AWS Cloud Practitioner Exam Guide

Mastering AWS identity, compute, storage, networking, and database fundamentals for cloud practitioner success

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Dedicated to

*My Girlfriend **Karina**, my beloved parents*
*and my two dogs **Ector** and **Iro***

About the Author

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Also, I want to thank all the technical editors who gave me suggestions to better this book.

Preface

This book will provide you with all the information that is required to understand AWS services to pass AWS Cloud Practitioner Certification exam, which is now updated to new version CLF-C02. It also will give you a solid foundation to choose when and why to use some specific AWS services based on the requirements of your job. This book explain the qualities of the cloud and will give you, as an individual or a company, a competitive advantage for the strong security guarantees, the elastic provisioning of servers, the speed of development and safeguards given by AWS. We will discover the main computing model, the billing and costs associated and all the other possible AWS services that the exam can ask you.

After reading this book, you will be able to follow the best practices suggested by AWS and will improve your work and the quality of your architectures for years to come. This book will help you pass AWS Cloud Practitioner Certification and to start your new career as a cloud engineer, a solution architect, a DevOps, support/help desk for the best cloud available.

Chapter 1: Cloud Introduction - This chapter introduces cloud computing, defines its core concepts, and outlines the benefits of adopting a cloud-based approach. It presents an overview of Amazon Web Services, its key offerings, and the potential advantages of transitioning to a cloud provider. The chapter provides a broad overview of the main functionalities available on AWS, grouped into its major service areas. It also explains the different deployment topologies supported by cloud providers, highlighting their advantages and disadvantages. At the end, the chapter outlines the foundational pillars of the AWS Well-Architected Framework with a focus on designing scalable, reliable, and secure solutions within the AWS environment.

Chapter 2: AWS Global Infrastructures and Main Services - This chapter provides a high level overview of AWS's global capabilities, focusing on how it operates across multiple regions and **Availability Zones** (**AZs**) to support deployments around the world. It highlights how AWS ensures high availability through its use of AZs and Global Infrastructure. We will also explore the main macro areas where AWS excels, along with the most commonly used services. Detailed descriptions of individual services will follow in the next chapters. Additionally, you will be introduced to AWS Global CloudFront **content delivery network** (**CDN**), along with options and features related to edge locations that AWS users can leverage to optimize performance and reduce latency.

Chapter 3: AWS Identity Access Management - This chapter provides a more detailed overview of how AWS manages users, roles, and groups. It focuses on the various features and options available for AWS users, emphasizing best security practices such as MFA and different types of access, including access tokens. It also highlights the tools available to monitor IAM security, check users' last access times, and review the types of policies applied.

Chapter 4: AWS Compute Services - This chapter covers EC2 as AWS's primary compute service, detailing instance types, billing options (on-demand, reserved, spot), and instance classes for different workloads like GPU, compute, memory-optimized. It discusses supported operating systems such as Windows, Linux and architectures like x86, ARM. ECS is introduced as the service for running Docker containers, integrated with ECR for image management. The chapter explains AWS Lambda, the serverless compute service, and its impact on system architecture, with use cases, pros, cons, and event-driven triggers. Finally, it discusses other AWS compute services, comparing their use cases, pros, cons, and pricing models.

Chapter 5: AWS Storage Services - This chapter highlights S3 as one of AWS's best services, explaining its role as an object storage solution. It covers the different storage options available, such as Glacier and Standard, and outlines the pricing model. The chapter also explores how S3 can be used for web hosting static assets. Additionally, it introduces other useful storage services like EBS and EFS, explaining their roles in storing data for various use cases.

Chapter 6: AWS Database Services - This chapter covers AWS's relational database solution explaining its meaning and history. It details database options like PostgreSQL, SQL Server, MySQL, and introduces Aurora. DynamoDB, AWS's NoSQL key-value database is discussed with options like on-demand, provisioned, auto scaling, and features such as main and sort keys, along with global distributions. Redshift, AWS's primary data warehouse is introduced for analytical purposes, along with big data and analytics services. The chapter also highlights other AWS big data services and databases, sparking interest in various solutions, from graph databases to document databases, and their use cases.

Chapter 7: AWS Networking - This chapter explains what a VPC is and how it provides users with security and networking guardrails in AWS. It covers the common use cases for AWS networking and the various options available, including networking features and configurations. Additionally, the chapter explores other networking services, such as VPNs and Direct Connect, and how they help in establishing secure, reliable connections between on-premises environments and AWS.

Chapter 8: AWS Security - This chapter provides a detailed explanation of AWS shared responsibility model, outlining what it means for users and the responsibilities of AWS. It covers SLAs and safeguards AWS guarantees. The chapter also discusses security measures at the networking level and how AWS services can enhance security at the data level, particularly through key management. It explains how to comply with regulations such as EU GDPR, HIPAA and demonstrates how to monitor AWS user activity and operations using CloudTrail.

Chapter 9: AWS Content Delivery and Global Applications - This chapter explains the concepts, usage, and pricing of Route 53. It also covers what a content delivery network CDN is, along with the usage and pricing of CloudFront. Additionally, the chapter explores other AWS services designed for global distribution.

