Introduction to Security & Architecture

Guided Notes

I am excited that you are on the journey to get your AWS Certified Cloud Practitioner certification. This guided outline is meant to complement the video course. Here are a few tips to help you get the most out of this resources:

1. Print this out before you start the video course.
2. Follow along with the course and fill out areas in this document as you watch the course. You'll notice that the module names in the course are the bold headings here in these notes. In addition, clips in the module have their titles in this document too. Not all clips have notes.
3. Review your notes against the completed notes that can be found in the exercise files.
4. Keep this document after you finish the course as a part of the materials you will use to study for the exam.

Remember, this course is just the first step in your journey to achieve this certification. Follow along with the remainder of courses in this path, and then register for the exam.

Don't forget to reach out on Twitter and LinkedIn to let me know how you are doing along the way.

AWS Architecture Core Concepts

Learning Outcomes

- Policies and Models
  - Acceptable Use Policy
    - You should know what this policy covers and the types of things it doesn't allow
  - Shared Responsibility Model
    - You should be able to know what kind of areas are the responsibility of the custom and which are for AWS
- Well-architected Framework
  - Know the type of information included in the framework and how it could be useful
  - Know the different pillars of the framework
- High-availability and Fault Tolerance
  - Understand the difference between these terms
  - Know the services that can help enable these

Helpful Links

- AWS Acceptable Use Policy
- AWS Shared Responsibility Model
- Well-architected Framework
- Services
  - AWS Config
  - AWS Artifact
  - Amazon GuardDuty

Security and Architecture Overview

AWS Acceptable Use Policy _____ : AWS's policy for acceptable and unacceptable uses of their cloud platform. All users must agree with this policy to have an account on the platform.

Shared Responsibility Model

"_____Security_____ and _____Compliance_____ is a shared responsibility between AWS and the customer." -- Amazon Web Services

AWS Responsibility	Customer Responsibility
Access & training for Amazon employees	Individual access to cloud resources and training
Global data centers and underlying network	Data security and encryption (both in transit and at rest)
Hardware for global infrastructure	Operating system, network, and firewall configuration
Configuration management for infrastructure	All code deployed onto cloud infrastructure
Patching cloud infrastructure and services	Patching guest operating system and custom applications

AWS Well-architected Framework

Pillars of the Well-architected Framework

1. _____Operational Excellence_____ - Running and monitoring systems for business value
2. _____Security_____ - Protecting information and business assets

3. Reliability - Enabling infrastructure to recover from disruptions
4. Performance Efficiency - Using resources efficiently to achieve business value
5. Cost Optimization - Achieving minimal costs for the desired value

High-availability and Fault Tolerance

Some services that support fault tolerance:

1. Simple Queue Service (SQS)
2. Route 53

Compliance

Services that support compliance:

1. AWS Config - Continually monitor AWS resources and provides conformance packs for specific compliance standards
2. AWS Artifact - Portal that provides self-service access to compliance reports
3. Amazon GuardDuty - Provides intelligent threat detection

Scenarios

The following scenarios are presented in the course as a way to explore your understanding of the module. Include your answer here in this outline, as well as your notes on the solution to each scenario.

SCENARIO 1

- Jane's company is building an application to process credit cards
- They will be processing cards directly and not through a service
- Their bank needs a PCI DSS compliance report for AWS
- Where would Jane go to get the information?

What's Your Answer: AWS Artifact:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 2

- Tim's company is considering a transition to the cloud
- They store personal information securely in their system
- Tim's CTO has asked what the company's responsibility is for security
- What would you tell Tim's CTO?

What's Your Answer: Review the Shared Responsibility Model:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 3

- Ellen is a solutions architect at a startup
- They are building a new tool for digital asset management
- Ellen is curious how to best leverage the capabilities of AWS in this application
- What resources would you recommend for Ellen and her team?

What's Your Answer: AWS Well Architected Framework:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

Module Wrap Up

Take a minute to write down any areas from this module that you don't fully understand or where you still have questions:

AWS Identities and User Management

Learning Outcomes

- AWS Identity & Access Management (IAM)
  - Understand the purpose of the service
  - Know about the three different IAM identity types and know when you would use each one
  - Know about identity federation for IAM
  - Know about IAM best practices
    - Multi-factor Authentication
    - Least Privilege Access
- Amazon Cognito
  - Know about why you would use the service
  - Know about social logins with Cognito and supported identity providers

Helpful Links

- AWS Identity and Access Management
- Amazon Cognito

Summary

Least Privilege Access : When granting permission for a user to access AWS resources, you should grant them the minimum permissions needed to complete their tasks and no more.

