Configuration
  - Elastic IPs
  - Connecting VPCs with peering
  - VPN Endpoints creation
  - Cross region VPN connectivity

## Module 8: DNS - Route 53

- Mapping domain to Route53
- Domain Name Basics
- Global DNS Query Routing Flow
- Common DNS Record Types
- Route 53 - DNS as a service
- Routing Policies
  - Simple Routing Policy
  - Latency Based Routing (LBR)
  - Weighted Routing Policy
  - Geolocation Routing Policy
  - Failover Routing Policy
- Labs
  - DNS Lookups
  - Creating Hosted Zones
  - Adding records in Route53
  - Simple record creation
  - Weighted Routing demo
  - Geo-location based routing demo
  - Health checks & Failover routing

## Module 9: Security & IAM

- Shared Responsibility Model
- IAAS vs PAAS vs SAAS Security Model
- Identity and Access Management
- IAM Components

- Users, Groups, Policies & Roles
- IAM Policy Evaluation Flow
- IAM Best Practices
- Labs
  - Activating MFA on Account
  - Creating IAM Users
  - Creating IAM Groups
  - Assigning Users to Groups
  - Assigning Policies
  - Creating Custom Policies
  - Live Testing Policies
  - AWS Certificate Manager (ACM)
  - IAM User Roles & Assuming Roles

## **Module 10: AWS Database Services**

- Database Types and use cases
- AWS Databases services portfolio
- Relational Database Service (RDS)
- RDS Engine Types
- RDS single AZ vs Multi AZ availability pattern
- Amazon Aurora
- High Availability Aurora Architecture
- Read Replicas
- Automated Backups
- Snapshots Use Case
- RDS Proxy

- AWS Database Migration Service Overview
- AWS Schema Conversion Overview
- Difference between SQL vs NoSQL Database Types
- DynamoDB
- ElastiCache
- Labs – Mini Project
  - Create DB Subnet Groups
  - Create MySQL RDS Instance
  - On EC2 Install an application that requires DB
  - Configure & Connect Application to database
  - Database Manual Login & Configuration
  - Monitoring application modification directly on DB
  - Create Aurora Database
  - Actual database migration using DMS from MySQL to Aurora
  - Switch application to Aurora after migration
  - DynamoDB table creation and querying data
  - ElastiCache setup & configuration with application
  - Testing application performance with ElastiCache

## Module 11: Elastic Beanstalk

- Elastic Beanstalk overview
- Manual deployment vs EB Automation
- Labs
  - Create a WordPress application environment with RDS Database and EC2 Instance via automated Elastic Beanstalk deployment
  - Blue/Green Deployment Scenarios

## Module 12: CloudWatch & Autoscaling

- CloudWatch Monitoring & Features
- Alarms
- Notifications
- CloudWatch Logs
- Custom Metrics
- CloudWatch Agent
- Triggering Autoscaling
- Autoscaling – Vertical vs Horizontal scaling
- Provisioned capacity vs Auto Scaled capacity
- Autoscaling Policies
- Autoscaling Groups
- Launch Configurations
- Lifecycle Hooks
- Triggering Autoscaling with CloudWatch
- Labs
  - Configuring CloudWatch Agent
  - Create CloudWatch Alarms
  - Creating CloudWatch Monitoring Dashboards
  - CloudWatch Billing Alarms
  - CloudWatch event filtering & custom metrics
  - Create AMI for Autoscaling
  - Create Autoscaling Launch Configurations
  - Create an auto-scaled application environment
  - Target Tracking, Step Scaling & Simple Scaling policies
  - Simulate demo environment failure to test Autoscaling

## Module 13: CloudFront & Global Accelerator

- Edge Locations & Point of Presence
- CloudFront – Global Content Delivery Network
- Caching Tiers
- Caching Request Flow
- Global Accelerator overview
- Regional, Multi-Regional deployments v/s Global Accelerator Scenario
- Global Accelerator Architecture & speed testing
- Labs
  - Create a CloudFront distribution linked to an S3 bucket as the origin
  - Test the speed/latency difference between direct from origin v/s from CloudFront cache
  - Cache invalidations
  - [Global Accelerator Labs is covered in the next module – HA Labs]

## Module 14: High Availability Project

- High availability project creating a multi-tiered live web application infrastructure environment using AWS services only
- Services used in project:
  - EC2 & Autoscaling
  - EBS & AMIs
  - ELB
  - EFS
  - Elasticache
  - VPC, Subnets, Route Tables, Internet GW, NAT GW (Optional) & VPN Endpoint
  - S3

- CloudFront
- Global Accelerator
- Route53
- RDS
- CloudWatch
- KMS
- Load testing the application environment using Apache JMeter

## **Module 15: CLI, CloudFormation, SES & SNS**

- API calls via Command Line Interface
- Automating Infrastructure deployment with CloudFormation
- Templates, Stacks & Changesets
- Analyzing sample Custom CloudFormation templates
- Simple email service overview & Features
- Simple Notification Service overview & features
- Labs
  - Creating IAM user for CLI
  - Configuring CLI profile on EC2 and Local Machine
  - IAM Roles
  - Multi Account access via Roles
  - Creating and deploying a CloudFormation Stack
  - CloudFormation Designer
  - CF Template Customizations

**Module 16: ECS, EKS, Fargate, Lambda, SQS & API Gateway**

- History progression towards microservices & serverless
- VMs v/s Container technology
- Serverless – AWS Lambda Overview
- Container Services – Amazon ECS, EKS & Fargate Overview
- ECS components & features
- Simple Queueing Service overview
- Concept of APIs and API GW overview.
- Labs
  - Create an ECS application
  - Lambda console overview
  - API Gateway Queries

**Module 17: Analytics, Security & Admin , Developer & Enterprise Apps**

- Analytics Services Overview
  - Amazon Redshift
  - Amazon EMR
  - Amazon Kinesis
  - Amazon ElasticSearch
  - AWS Glue
  - Amazon Athena
  - Amazon QuickSight
- Security & Administration Services Overview
  - Trusted Advisor
  - Service Catalog
  - AWS Certificate Manager (ACM)

- AWS Config
- OpsWorks
- EC2 Systems Manager
- Developer Tools Services Overview
  - AWS CodePipeline
  - AWS CodeCommit
  - AWS CodeBuild
  - AWS CodeDeploy
- Enterprise Application Services Overview
  - Amazon WorkSpaces
  - Amazon WorkDocs
  - Amazon WorkMail
- Labs
  - Configuring Glue Crawler
  - Querying Data from S3 within Athena
  - Visualizing data with Quicksight
  - Systems Manager Run command
  - Systems Manager EC2 Session

## Module 18: AWS Organizations, Billing Console & Closing

- AWS Organizations Overview
- AWS Control Tower Overview
- AWS Billing Console – How to read your AWS bills
- AWS Whitepapers
- Additional Practice Resources
- Exam Info & Format
- Exam Sample Questions Quiz

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