Chapter 10: AWS Events and Messages - This chapter explains the SQS service, pricing model, and use cases. It also covers the different types of queues and discusses why they are essential in applications for managing asynchronous communication. It also describes the SNS service, its pricing model, and its role in pub/sub messaging with event buses, highlighting why this service is valuable in applications. Additionally, the chapter explores other messaging and event-driven services, including Kinesis, MQ, and EventBridge, detailing their use cases and pricing models, and explaining when to choose these alternatives for specific application needs.

Chapter 11: AWS Cloud Monitoring - This chapter explains the main functionalities of CloudWatch, including custom alarms, metrics, and dashboards for monitoring AWS resources. It also covers the features, highlighting its usefulness for auditing and tracking user activity across AWS services. Additionally, the chapter introduces other monitoring and diagnostic services, such as X-Ray for tracing application performance, CodeGuru for code quality analysis, and AWS Health for personalized alerts and information about AWS service events impacting your environment.

Chapter 12: AWS Cloud Deployment and IaC - This chapter explains the main features of CloudFormation, its use cases. It also covers AWS CDK, highlighting its key features and use cases as an alternative to CloudFormation for defining infrastructure. Additionally, the chapter explores AWS's CI/CD services, including CodeCommit, CodePipeline, and CodeBuild, detailing how they streamline the software development lifecycle. It also discusses the advantages of using these services and the associated costs.

Chapter 13: AWS Billing and Organizations - This chapter outlines the pricing models for various AWS services along with AWS Billing and Cost Explorer for managing and analyzing costs. It also covers AWS Organizations, explaining its use cases and how it

allows you to segment companies or create sub-level organizational units for better management and control of resources across different teams or departments.

Chapter 14: AWS Advanced Identity Services - This chapter explains the main features of AWS Cognito, including its use cases for user authentication, authorization, and management. It covers federation and single sign-on capabilities, allowing seamless access across multiple applications. Additionally, the chapter explores other AWS services for authentication and authorization, highlighting their roles in securing applications and managing user access across different environments.

Chapter 15: Machine Learning and Other AWS Services - This chapter explores other AWS services used for machine learning, highlighting their capabilities and use cases in building intelligent applications. It also covers a range of AWS compute services, focusing on more specialized use cases. The chapter provides a comprehensive overview of AWS's diverse compute options, showcasing the full spectrum of possibilities for leveraging AWS infrastructure to meet various application needs.

Chapter 16: Preparing for the Exam - This chapter provides additional resources for readers to test and study for the exam. It includes tips on how to effectively prepare for exam day, covering common installations and best practices to follow. The chapter also prepares the reader for proctored exam inspections, outlining what to expect. It also offers advice on how to access discounts or take the exam, ensuring a cost-effective path to certification.

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Code Bundle and the ***Coloured Images*** of the book:

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Table of Contents

1. Cloud Introduction 1
Introduction 1
Structure 2
Objectives 2
History of AWS 2
Genesis and inception (2002-2006) 2
Launching the cloud (2006-2010) 3
Diversification and expansion (2010-2014) 3
Enterprise adoption and dominance (2014-2017) 3
Innovation and specialization (2017-2020) 3
Beyond cloud infrastructure (2020-2023) 4
Cloud computing 4
Elastic computing 4
Benefits of cloud computing 5
Advantages of the cloud over on-premises hosting 6
Advantages of Amazon Web Services 7
Managed service 7
AWS versus other cloud providers 8
Deployment types 9
Infrastructure ownership and location 9
Scalability 9
Costs 10
Flexibility and agility 10
Security and compliance 10
Management and maintenance 11
Disaster recovery and redundancy 11
AWS Cloud Practitioner exam 12
Importance of the AWS Cloud Practitioner exam 12
Exam description and main domains asked 14

Domain 1: Cloud concepts *14*
Domain 2: Security and compliance *15*
Domain 3: Cloud technology and services *16*
Domain 4: Billing, pricing, and support *17*
Sitting for the exam *18*
AWS Well-Architected Framework *19*
Benefits of AWS Cloud services 20
Advantages of using AWS for enterprises *21*
Advantages of using AWS for developers *22*
Free Tier in AWS *23*
Main AWS services *24*
Learning and starting to use AWS *26*
AWS Documentation *26*
AWS Educate *27*
AWS Cloud Quest *27*
AWS Console *28*
Conclusion 33

2. AWS Global Infrastructures and Main Services 35
Introduction 35
Structure 36
Objectives 36
AWS Regions 37
High availability introduction *38*
Fault-tolerance introduction *38*
AWS Availability Zones 39
AWS Regions list 40
AWS Local Zones and Availability Zones 40
Example of RDS high availability 41
Recap of AWS Regions and AZs 42
Overview of AWS main services 42
Compute services *42*
Storage services *43*