Introduction to AWS IAM

AWS IAM Identities

Please fill in the correct identities for the following descriptions:

Users

Account for a single individual to access AWS resources

Groups

Allows you to manage permissions for a group of IAM users

Roles

Enables a user or AWS service to assume permissions for a task

Amazon Cognito

List the supported Cognito identity providers:

1. Google
2. Amazon
3. Facebook
4. Microsoft Active Directory
5. SAML 2.0 Providers

Scenarios

The following scenarios are presented in the course as a way to explore your understanding of the module. Include your answer here in this outline, as well as your notes on the solution to each scenario.

SCENARIO 1

- Sylvia manages a team of DevOps engineers for her company
- Each member of her team needs to have the same access to cloud systems
- It is taking her a long time to attach permissions to each user for access
- What approach would help Sylvia manage the team's permissions?

What's Your Answer: Use an IAM Group for the team:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 2

- Edward works for a startup that is building a mapping visualization tool
- Their EC2 servers need to access data stored within S3 buckets
- Edward created a user in IAM for these servers and uploaded keys to the server
- Is Edward following best practices for this approach? If not, what should he do?

What's Your Answer: Use an IAM Role with EC2:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 3

- William is leading the effort to transition his organization to the cloud
- His CIO is concerned about securing access to AWS resources with a password
- He asks William to research approaches for additional security
- What approach would you recommend to William for this additional security?

What's Your Answer: Use Multi-factor Authentication (MFA):

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

Module Wrap Up

Take a minute to write down any areas from this module that you don't fully understand or where you still have questions:

Data Architecture on AWS

Learning Outcomes

- On-premise Data Services
  - Understand when you would use each of these
    - AWS Storage Gateway
    - AWS DataSync
- Be able to explain the different data processing services
  - AWS Glue
  - Amazon EMR
  - AWS Data Pipeline
- Be able to define and explain the different data analysis services
  - Amazon Athena
  - Amazon Quicksight
  - Amazon CloudSearch
- Be able to explain each of the following AI / ML services and its use
  - Amazon Rekognition
  - Amazon Translate
  - Amazon Transcribe

Integrating On-premise Data

AWS Storage Gateway - Hybrid-cloud storage service that integrates cloud storage into your local network.

AWS Storage Gateway Volume Types

Please enter the name and brief definition of each volume type for AWS Storage Gateway:

1. File Gateway - Stores files in Amazon S3 while providing cached low-latency local access

2. Tape Gateway - Enables tape backup processes to store data in the cloud on virtual tapes

3. Volume Gateway - Provides cloud based iSCSI volumes to local applications

AWS DataSync - Automated data transfer service that uses an optimized protocol for high-speed synchronization to the cloud

Processing Data

AWS Glue

Managed Extract, Transform, and Load (ETL) Service

Amazon EMR

Big-data cloud processing using popular tools

AWS Data Pipeline

Data workflow orchestration service across AWS services

AWS Glue supports data in Amazon RDS, Amazon DynamoDB, Amazon Redshift, and Amazon S3.

Supported EMR Tools

Enter the different open source tools supported in Amazon EMR:

1. Apache Spark
2. Apache Hive
3. Apache HBase
4. Apache Flink
5. Apache Hudi
6. Presto

AWS Data Pipeline integrates with Amazon S3, Amazon EMR, Amazon Redshift, Amazon DynamoDB, and Amazon RDS.

Analyzing Data

Data Analysis Services

Please enter the service name for each description:

Service Name	Description
Amazon Athena	Service that enables serverless querying of data stored within Amazon S3 using standard SQL queries
Amazon Quicksight	Fully-managed Business Intelligence (BI) service enabling self-service data dashboards for data stored in the cloud
Amazon CloudSearch	Managed search service for custom applications

Integrating AI and Machine Learning

Enter the service names for the following ML services on AWS:

Amazon Rekognition

Computer vision service powered by Machine Learning

Amazon Translate

Text translation service powered by Machine Learning

Amazon Transcribe

Speech to text solution using Machine Learning

Scenarios

The following scenarios are presented in the course as a way to explore your understanding of the module. Include your answer here in this outline, as well as your notes on the solution to each scenario.

SCENARIO 1

- Ruth is a data scientist for a financial services company
- Large-scale data set needs to be processed before analysis
- Ruth doesn't want to manage servers but just wants to define processing
- What service would you recommend to Ruth?

