# Mastering Amazon AWS: Developer

## 1. **Introduction to Cloud Computing and AWS**

* **1.1** Understanding Cloud Computing
  + Definition and Key Concepts
  + Cloud Service Models: IaaS, PaaS, SaaS
  + Cloud Deployment Models: Public, Private, Hybrid
* **1.2** Overview of Amazon Web Services (AWS)
  + History and Evolution
  + Core Benefits and Features
  + AWS Global Infrastructure

## 2. **Getting Started with AWS**

* **2.1** Setting Up an AWS Account
  + Account Creation and Verification
  + Understanding AWS Free Tier
* **2.2** Navigating the AWS Management Console
  + Dashboard Overview
  + Service Categories and Quick Access
* **2.3** Introduction to AWS Command Line Interface (CLI)
  + Installation and Configuration
  + Basic Commands and Usage
* **2.4** AWS Software Development Kits (SDKs)
  + Overview of SDKs for Different Languages (Python, Java, .NET, Node.js)
  + Setting Up Development Environments

## 3. **AWS Identity and Access Management (IAM)**

* **3.1** Understanding IAM Users, Groups, and Roles
  + Creating and Managing Users
  + Organizing Users into Groups
  + Assigning Roles for Resource Access
* **3.2** IAM Policies and Permissions
  + Policy Structure and Syntax
  + Inline vs. Managed Policies
  + Permission Boundaries and Best Practices
* **3.3** Multi-Factor Authentication (MFA)
  + Enabling MFA for Enhanced Security
  + MFA Device Management

## 4. **Amazon Elastic Compute Cloud (EC2)**

* **4.1** Introduction to EC2
  + EC2 Features and Benefits
  + Use Cases for EC2 Instances
* **4.2** EC2 Instance Types and Families
  + General Purpose, Compute Optimized, Memory Optimized, Storage Optimized, Accelerated Computing
  + Choosing the Right Instance Type
* **4.3** Launching and Managing EC2 Instances
  + AMIs (Amazon Machine Images)
  + Key Pairs and SSH Access
  + Instance Lifecycle (Start, Stop, Reboot, Terminate)
* **4.4** Security Groups and Network Configuration
  + Inbound and Outbound Rules
  + Configuring Firewalls
* **4.5** Elastic IPs and Elastic Network Interfaces
  + Assigning Static IP Addresses
  + Network Interface Management
* **4.6** EC2 Pricing Models
  + On-Demand Instances
  + Reserved Instances
  + Spot Instances
  + Savings Plans

## 5. **Amazon Simple Storage Service (S3)**

* **5.1** Introduction to S3
  + Buckets and Objects
  + Data Consistency Model
* **5.2** Working with Buckets and Objects
  + Creating and Configuring Buckets
  + Uploading, Downloading, and Deleting Objects
* **5.3** S3 Storage Classes
  + Standard, Standard-Infrequent Access, One Zone-IA, Glacier, Glacier Deep Archive
  + Lifecycle Policies and Transitions
* **5.4** S3 Security and Access Control
  + Bucket Policies and Access Control Lists (ACLs)
  + S3 Encryption Options (Server-Side and Client-Side Encryption)
  + Pre-Signed URLs
* **5.5** Versioning and Replication
  + Enabling Versioning
  + Cross-Region Replication (CRR)
* **5.6** S3 Event Notifications
  + Configuring Event Triggers
  + Integrating with AWS Lambda and SNS

## 6. **AWS Databases**

* **6.1** Amazon Relational Database Service (RDS)
  + Supported Database Engines (MySQL, PostgreSQL, Oracle, SQL Server, MariaDB, Aurora)
  + Creating and Configuring RDS Instances
  + Multi-AZ Deployments and Read Replicas
  + Backup and Recovery Options
  + Monitoring and Performance Tuning
* **6.2** Amazon DynamoDB
  + Key Concepts (Tables, Items, Attributes)
  + Partition Keys and Sort Keys
  + Reading and Writing Data
  + DynamoDB Streams
  + Global Tables for Multi-Region Replication
* **6.3** Amazon Aurora
  + Features and Benefits
  + Aurora Serverless
  + High Availability and Scaling
* **6.4** Amazon ElastiCache
  + Introduction to Redis and Memcached
  + Setting Up ElastiCache Clusters
  + Caching Strategies and Best Practices