Networking services *43*
Database services *43*
Overview of AWS accounts *43*
Significance of AWS accounts *44*
Creating an AWS account *44*
Managing your AWS account *44*
Managing multiple AWS accounts *44*
Managing access with AWS IAM 45
AWS Organizations: Structuring your AWS resources *46*
Overview of AWS CDN and edge locations 46
Route 53 scalable Domain Name System service *47*
CloudFront *48*
AWS edge locations and their significance *49*
AWS edge locations vs regional edge locations 50
AWS CloudFront edge functions *50*
CloudFront Functions versus Lambda@Edge functions *51*
Differences between types of edge functions *52*
Use cases and best practices for edge functions *53*
Conclusion 54
Points to remember 54
Exercises 56
Answers *57*
Key terms 58

3. AWS Identity Access Management 59
Introduction 59
Structure 59
Objectives 60
Identity and Access Management users 60
Identity and Access Management groups 61
Understanding IAM roles and policies 61
IAM roles *61*
IAM policies *62*

Best practices of using AWS IAM 63
Introduction to common predefined IAM roles 63
IAM roles for developers 64
IAM roles for administrators 64
IAM roles for DevOps engineers 64
IAM roles for read-only users 65
Examples of predefined IAM roles and their usage 65
Useful IAM roles for developers 65
Useful IAM roles for administrators 66
Useful IAM roles for DevOps 66
Useful IAM roles for read-only users 67
Introduction to IAM custom policies 67
Creating custom policies 67
Step 1: Sign in to the AWS Management Console 68
Step 2: Access the IAM dashboard 68
Step 3: Create a custom policy 68
Step 4: Build the policy document 68
Step 5: Define the policy 68
Step 6: Review and validate 69
Step 7: Name and describe the policy 69
Step 8: Review and create the policy 69
Step 9: Attach the policy to users, groups, or roles 69
AWS IAM security best practices 70
Setting up multi-factor authentication for an AWS user 70
Setting up single sign-on in AWS 71
Generating access keys for an IAM user 73
Introduction to AWS CLI and AWS SDK 75
Overview of AWS software development kit 75
AWS Command Line Interface in detail 76
Installation and configuration 76
Basic commands and usage 76
AWS CLI advanced features 76
AWS software development kit in detail 77

SDK installation and configuration ... 77
SDK usage in code ... 77
Creating AWS service clients ... 78
Making API requests ... 78
Error handling and asynchronous operations ... 78
AWS SDK features and benefits ... 78
Installation ... 79
Configuration ... 79
Verification ... 79
Setting up AWS SDK ... 79
Choose the right SDK ... 79
Installation ... 80
Configuration ... 80
Verification ... 80
Conclusion on AWS CLI and AWS SDK ... 80
AWS CloudShell ... 80
Important security considerations on managing AWS IAM users ... 81
Introduction to AWS IAM security tools ... 82
Importance of IAM security ... 82
IAM credential report ... 82
Key features and benefits ... 83
Use cases ... 83
IAM access advisor ... 83
Key features and benefits ... 83
Use cases ... 84
AWS IAM shared responsibility model ... 84
AWS guarantees and administrator responsibilities ... 84
AWS guarantees in IAM Security ... 85
AWS guarantees for Infrastructure level ... 85
Customer responsibilities for configuration and vulnerability scans ... 86
AWS IAM compliance validation ... 86
Administrator responsibilities in AWS IAM security ... 87
Security level of AWS IAM ... 87

Conclusion 88
Points to remember 88
Exercises 89
Answers *90*
Key terms 90

4. AWS Compute Services 91
Introduction 91
Structure 91
Objectives 92
AWS Elastic Compute Cloud 92
EC2 instance types *92*
Supported operating systems: Flexibility in the cloud *93*
Types of EC2 ..... *93*
Understanding AWS EC2 and security groups *94*
SSH access to EC2 Linux instances *95*
EC2 Instance Connect *95*
AWS Amazon Machine Images *97*
Understanding the AWS shared responsibility model for EC2 ..... *97*
AWS's responsibilities *97*
Customer's responsibilities *98*
AWS Elastic Container Service 99
Software packaging and deployment *100*
Understanding Docker *100*
Docker is the standard way to deploy projects *100*
Impact on modern software development *101*
Main use cases of AWS ECS *102*
Microservices architecture *102*
CI/CD 102
Hybrid and multi-cloud deployments *102*
AWS ECS for web services and workers and batch jobs *103*
AWS Elastic Container Registry *104*
AWS Fargate *106*

Serverless computing on AWS 107
AWS Lambda and its significance *108*
Common properties and use cases *109*
Common use cases *109*
AWS Lambda *110*
Other compute services 112
API Gateway *112*
Use cases *112*
AWS EKS Managed Kubernetes service *114*
Architecture of Amazon EKS *115*
Ecosystem integration *115*
AWS Amazon Elastic Load Balancer *116*
AWS Beanstalk *117*
Lightsail *120*
Conclusion 121
Points to remember 122
Exercises 123
Answers *125*
Key terms 125

5. AWS Storage Services 127
Introduction 127
Structure 128
Objectives 128
Amazon Simple Storage Service 128
Object storage concept *128*
Amazon S3 storage classes *130*
Pricing details for each storage class *132*
Scheduled rules for S3 Storage classes 132
Considerations *133*
S3 asset and site hosting *133*
CORS configuration *134*
Enabling CORS on S3 ..... *134*

