

**Course Duration:** 12 hours (1.5 Days)

## **Amazon API Gateway: Design, Secure, and Deploy APIs**

This course offers an in-depth exploration of **Amazon API Gateway**, a fully managed service that simplifies the process of creating, publishing, maintaining, monitoring, and securing APIs at any scale. Participants will delve into advanced features such as **Message Transformation, Request Validation, Authentication and Authorization, Message Caching, Usage Plans, Message Throttling, REST Integrations, Observability, WebSocket APIs, and fine-grained access control**. Through hands-on exercises and real-world scenarios, attendees will acquire the skills necessary to design and manage robust APIs, ensuring optimal performance and security.

### **Course objectives**

By the end of this course, participants will be able to:

- Design and deploy APIs using Amazon API Gateway, leveraging both RESTful and WebSocket protocols.
- Implement Message Transformation to modify request and response payloads effectively.
- Configure Request Validation to ensure data integrity and adherence to API schemas.
- Apply Authentication and Authorization mechanisms, including integration with AWS Identity and Access Management (IAM) and Amazon Cognito.
- Utilize Message Caching to enhance API performance and reduce backend load.
- Set up Usage Plans and Throttling to manage API consumption and protect resources.
- Integrate API Gateway with various backend services, including AWS Lambda and HTTP endpoints.
- Monitor and observe APIs using built-in tools for logging and metrics.
- Implement fine-grained access control to secure APIs at a granular level.

### **Prerequisites**

- Basic understanding of AWS services and cloud computing concepts.
- Familiarity with RESTful API principles and HTTP protocols.
- Experience with AWS IAM roles and policies (recommended but not mandatory).

### **Target Audience**

- API Developers
- Cloud Architects

- DevOps Engineers
- Security Professionals

## **Course outline**

### **Module 1: Introduction to Amazon API Gateway**

- Overview of Amazon API Gateway and its core functionalities.
- Benefits of using API Gateway for API management.
- Understanding RESTful and WebSocket APIs.
- Setting up your AWS environment for API Gateway.

**Hands-on Lab:** Creating a simple REST API using API Gateway.

### **Module 2: Message Transformation and Request Validation**

- Understanding the need for message transformation in APIs.
- Implementing mapping templates for transforming requests and responses.
- Configuring request validation to enforce schema compliance.

**Hands-on Lab:** Setting up message transformation and request validation for an API.

### **Module 3: Authentication and Authorization**

- Exploring authentication and authorization mechanisms in API Gateway.
- Integrating with AWS IAM for securing APIs.
- Leveraging Amazon Cognito for user authentication and fine-grained access control.

**Hands-on Lab:** Implementing IAM-based and Cognito-based authorization for APIs.

### **Module 4: Message Caching and Performance Optimization**

- Benefits of caching in API performance.
- Configuring and managing API Gateway caching.
- Strategies for optimizing API performance and reducing latency.

**Hands-on Lab:** Enabling and configuring caching for an API endpoint.

### **Module 5: Usage Plans and Throttling**

- Understanding usage plans and their importance.
- Setting up API keys and associating them with usage plans.
- Configuring throttling and quota limits to manage API consumption.

**Hands-on Lab:** Creating usage plans and implementing throttling for APIs.

### **Module 6: API Gateway REST Integrations**

- Integrating API Gateway with AWS Lambda functions.
- Connecting to HTTP endpoints and other AWS services.
- Understanding integration types: proxy vs. non-proxy integrations.

**Hands-on Lab:** Setting up REST integrations with various backend services.

### **Module 7: Observability in API Gateway**

- Importance of monitoring and logging in API management.
- Utilizing CloudWatch for API Gateway metrics and logs.
- Setting up alarms and dashboards for real-time monitoring.
- Debug failed executions with AWS X-Ray traces

**Hands-on Lab:** Configuring observability features for API Gateway.

### **Module 8: Working with WebSocket APIs**

- Introduction to WebSocket APIs and real-time communication.
- Setting up WebSocket APIs using API Gateway.
- Managing connections and messages in WebSocket APIs.

**Hands-on Lab:** Building a pizza ordering application using WebSocket APIs.

### **Module 9: Fine-Grained Access Control**

- Understanding the need for fine-grained access control in APIs.
- Implementing resource policies and method-level authorization.
- Using IAM policies and Cognito
- Authorizers