## 7. **AWS Networking**

* **7.1** Amazon Virtual Private Cloud (VPC)
  + VPC Components and Concepts
  + Creating and Configuring VPCs
* **7.2** Subnets and Route Tables
  + Public vs. Private Subnets
  + Configuring Route Tables
  + Internet Gateways and NAT Gateways
* **7.3** Security Groups and Network Access Control Lists (ACLs)
  + Stateful vs. Stateless Filtering
  + Configuring Network Security
* **7.4** Elastic Load Balancing (ELB)
  + Types of Load Balancers (Classic, Application, Network, Gateway)
  + Configuring Load Balancers
  + Health Checks and Target Groups
* **7.5** Amazon Route 53
  + DNS Fundamentals
  + Registering Domains
  + Configuring Hosted Zones and Record Sets
  + Routing Policies (Simple, Weighted, Latency-Based, Failover, Geo)
* **7.6** AWS Direct Connect and VPN
  + Establishing Dedicated Network Connections
  + Setting Up VPN Connections

## 8. **Serverless Computing with AWS**

* **8.1** AWS Lambda
  + Understanding Serverless Architecture
  + Creating and Deploying Lambda Functions
  + Supported Languages and Runtimes
  + Lambda Triggers and Event Sources
* **8.2** AWS API Gateway
  + Creating RESTful APIs
  + Integrating with Lambda and Other AWS Services
  + Custom Domain Names and SSL/TLS Certificates
* **8.3** AWS Serverless Application Model (SAM)
  + SAM Templates and CLI
  + Building and Deploying Serverless Applications
* **8.4** AWS Step Functions
  + Orchestrating Serverless Workflows
  + Defining State Machines
  + Error Handling and Retry Policies

## 9. **AWS Application Integration**

* **9.1** Amazon Simple Queue Service (SQS)
  + Standard vs. FIFO Queues
  + Sending and Receiving Messages
  + Queue Configuration and Policies
* **9.2** Amazon Simple Notification Service (SNS)
  + Publishing Messages to Topics
  + Subscribing Endpoints (Email, SMS, Lambda, HTTP/S)
  + Message Filtering
* **9.3** Amazon Simple Email Service (SES)
  + Email Sending and Receiving
  + Managing Identities and Deliverability
  + Email Templates and Bulk Sending
* **9.4** AWS AppSync
  + Building Scalable GraphQL APIs
  + Data Sources and Resolvers
  + Real-Time Subscriptions

## 10. **Containers and Orchestration**

* **10.1** Amazon Elastic Container Registry (ECR)
  + Storing and Managing Container Images
  + Pushing and Pulling Images
* **10.2** Amazon Elastic Container Service (ECS)
  + Launch Types: EC2 vs. Fargate
  + Task Definitions and Services
  + Cluster Management
* **10.3** Amazon Elastic Kubernetes Service (EKS)
  + Setting Up Kubernetes Clusters
  + Deploying Applications to EKS
  + Scaling and Updating Deployments
* **10.4** AWS Fargate
  + Serverless Compute Engine for Containers
  + Running Containers without Managing Servers

## 11. **AWS DevOps Tools**

* **11.1** AWS CodeCommit
  + Setting Up Private Git Repositories
  + Version Control and Collaboration
* **11.2** AWS CodeBuild
  + Continuous Integration with Build Services
  + Configuring Build Projects and Environments
* **11.3** AWS CodeDeploy
  + Automated Application Deployment
  + Deployment Strategies (In-Place, Blue/Green)
  + Integrating with EC2, Lambda, and On-Premises Servers
* **11.4** AWS CodePipeline
  + Orchestrating CI/CD Pipelines
  + Integrating with CodeCommit, CodeBuild, CodeDeploy
  + Custom Actions and Third-Party Integrations
* **11.5** AWS CloudFormation
  + Infrastructure as Code (IaC)
  + Writing and Deploying Templates
  + Stack Management and Updates
* **11.6** AWS Cloud Development Kit (CDK)
  + Defining Infrastructure with Familiar Programming Languages
  + Constructs and High-Level Abstractions
  + Synthesizing and Deploying CDK Apps

## 12. **Monitoring, Logging, and Diagnostics**

* **12.1** Amazon CloudWatch
  + Metrics and Alarms
  + Custom Metrics and Dashboards
  + Logs Management and Insights
* **12.2** AWS CloudTrail
  + Tracking User Activity and API Calls
  + Configuring Trails and Event History
* **12.3** AWS X-Ray
  + Distributed Tracing for Applications
  + Analyzing Performance Bottlenecks
* **12.4** AWS Trusted Advisor
  + Cost Optimization Recommendations
  + Security and Performance Checks