Example CORS configuration for S3 ..... *134*
Handling preflight requests *134*
Shared responsibility model for AWS S3 135
AWS Snow Family *136*
AWS Storage Gateway *137*
Local caching *138*
Use casesBackup and archive *138*
Disaster recovery *138*
Tiered storage *138*
Cloud-based applications *139*
Amazon Elastic Block Store 139
Classes of EBS disks *140*
Best practices *142*
Advanced features *143*
Shared responsibility model for AWS EBS 143
AWS responsibilities *143*
Customer's responsibilities *143*
Amazon Elastic File System 144
Understanding network storage *144*
Pricing model *145*
Classes of storage *145*
Key features *145*
Integration with AWS services *146*
Use cases *146*
Usage Amazon EFS *146*
Best practices *147*
Conclusion 147
Points to remember 147
Exercises 149
Answers *151*
Key terms 151

6. AWS Database Services 153
Introduction 153
Structure 154
Objectives 154
AWS Relational Database Service 155
Introduction to relational databases 156
ACID in relational databases 157
Choosing a relational database 158
Key challenges faced by relational databases 158
Key features of Amazon RDS 159
Database engine support 161
NoSQL Databases in AWS 170
The advent of NoSQL 171
Examples of NoSQL databases 172
Amazon DynamoDB 173
DynamoDB as a NoSQL key-value store 174
Features of DynamoDB 175
Use cases of DynamoDB 175
On-demand and provisioned throughput 176
Pricing models and auto scaling options 176
DynamoDB Streams 177
Backups in Amazon DynamoDB 178
Secondary indexes in Amazon DynamoDB 178
Introduction to AWS Redshift 179
OLAP versus OLTP 180
Features of Amazon Redshift 180
AWS Redshift pricing model 182
Other databases in AWS 184
A different kind of databases 185
In-memory database in AWS 186
Search database in AWS 186
Graph database in AWS 186
Document database in AWS 187

Pricing models of alternative AWS databases *187*
Big data processing in Amazon 188
Concept of data lakes *188*
Pricing model for EMR, Athena, and Glue *193*
AWS Cloud Data Migration Services 195
AWS Direct Connect *196*
AWS Snow Family *196*
AWS Storage Gateway *197*
AWS S3 Transfer Acceleration *198*
AWS Firehose *198*
AWS Transfer Family *199*
Third-party connectors *200*
AWS Database Migration Service *201*
Schema Conversion Tool *201*
Conclusion 202
Points to remember 203
Exercises 205
Answers *208*
Key terms 209

7. AWS Networking 211
Introduction 211
Structure 212
Objectives 212
Amazon Virtual Private Cloud introduction 213
Definition of VPC *214*
Importance of VPCs *215*
IP addresses in AWS VPC 215
Elastic IPs in AWS VPC 217
Default VPC in AWS 218
Characteristics of the default VPC *218*
Subnets in AWS VPC 218
AWS route tables 219

VPC integration *220*
Routes and propagation *220*
Internet gateway and NAT gateway in AWS VPC 221
Internet gateway *221*
NAT gateway *221*
Load balancers in AWS VPC *222*
AWS Elastic Balancer types 223
Understanding DHCP in AWS VPC *224*
Security groups in AWS VPC *225*
Network access control lists in AWS VPC 225
VPC Flow Logs *225*
Anatomy of VPC Flow Logs *226*
Understanding VPC peering 226
Managing VPC peering connections *227*
Unlocking VPC endpoints 228
Functionality of VPC endpoints *228*
Use cases *229*
Configuring and managing VPC endpoints *229*
AWS networking and other services 230
AWS PrivateLink *230*
AWS Direct Connect *230*
Site-to-site VPN, Client VPN, and Transit Gateway *231*
Conclusion 231
Points to remember 232
Exercises 233
Answers *234*
Key terms 235

8. AWS Security 237
Introduction 237
Structure 238
Objectives 238
AWS encryption and key management 238

Encryption in AWS S3 and KMS *240*
Encryption in transit and at rest *240*
AWS shared responsibility model 241
Defining the shared responsibility model *241*
Shared responsibility model for Amazon EC2 ..... *242*
Securing an application deployed in EC2 ..... *243*
Shared responsibility model for Amazon EBS *243*
Securing your data stored in EBS *244*
Shared responsibility model for Amazon S3 ..... *244*
AWS responsibilities *245*
Customer responsibilities *245*
Best practices and considerations for secure S3 ..... *246*
Shared responsibility model for Amazon RDS *247*
Operational aspects of shared responsibility in RDS security *247*
Shared responsibility model for Lambda *248*
Best practices and implementation strategies *249*
Shared responsibility model for Redshift *250*
Implementing security measures in Amazon Redshift *250*
Shared responsibility model for DynamoDB *251*
Navigating security best practices and implications *251*
ACL and security groups in VPCs 252
Security groups in VPCs *252*
Best practices and use cases for AWS security groups *253*
ACL in VPCs *253*
Configuring and customizing ACLs *254*
Best practices for AWS ACLs *254*
AWS Network Firewall 255
Key features and functionality *255*
Scalability and automation *255*
AWS Shield 256
Key features and benefits of AWS Shield *256*
Versioning and logging *257*
Regular key rotation and auditing *257*