What's Your Answer: AWS Glue:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 2

- Jessi is a member of the IT team for a biotech company
- She is currently working to identify an approach for controlled lab access
- She wants leverage AI to determine access based on facial imaging
- Is there an AWS service that can help with this approach?

What's Your Answer: Amazon Rekognition:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 3

- Roger's company sells custom services around machine learning
- His head of sales is trying to find a great way to visualize their sales data
- This data is currently stored in Redshift as their data warehouse
- What AWS service would allow this access to the data by non-technical resources?

What's Your Answer: _____Amazon Quicksight_____:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

Module Wrap Up

Take a minute to write down any areas from this module that you don't fully understand or where you still have questions:

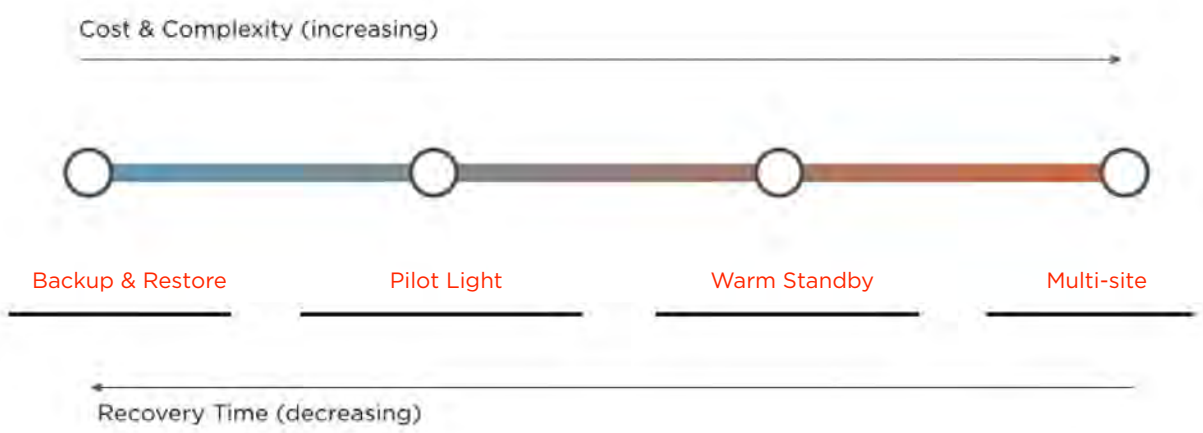
Disaster Recovery on AWS

Learning Outcomes

- Understand the four different recommended architectures for disaster recovery (DR)
  - Backup and Restore
  - Pilot Light
  - Warm Standby
  - Multi-site
- Be able to determine which approach makes sense for an organization based on RTO and RPO

Disaster Recovery Architectures

Enter the correct names for each disaster recovery architecture:



Selecting a Disaster Recovery Architecture

Recovery Time Objective (RTO) - The time it takes to get your systems back up and running to the ideal business state after a disaster recovery event.

Recovery Point Objective (RPO) - The amount of data loss (in terms of time) for a production system during a disaster recovery event.

Scenarios

The following scenarios are presented in the course as a way to explore your understanding of the module. Include your answer here in this outline, as well as your notes on the solution to each scenario.

SCENARIO 1

- Roger's company runs several production workloads in AWS
- Roger is tasked with architecting the disaster recovering approach
- His organization wants there to be a seamless transition during an event
- Which disaster recovery approach would Roger's company use for this?

What's Your Answer: Multi-site:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 2

- Jennifer's company is a startup
- They do not currently have a disaster recovery approach
- In this case, minimizing cost is more critical than minimizing RTO
- What disaster recovery approach would you recommend to Jennifer?

What's Your Answer: Backup and Restore:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 3

- Eliza is documenting her company's disaster recovery approach
- They keep a few key servers up an running in AWS in case of an event
- These servers have smaller instance types than what production would need
- Which disaster recovery approach most closely matches this scenario?

What's Your Answer: Pilot Light:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

Module Wrap Up

Take a minute to write down any areas from this module that you don't fully understand or where you still have questions:

Architecting Applications on Amazon EC2

Learning Outcomes

- Scaling EC2
  - Understand the difference between horizontal and vertical scaling
  - Explain services that support scaling
    - Auto-scaling groups
    - Elastic Load Balancing
- Limiting Access to EC2 Instances
  - Understand the different approaches for controlling access
    - Security Groups
    - ACL's
    - AWS VPN
- Know the AWS services that provide protection from hacks and attacks
  - AWS Shield
  - Amazon Macie
  - Amazon Inspector
- Understand the different ways to launch pre-existing experiences on EC2
  - AWS Service Catalog
  - AWS Marketplace
- Be able to define the different services in the suite of developer tools on AWS
  - AWS CodeCommit
  - AWS CodeBuild
  - AWS CodeDeploy
  - AWS CodePipeline
  - AWS CodeStar