## 13. **Security and Compliance**

* **13.1** AWS Key Management Service (KMS)
  + Creating and Managing Encryption Keys
  + Integrating KMS with AWS Services
* **13.2** AWS Certificate Manager (ACM)
  + Provisioning SSL/TLS Certificates
  + Managing Certificate Renewal
* **13.3** AWS Web Application Firewall (WAF) and AWS Shield
  + Protecting Against Common Web Exploits
  + Configuring WAF Rules and Policies
  + DDoS Protection with AWS Shield
* **13.4** AWS Security Hub
  + Centralized Security View
  + Integrating Security Findings from Multiple Services
* **13.5** Compliance and Governance
  + AWS Artifact for Compliance Reports
  + Implementing Governance with AWS Organizations

## 14. **Advanced AWS Services**

* **14.1** AWS Elastic Beanstalk
  + Deploying and Managing Applications
  + Supported Platforms and Languages
  + Environment Configuration and Scaling
* **14.2** AWS Cognito
  + User Authentication and Authorization
  + Identity Pools and User Pools
  + Integrating Social Identity Providers
* **14.3** AWS IoT Core
  + Connecting Devices to AWS
  + Device Management and Messaging
* **14.4** AWS App Mesh
  + Service Mesh for Microservices
  + Traffic Control and Observability

## 15. **Data Analytics and Big Data**

* **15.1** Amazon Kinesis
  + Real-Time Data Streaming and Processing
  + Kinesis Data Streams, Firehose, and Analytics
* **15.2** Amazon Redshift
  + Data Warehousing Concepts
  + Setting Up Redshift Clusters
  + Querying and Managing Data
* **15.3** Amazon Athena
  + Serverless Interactive Query Service
  + Querying Data in S3 Using SQL
* **15.4** AWS Glue
  + ETL Service for Data Preparation
  + Creating and Managing Crawlers
  + Writing and Running Glue Jobs
* **15.5** Amazon Elastic MapReduce (EMR)
  + Big Data Processing with Hadoop Ecosystem
  + Configuring and Managing EMR Clusters

## 16. **Machine Learning and AI Services**

* **16.1** Amazon SageMaker
  + Building, Training, and Deploying ML Models
  + SageMaker Studio and Notebooks
  + Hyperparameter Tuning and Model Hosting
* **16.2** AWS AI Services Overview
  + Amazon Rekognition (Image and Video Analysis)
  + Amazon Comprehend (Natural Language Processing)
  + Amazon Polly (Text-to-Speech)
  + Amazon Lex (Chatbots)
* **16.3** Integrating AI Services into Applications
  + Using SDKs and APIs
  + Real-World Use Cases

## 17. **Migration and Transfer Services**

* **17.1** AWS Database Migration Service (DMS)
  + Migrating Databases to AWS
  + Continuous Data Replication
* **17.2** AWS Snow Family
  + Data Transfer with Snowball, Snowball Edge, and Snowmobile
  + Offline Data Migration Strategies
* **17.3** AWS DataSync
  + Automated Data Transfer Between On-Premises and AWS
  + Configuring DataSync Tasks
* **17.4** AWS Transfer Family
  + Managed File Transfer over SFTP, FTPS, and FTP
  + Securely Exchanging Data with Partners

## 18. **Optimization and Best Practices**

* **18.1** Cost Management and Optimization
  + AWS Cost Explorer and Budgets
  + Rightsizing Resources
  + Implementing Cost Allocation Tags
* **18.2** Performance Optimization
  + Caching Strategies
  + Content Delivery with Amazon CloudFront
  + Auto Scaling Applications
* **18.3** Security Best Practices
  + Shared Responsibility Model
  + Regular Security Audits and Assessments
  + Incident Response Planning

## 19. **AWS Certification Preparation**

* **19.1** AWS Certified Developer – Associate Exam Overview
  + Exam Domains and Objectives
  + Recommended Knowledge and Experience
* **19.2** Study Resources and Practice Exams
  + Official AWS Training and Documentation
  + Sample Questions and Exam Simulators
* **19.3** Exam Tips and Strategies
  + Time Management During the Exam
  + Understanding Question Formats
  + Eliminating Incorrect Answers

## 20. **Capstone Projects and Real-World Applications**

* **20.1** Building a Serverless Web Application
  + Using AWS Lambda, API Gateway, DynamoDB, and S3
* **20.2** Developing a CI/CD Pipeline
  + Automating Deployment with AWS DevOps Tools
* **20.3** Implementing Microservices with Containers
  + Orchestrating Services with ECS or EKS
* **20.4** Data Analytics Pipeline
  + Processing Streaming Data with Kinesis and Redshift
* **20.5** Machine Learning Application
  + Training and Deploying a Model with SageMaker

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By following this comprehensive guide, you'll progress from a beginner to an advanced AWS developer, mastering a wide range of services and best practices essential for building scalable, secure, and efficient applications on the AWS platform.

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