CloudHSM *257*
Key features and use cases *258*
AWS Certificate Manager *259*
Key features and benefits of AWS Certificate Manager *259*
AWS Secrets Manager *260*
Client-side encryption and security best practices *260*
AWS compliance and auditing 261
Compliance introduction *261*
Understanding the compliance landscape in AWS *262*
Compliance journey *262*
Compliance tools in AWS *263*
Tools for ensuring compliance *263*
Shared responsibility in compliance *263*
AWS CloudTrail *264*
Key features for compliance *264*
Integration with AWS Key Management Service *264*
Automated compliance monitoring *264*
Implementation and use cases of compliance in AWS CloudTrail *265*
AWS Config *266*
AWS Artifact *267*
AWS GuardDuty *268*
Key features and benefits *268*
Amazon Inspector *269*
Amazon Macie *270*
Key features and benefits of Amazon Macie *270*
AWS Detective *271*
Key features and benefits *272*
Conclusion 272
Points to remember 273
Exercises 275
Answers *276*
Key terms 277

9. AWS Content Delivery and Global Applications 279
Introduction 279
Structure 279
Objectives 280
Amazon Route 53 280
DNS and its importance 281
DNS functions and challenges 281
Key qualities of using AWS Route 53 282
Main features of AWS Route 53 282
Use cases of AWS Route 53 283
Advanced features of AWS Route 53 283
Best practices for AWS Route 53 284
Amazon Route 53 pricing 284
Amazon content delivery network 285
Understanding content delivery networks 286
CDN architecture, operation, and benefits 286
Introduction to AWS CloudFront 287
Key features of AWS CloudFront 287
Best practices for AWS CloudFront implementation 288
AWS CloudFront vs Lambda@Edge functions 288
Differences and use cases 290
Amazon CloudFront pricing 291
Other AWS services for global applications 292
S3 Transfer Acceleration 293
AWS Global Accelerator 295
AWS Outpost 296
AWS Wavelength 297
Conclusion 299
Points to remember 300
Exercises 302
Answers 304
Key terms 304

10. AWS Events and Messages 305
Introduction 305
Structure 306
Objectives 306
Amazon Simple Queue Service 306
Definition of a queue 307
Use cases of queues in IT 308
Challenges and considerations 308
Overview of AWS SQS 309
Types of SQS queues 309
SQS pricing 310
Key features of AWS SQS 310
Use cases and benefits of AWS SQS 311
AWS SQS usage and best practices 312
SQS dead-letter queue 312
Best practices for AWS SQS DLQs 313
Amazon Simple Notification Service 314
Notification services in AWS SNS 314
Use cases of AWS SNS 316
Types of SNS messages 317
Protocols supported by AWS SNS 317
Pricing structure 318
Cost optimization tips 318
Other AWS services for event and messaging 319
Event-driven programming 319
Asynchronous programming 319
Other AWS event-driven services 320
Amazon Kinesis 321
AWS MQ 325
AWS EventBridge 326
Getting started with AWS EventBridge 329
Conclusion 330
Points to remember 331

Exercises ... 332
Answers ... *334*
Key terms ... 334

11. AWS Cloud Monitoring ... 335
Introduction ... 335
Structure ... 336
Objectives ... 336
AWS CloudWatch ... 337
Key features of AWS CloudWatch ... *337*
AWS CloudWatch Logs ... *338*
AWS CloudWatch metrics ... *340*
AWS CloudWatch alarms ... *342*
AWS CloudWatch custom dashboards ... *343*
AWS CloudWatch custom dashboard example ... *345*
AWS CloudWatch custom dashboard best practices ... *347*
AWS CloudTrail ... 348
Features of AWS CloudTrail ... *348*
Benefits of AWS CloudTrail ... *349*
Auditing and compliance ... *349*
AWS Trusted Advisor ... 351
Features of AWS Trusted Advisor ... *351*
Benefits of AWS Trusted Advisor ... *352*
AWS X-Ray ... 353
Understanding AWS X-Ray concepts ... *353*
Features of AWS X-Ray ... *354*
Benefits of Using AWS X-Ray ... *354*
AWS Lambda Insight ... 355
Understanding AWS Lambda Insight ... *355*
Benefits of Using AWS Lambda Insight ... *356*
Key features of AWS Lambda Insight ... *356*
AWS CodeGuru ... 357
Features of AWS CodeGuru ... *357*

Benefits of AWS CodeGuru *357*
Implementing AWS CodeGuru *358*
AWS Health 359
Features of AWS Health *360*
Benefits of AWS Health *360*
Best practices for leveraging AWS Health *361*
Conclusion 362
Points to remember 362
Exercises 364
Answers *366*
Key terms 366