Scaling EC2 Infrastructure

Vertical Scaling - You "scale up" your instance type to a larger instance type with additional resources

Horizontal Scaling - You "scale out" and add additional instances to handle the demand of your application

Fill in the notes on Auto-scaling Groups for EC2:

Amazon EC2 Auto-scaling Groups
Launch template defines the instance configuration for the group
Defines the minimum, maximum, and desired number of instances
Performs health checks on each instance
Exists within 1 or more availability zones in a single region
Works with on-demand and spot instances

AWS Secrets Manager - Service that manages secrets (such as passwords, keys, tokens, etc...) used in your custom applications on AWS. It also supports auto-rotation of credentials on supported AWS services.

Controlling Access to EC2 Instances

Fill in the solutions for limiting access to EC2 instances based on the included descriptions:

Solution	Description
EC2 Security Group	Enables firewall-like controls for resources within the VPC
Network Access Control Lists (ACL's)	Controls inbound and outbound traffic for subnets within the VPC

AWS VPN	Secure access to an entire VPC using an encrypted tunnel

Indicate which of the following are characteristics of Security Groups and which are Network ACL's:

Security Group, ACL, or both	Characteristic
Security Group	Operates at the instance level
ACL	Works for an entire subnet
Security Group	Multiple can be assigned to an EC2 instance
ACL	Can be used to allow or deny traffic
Both	Controls inbound and outbound traffic

Protecting Infrastructure from Attacks

Fill in the names for the following security services:

AWS Shield

Managed DDoS protection service for apps on AWS

Amazon Macie

Data protection service powered by machine learning

Amazon Inspector

Automated security assessment service for EC2 instances

Deploying Pre-defined Solutions

AWS Service Catalog - Targeted to serve as an organizational service catalog for the cloud

AWS Marketplace - Enables third-party ISV's to offer configurations for the cloud that can be launched in your account

Developer Tools

Fill in the following service names based on the description:

Service Name	Description
AWS CodeCommit	Fully-managed source control service using Git

AWS CodeBuild	Fully-managed build and continuous integration service on AWS
AWS CodeDeploy	Fully-managed deployment service for applications running on Amazon EC2, AWS Fargate, AWS Lambda, and on-premise servers
AWS CodePipelines	Fully-managed continuous delivery service on AWS for automating building, deploying, and testing. Integrates with other developer services
AWS CodeStar	Workflow tool for automatic creation of a continuous delivery pipeline for a custom application using the other developer services

Scenarios

The following scenarios are presented in the course as a way to explore your understanding of the module. Include your answer here in this outline, as well as your notes on the solution to each scenario.

SCENARIO 1

- Ellen is a solutions architect at a traditional financial services company
- They recently transitioned to AWS
- They want to be sure each department follows best practices
- They want to create compliant IT services that other departments can use
- What service would you recommend for Ellen and her team?

What's Your Answer: AWS Service Catalog:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 2

- Tim's company leverages AWS for multiple production workloads
- Recently they have had downtime due to one of their applications failing on EC2
- Tim is looking to avoid downtime if an instance stops responding
- What approach would you recommend for Tim to solve this issue?

What's Your Answer: Create an EC2 Auto-scaling Group alongside an Elastic Load Balancer:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

SCENARIO 3

- Jane's company deals with sensitive information from its users
- They have put reasonable policies in place for data stored in S3
- Jane is worried if some of those policies accidentally get changed
- She is also worried of a breach going unnoticed
- What service would you recommend to Jane and her company?

What's Your Answer: _____Amazon Macie_____:

Why did you pick this answer:

If you didn't get this one right, what insight did you gain from the explanation:

Module Wrap Up

Take a minute to write down any areas from this module that you don't fully understand or where you still have questions:

The Exam

Complete all of the courses in this path to prepare for your AWS Certified Cloud Practitioner exam. Once you are ready, follow the links below to register for the exam:

Exam Links

- Certified Cloud Practitioner - Exam Information
- Schedule an Exam

Stay in Touch

If you have questions along the way, feel free to reach out to **David Tucker** on Twitter (@_davidtucker_) or through his website. Also, feel free to connect on LinkedIn.

For More Information

As a part of creating this course, the pages for each included service were referenced. For additional information, follow the links in this document to each service.