

## Architecting on AWS (3 Days)

Architecting on AWS covers the fundamentals of building IT infrastructure on AWS. The course is designed to teach solutions architects how to optimize the use of the AWS cloud by understanding AWS services and how these services fit into cloud-based solutions. Because architectural solutions may differ depending on industry, type of applications, and size of business, this course emphasizes AWS cloud best practices and recommended design patterns to help students think through the process of architecting optimal IT solutions on AWS. It also presents case studies throughout the course that showcase how some AWS customers have designed their infrastructures and the strategies and services they implemented. Opportunities to build a variety of infrastructures via a guided, hands-on approach are also provided.

### Skills Gained

This course teaches you how to:

- Make architectural decisions based on the AWS-recommended architectural principles and best practices.
- Leverage AWS services to make your infrastructure scalable, reliable, and highly available.
- Leverage AWS managed services to enable greater flexibility and resiliency in an infrastructure.
- Make an AWS-based infrastructure more efficient in order to increase performance and reduce costs.
- Use the Well-Architected Framework to improve architectures with AWS solutions.

### Who Can Benefit

This course is intended for:

- Solutions Architects
- Solution Design Engineers

### Prerequisites

We recommend that attendees of this course have the following prerequisites:

- Courses taken: AWS Technical Essentials
- Working knowledge of distributed systems
- Familiarity with general networking concepts
- Working knowledge of multi-tier architectures
- Familiarity with cloud computing concepts

## Course Outline

### Day 1

#### **Module 0: Welcome to Architecting on AWS**

A quick module to get the course running. Start off with the expected course outcomes, followed by logistical info.

#### **Module 1: Introduction**

The goal of this module is to show the students what they will learn in this class. In the beginning, we start off with the real story of Amazon (AWS), and how it struggled to provide high availability and scalability. Then we review the Well Architected Framework and six advantages of the cloud. Then we touch on the global infrastructure of AWS.

#### **Module 2: The Simplest Architectures**

This module focuses on S3, Glacier, and best practices on how to choose your regions. We also cover a few use cases that show off the topics and some features of S3.

#### **Module 3: Adding a Compute Layer**

As our architectural needs develop, we experience more complex problems. After discussing how S3 can be used as a simple architecture to serve static content, we find that our architecture probably needs some dynamic help as well. Enter the compute layer with EC2, AMIs, EBS, and EFS.

#### **Module 4: Adding a Database Layer**

This module is about the database layer and considerations one should make. Covers RDS and DynamoDB.

#### **Module 5: Networking In AWS Part 1**

We open up with a chat about VPC and talk about workload isolation. We cover CIDR and subnets, NAT instances, route tables, security groups, and NACLs.

### Day 2

#### **Module 6: Networking In AWS Part 2**

Opening up with Virtual Private Gateway, we get to talk about VPN and Direct Connect. VPC connections comes up next, and lets us talk about VPC peering. ELB in all its flavors makes an entrance here. This opens the conversation for High Availability and talking about the number of Availability Zones you should be using. Last but not least, we FINALLY get to talk about Route 53: the only service with a 100% available SLA. This lets us discuss regional failover and worldwide footprints.

#### **Module 7: AWS Identity and Access Management (IAM)**

In this module, we talk about user creation, IAM principals and permissions. This leads into groups and then roles and working through various identity federation examples. Cognito makes a quick appearance. Ending the module is a section on multiple accounts and the strategies one might employ. This includes talking about AWS Organizations.

### **Module 8: Elasticity, High Availability, and Monitoring**

We want the student to really understand what flexibility auto scaling provides. Before we go into that, though, we need to look into monitoring. You can't grow if you can't see a need for change. In this case, monitoring includes mostly CloudWatch with a slide on CloudTrail and VPC flow logs. Then we get into auto scaling.

### **Module 9: Automation**

We will cover only a few services here, starting out with CloudFormation. This lets us really dig into infrastructure as code (IaC) and repeatability. There is also a side conversation about using AWS Quick Starts. The next section deals with automating the deployment of applications and managing updating your fleet. This involves AWS Systems Manager and AWS OpsWorks, respectively. Finally, we move onto AWS Elastic Beanstalk as a more hands-off approach.

### **Day 3**

### **Module 10: Caching**

This module goes over the idea of caching from the perspective of the data's journey through your architecture, starting with the reasons and benefits on why you should cache.

Next, discuss the edge, and how AWS has a CDN called CloudFront that can solve this first caching problem. There is a follow up section dealing with caching the Web Tier. It involves simple session management using ELB and Dynamo for state management. Caching the app/database tier involves a conversation about DynamoDB Accelerator and ElastiCache using Redis/Memcached.

### **Module 11: Building Decoupled Architectures**

The first step to going serverless is creating a decoupled architecture. We need to make sure all our pieces work as independently as possible. This conversation starts with a look at SQS, SNS, MQ, and Kinesis.

### **Module 12: Microservices and Serverless Architectures**

This module explores the idea of breaking down a monolithic forum application (think reddit.com) into smaller microservice parts. This talk begins by showing how containers can be a perfect solution for this idea—specifically, ECS and the Application Load Balancer. AWS Fargate is covered, for the customers who want a managed service. The last half of the module moves into the serverless realm. We begin by showing off Lambda as our crown jewel of serverless. API Gateway comes up as a way to access Lambda outside of your environment and as a means of DDoS protection.

### **Module 13: RTO/RPO and Backup Recovery Setup**

Everything fails, all the time. Regions can go down. How are we going to deal with this? This module covers the various services that we talked about throughout the class and goes over the options you have. It moves forward to show off Storage Gateway as a backup solution. The module concludes with a few helpful tips.

### **Module 14: Optimizations and Review**

This is a simple review module to cover some of the topics learned in class.