12. AWS Cloud Deployment and IaC 367
Introduction 367
Structure 368
Objectives 368
IaC introduction 369
Understanding infrastructure as code *369*
Exploring different infrastructure as code languages *369*
Example of IaC using YAML or JSON formats *371*
Usage in AWS *372*
Benefits of IaC *373*
Implementation strategies *373*
Challenges and considerations *374*
AWS CloudFormation 375
Overview of AWS CloudFormation *375*
Key features of AWS CloudFormation *375*
Benefits of using AWS CloudFormation *376*
Best practices for using AWS CloudFormation *376*
AWS CDK 377
Introduction to AWS CDK *377*
Getting started with AWS CDK *377*
Defining infrastructure with AWS CDK *378*

Deploying infrastructure with AWS CDK *378*
AWS CDK and CloudFormation *379*
AWS CodeCommit 379
Introduction to AWS CodeCommit *379*
Getting started with AWS CodeCommit *380*
CI/CD introduction 381
Definition of CI/CD *381*
Key concepts of CI/CD *381*
Benefits of CI/CD *382*
AWS CodeBuild 383
Key features of AWS CodeBuild *383*
Getting started with AWS CodeBuild *383*
Best practices for AWS CodeBuild *384*
AWS CodePipeline 384
Introduction to AWS CodePipeline *384*
Key concepts *385*
Working with AWS CodePipeline *385*
Integrations and extensibility *386*
AWS CodeArtifact 386
Definition of AWS CodeArtifact *386*
Meaning of code repositories *386*
Key features of AWS CodeArtifact *388*
Benefits of using CodeArtifact *388*
Conclusion 390
Points to remember 390
Exercises 392
Answers *394*
Key terms 394

13. AWS Billing and Organizations 395
Introduction 395
Structure 396
Objectives 396

AWS Billing introduction 397
AWS Billing components *397*
AWS Billing pricing models 398
Optimizing AWS costs *399*
AWS Cost Explorer 400
AWS Billing dashboard 401
AWS Billing dashboard versus Cost Explorer *402*
AWS Budgets 403
Setting budgets *403*
Monitoring and tracking spending *403*
Custom notifications and alerts *403*
Cost optimization strategies *404*
Best practices and recommendations *404*
Cost and usage reports for billing 404
AWS Billing alarms 406
Configuring AWS Billing alarms *406*
Best practices for utilizing AWS Billing alarms *406*
AWS Organizations 407
Understanding AWS Organizations *407*
Key features and functionality *408*
Benefits of AWS Organizations *408*
Best practices for implementation *409*
AWS Organizations service control policies 409
AWS Organizations and service control policies *409*
Implementation and configuration of SCPs *410*
Implications for organizational governance *410*
AWS consolidated billing for AWS Organizations 411
Conclusion 412
Points to remember 413
Exercises 415
Answers *417*
Key terms 417

14. AWS Advanced Identity Services 419
Introduction 419
Structure 420
Objectives 420
AWS Cognito introduction 420
Purpose of AWS Cognito 421
Key features of AWS Cognito 421
Features of AWS Cognito 422
User management with AWS Cognito 423
User authentication flows 424
User management APIs 424
Security and compliance 425
Identity federation for access 425
Understanding identity federation 425
Implementing identity federation in Amazon Cognito 426
Supported identity providers 427
Authentication flows 427
Identity federation in IAM 428
Understanding identity federation in AWS IAM 428
Implementing Identity Federation in AWS IAM 429
AWS Security Token Service 432
Understanding temporary security credentials 432
Role of STS in cross-account access 433
Advanced features and use cases 433
Cross-account role access 433
Best practices for using STS effectively 434
AWS Directory Service 435
Overview of AWS Directory Service 435
AWS Managed Microsoft AD 435
AD Connector 436
Simple AD 436
Amazon Cloud Directory 436
Conclusion 437

Points to remember 438
Exercises 439
Answers *440*
Key terms 440

15. Machine Learning and Other AWS Services 441
Introduction 441
Structure 442
Objectives 442
AWS machine learning services 442
AWS Polly *443*
Understanding AWS Polly *443*
Applications of AWS Polly *444*
AWS Rekognition *445*
Understanding AWS Rekognition *445*
Use cases and applications *446*
AWS Comprehend *447*
Key features and capabilities *447*
Real-world applications and use cases *448*
Amazon Lex *449*
Key features and capabilities *449*
Real-world applications and use cases *450*
AWS Transcribe *451*
Understanding AWS Transcribe *451*
How AWS Transcribe works *451*
Applications of AWS Transcribe *451*
Benefits of AWS Transcribe *452*
AWS SageMaker *452*
Understanding AWS SageMaker *452*
AWS Kendra *454*
Understanding AWS Kendra *454*
Other useful AWS services 456
AWS Amplify *456*

Introduction to AWS Amplify *456*
Key features of AWS Amplify *456*
Accelerating development with AWS Amplify CLI *456*
AWS AppSync *457*
Introduction to AWS AppSync *457*
Getting Started with AWS AppSync *458*
AWS IoT Core *459*
Understanding AWS IoT Core *459*
Use cases and applications *460*
AWS Ground Station *461*
Introduction to AWS Ground Station *461*
Key features and capabilities *461*
Use cases and applications *461*
Future outlook and impact *462*
Conclusion 462
Points to remember 463
Exercises 466
Answers *467*
Key terms 468

16. Preparing for the Exam 469
Introduction 469
Structure 470
Objectives 470
AWS resources for exam preparation 470
Understanding AWS Certified Cloud Practitioner exam *471*
AWS Training and Certification *471*
AWS Educate *472*
AWS Cloud Quest for Cloud Practitioner *473*
Understanding the game *473*
Gameplay mechanics *473*
AWS Workshops *474*
Other resources from third-parties 476

Mock exam 477
Real exam details *477*
Instructions to mock exam *477*
Questions 478
Answers *481*
Exam day preparation 481
Basic installation setup for proctored online exam *482*
Basic prerequisites for taking the exam *482*
Tips and exam discounts 483
Leveraging AWS meetups *483*
Discounts for exams *483*
Tips for the exam *484*
Conclusion 485

Index 487-506

Chapter 1
Cloud Introduction

Introduction

Amazon Web Services (**AWS**) is a cloud computing platform that provides a wide range of cloud-based services and solutions to individuals and businesses. It gives security, scalability, and a vast range of services for all possible use cases. AWS is a company created by *Amazon* (**http://amazon.com**) and was launched in 2006. Since then, it has grown to become one of the most popular cloud computing platforms in the world and the first public cloud used in business.

AWS revolutionized the concept of deployment and infrastructure as what was used before, bringing new concepts like pay on demand, elastic compute, and auto scaling, giving a better and solid **service level agreement** (**SLA**) of services and offering better security all around. All those features can be used in small startups and difficult use cases like in the enterprise.

AWS was the first cloud provider, the first product bringing us concepts such as Cloud, Serverless, Elastic compute, and so on. AWS is the biggest and most important cloud as it is the most comprehensive in terms of services offered and also because it is the fastest in innovating its offering year by year.

As of today, 2023, based on different professional surveys, AWS is the most used cloud provider for startups and enterprises worldwide. For example, the Stack Overflow survey of 2023 gives AWS (as in the previous years) the primate of the most used cloud by IT professionals:

https://survey.stackoverflow.co/2023/# most-popular-technologies-platform-prof

Structure

In this chapter, we will cover the following topics:

- History of AWS
- Cloud computing
- Elastic computing
- Advantages of AWS
- Deployment types
- AWS Cloud Practitioner exam
- Benefits of AWS Cloud services

Objectives

This chapter will give the reader a high level view of the main AWS services, and we will gain an insight into basic cloud concepts. Starting from the history of AWS, we will then explore different use cases and why choosing a cloud provider like AWS could benefit you and your team. Then, we will see how the AWS Cloud Practitioner exam is structured, how it could be useful for the reader and their career, and the main domains that you need to know to pass the exam. Finishing this chapter will help you to start to understand the main terms and services of AWS, create your first AWS account, and understand all the main topics of the exam. This is an introductory step for all the topics discussed in the next chapters.

History of AWS

The story of AWS began in the early 2000s, when Amazon.com, under the leadership of *Jeff Bezos*, recognized the need for a more efficient and scalable way to manage its vast IT infrastructure and to improve the speed of development of new services from his team of engineers. AWS could be described as a spin-off from Amazon.com, built as another company dedicated to reproducing the same scalable services used for Amazon.com.

Genesis and inception (2002-2006)

The company's existing IT infrastructure struggled to keep up with this growth, leading to challenges in maintaining a high level of engineering velocity. As Amazon expanded its product range, the need for faster development cycles, efficient deployment, and seamless scalability became significant. Amazon recognized that its existing approach to IT infrastructure was hindering its engineers' ability to innovate and iterate quickly. Traditional data centers were labor-intensive to manage and required substantial upfront investments. The result was slow development cycles, stifled innovation, and a growing gap between engineering potential and reality.

To address these challenges, Amazon began developing internal tools and services that leveraged cloud computing principles. These tools allowed Amazon's engineers to provision resources on demand, experiment more freely, and accelerate development cycles. Over time, it became evident that these solutions had the potential to revolutionize not only Amazon's own operations but the entire industry.

In 2002, the concept of AWS emerged. By transforming their internal tools into external services, Amazon aimed to provide other businesses with the same technological advantages that had helped streamline their own operations. This marked the inception of AWS and the birth of cloud computing as a transformative force.

Launching the cloud (2006-2010)

The pivotal moment arrived in March 2006 with the launch of Amazon's **Simple Storage Service** (**S3**), which offered developers a scalable and reliable storage solution in the cloud. This marked the official entry of AWS into the market. A year later, Amazon **Elastic Compute Cloud** (**EC2**) was unveiled, allowing users to rent virtualized computing resources on demand. These services ignited a revolution, providing businesses with unprecedented flexibility and scalability.

Diversification and expansion (2010-2014)

AWS quickly broadened its service portfolio. Amazon introduced services like Amazon SimpleDB, a highly available NoSQL data store, and AWS Elastic Beanstalk, a **Platform-as-a-Service** (**PaaS**) offering. The introduction of these services demonstrated AWS's commitment to catering to a diverse range of application needs, from databases to application deployment.

Enterprise adoption and dominance (2014-2017)

As AWS matured, it became evident that cloud computing was not just for startups and small businesses. Major enterprises started migrating their critical workloads to AWS, driven by its reliability, scalability, and cost-effectiveness. In 2015, AWS achieved an annual revenue run rate of $7.3 billion, solidifying its position as the dominant player in the cloud market.

Innovation and specialization (2017-2020)

AWS continued to innovate and release new services at a rapid pace. It ventured into specialized areas such as **artificial intelligence** (**AI**) and **machine learning** (**ML**) with services like Amazon Polly, Rekognition, and SageMaker. AWS Marketplace also emerged, offering third-party software and services to complement the AWS ecosystem.

Beyond cloud infrastructure (2020-2023)

In recent years, AWS expanded its focus beyond traditional cloud infrastructure. It delved into space with AWS Ground Station, providing satellite communication capabilities, and made significant strides in edge computing with services like AWS Greengrass. Acquiring companies like Annapurna Labs and CloudEndure further strengthened its technological prowess.

From its humble beginnings as an internal initiative to its status as a technology powerhouse, AWS's journey has been one of innovation, expansion, and transformation. It has not only revolutionized the way businesses approach IT infrastructure but has also played a pivotal role in shaping the very nature of technology deployment and scalability.

As we move forward, the legacy of AWS will undoubtedly continue to evolve, driving new standards and possibilities in the tech industry. With its ongoing commitment to customer-centricity and innovation, AWS remains at the forefront of the digital revolution, inspiring businesses and individuals to dream big and harness the power of the cloud.

Cloud computing

Cloud computing is a technology that enables businesses and individuals to access powerful computing resources on demand without having to invest in expensive hardware and infrastructure. Instead, they can rent resources from cloud providers like AWS, which has a vast global network of data centers that offer scalable and flexible services.

Cloud computing offers several advantages over traditional on-premises computing. Firstly, it allows businesses to scale their resources up or down depending on their needs, pay only for what they use, and avoid the costs and complexities of managing their infrastructure. With cloud computing, businesses can scale and create applications that can be accessed near the location of their users from anywhere in the world, thanks to AWS geographically distributed networks (AWS Region) and AWS CloudFront **content delivery network** (**CDNs**). This provides significant flexibility for businesses and their customers, even if the business is working with customers coming from various geographical locations around the world.

Also, cloud computing offers businesses a significant advantage over traditional on-premises computing systems in terms of security. With cloud computing, businesses can benefit from the latest security technology and infrastructure maintained and updated by the cloud provider, freeing them from the costs and complexities of managing their own security systems.

Elastic computing

Elastic computing encompasses the capacity to seamlessly modify the allocation of computing resources, such as CPU and memory, to adapt to fluctuating workloads

experienced by your applications and services. This flexibility ensures that your system can efficiently scale up or down as demand varies. This elasticity allows you to scale up or down as needed, ensuring your applications can handle varying traffic levels efficiently. AWS offers services like Amazon EC2 that exemplify this concept by providing resizable virtual servers that you can launch or terminate based on your use cases.

The Elastic term in AWS enables companies to have the flexibility and adaptability of various cloud resources beyond just computing, including storage, databases, and networking. An elastic infrastructure allows you to provision and de-provision resources quickly, automate scaling based on conditions or policies, and optimize cost and performance by dynamically adjusting resources. This elasticity is a fundamental characteristic of cloud computing, allowing you to align your IT infrastructure with your specific business needs and effectively manage costs.

Benefits of cloud computing

Cloud computing has several advantages, including scalability, cost savings, flexibility, and security. One of the primary advantages of cloud computing is its scalability. Businesses can quickly and easily increase or decrease their computing resources as demand fluctuates. This can be particularly beneficial for businesses with seasonal or unpredictable workloads, like black Fridays for e-commerce, a flow of new signups for a mobile app from socials, startups with new customers giving them new data to handle, big data workloads on Apache Spark and other big data frameworks, ML tasks, big enterprises in need to handle a big new customer dataset and new traffic, and so on.

So, the cloud enables enterprises big and small to handle the unpredictable: the spikes in traffic that an application can see if it gains traction and users, but also to make engineers faster in handling new projects and workloads; also it enables working on a solid base for the infrastructure, so a cloud as AWS could improve the velocity of the development team but also improve the handling of new user demands.

Cloud computing also saves businesses money on hardware and infrastructure costs by only paying for the resources they use. They do not have to invest in expensive servers, storage, and networking equipment that they may not fully utilize. Instead, they can rent resources from cloud providers like AWS, which offers a wide range of services that cater to businesses of all sizes.

Another advantage of cloud computing is its flexibility. It allows businesses to spin up instances on demand around the world near the location of their users, based upon the needs of the business, and create servers in seconds instead of waiting hours or days as we can see with on-premises setups. This is possible thanks to all the features of a cloud like AWS, like integrating with on-premises setups, accessing and creating secure credentials for storage and credentials for users in a team, creating secure connections using VPN, and secure direct connection to the resources on the cloud and on-premises servers.