

# Scenarios-based Review

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## AWS Cloud



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# Fundamental Cloud Concepts for AWS

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UNDERSTANDING CLOUD COMPUTING



# Overview

**Reviewing the course resources**

**Creating an AWS account for personal use**

**Examining how organizations leverage traditional data centers**

**Exploring the benefits of cloud computing**

**Reviewing cloud computing models**

**Understanding cloud computing deployment models**



# Cloud Computing Models

**Infrastructure as a Service** (IaaS)



Maximum Control

**Platform as a Service** (PaaS)



**Software as a Service** (SaaS)



Minimum Maintenance



# Cloud Deployment Models

## Public Cloud

Deployed onto a public cloud provider like AWS

## On-Premises (Private Cloud)

Cloud-like platform in a private data center

## Hybrid

Cloud applications connected to a private data center



# Cloud Computing Scenarios

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# Scenario 1



**Roger's company runs several production workloads in its data center**

**They are using VMWare to manage infrastructure in their data center**

**They want to use AWS and integrate it with their data center for new workloads**

**Which cloud deployment model would his company be following?**



## Scenario 2



**Eliza's company is trying to decide whether to fund a new line of business**

**Eliza's team is looking to monetize a new emerging technology**

**This new line of business will require new infrastructure**

**What benefit of cloud computing would be most relevant to her company?**



## Scenario 3



**Jennifer is the CTO at an insurance company**

**They are considering moving to the cloud instead of colocating servers**

**They want to make sure they have maximum control of the cloud servers**

**Which cloud computing model would they need to leverage?**



# Scenario 1



**Roger's company runs several production workloads in its data center**

**They are using VMWare to have cloud-like infrastructure in their data center**

**They want to use AWS and integrate it with their data center for new workloads**

**Which cloud deployment model would his company be following?**

**Solution: Hybrid Cloud**



## Scenario 2



**Eliza's company is trying to decide whether to fund a new line of business**

**Eliza's team is looking to monetize a new emerging technology**

**This new line of business will require new infrastructure**

**What benefit of cloud computing would be most relevant to her company?**

**Solution: Pay as you go**



## Scenario 3



Jennifer is the CTO at an insurance company

They are considering moving to the cloud instead of colocating servers

They want to make sure they have maximum control of the cloud servers

Which cloud computing model would they need to leverage?

**Solution: Infrastructure as a Service (IaaS)**



# AWS Global Infrastructure

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**Regions**  
**Availability Zones**  
**Edge Locations**

AWS Global  
Infrastructure



# Overview

**Reviewing the three elements of the AWS global infrastructure**

**Understanding the use of AWS Regions**

**Understanding Availability Zones within AWS Regions**

**Reviewing the purpose of Edge Locations**

**Utilizing the AWS global infrastructure visualization**



# Scenarios

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# Scenario 1



**Jane's company is looking to transition to AWS**

**They are starting with a few workloads**

**It is a requirement to store backup data in multiple geographic areas**

**Which element of AWS global infrastructure will best suit this need?**



## Scenario 2



**Tim's company serves content through their site to users around the globe**

**They are looking to optimize performance to users around the world**

**They want to leverage a Content Delivery Network (CDN)**

**Which element of the AWS global infrastructure will be used in this case?**



## Scenario 3



**Ellen's company is transitioning one of their legacy applications to AWS**

**This application requires uptime of at least 99.5%**

**They want to be sure any issues at a single data center don't cause an outage**

**Which element of the AWS global infrastructure supports this need?**



# Scenario 1



**Jane's company is looking to transition to AWS**

**They are starting with a few workloads**

**It is a requirement to store backup data in multiple geographic areas**

**Which element of AWS global infrastructure will best suit this need?**

**Solution: AWS Region**



## Scenario 2



**Tim's company serves content through their site to users around the globe**

**They are looking to optimize performance to users around the world**

**They want to leverage a Content Delivery Network (CDN)**

**Which element of the AWS global infrastructure will be used in this case?**

**Solution: AWS Edge Location**



## Scenario 3



**Ellen's company is transitioning one of their legacy applications to AWS**

**This application requires uptime of at least 99.5%**

**They want to be sure any issues at a single data center don't cause an outage**

**Which element of the AWS global infrastructure supports this need?**

**Solution: AWS Availability Zone (AZ)**



# Understanding Cloud Economics

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# Overview

**Understanding funding between traditional data centers and the cloud**

**Utilizing AWS tools for cost organization**

**Utilizing AWS tools to make a case for moving to the cloud**

**Exploring AWS costs using the AWS provided tools**



# Capitalized Expenditure (CapEx)

When building a data center, an organization invests in upfront costs for the building, servers, and supporting equipment. This type of expense to attain a fixed asset is referred to as a **Capitalized Expenditure** or **CapEx**.



# Operating Expenditure (OpEx)

The regular day to day expenses of a business are considered **Operating Expenditures** or **OpEx**. After the initial build of a data center, ongoing connectivity, utility, and maintenance costs would be considered OpEx.



# Applying Cloud Economics

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# Scenario 1



**Oscar's company has multiple departments that work within AWS**

**Finance is asking for a clean separation of AWS costs between departments**

**Currently all resources are included within a single AWS account**

**What approach would meet this need for future costs with minimal effort?**



## Scenario 2



**Cindy's company is considering a transition to the cloud**

**They currently have two physical data centers that they own and maintain**

**Stakeholders are questioning whether this approach will save money**

**Which approach should Cindy take to make a case for the cloud?**



## Scenario 3



**William is a web developer at his company**

**Given some recent downtime he is looking at moving their site to the cloud**

**Finance is asking for an estimate of costs for this transition to AWS**

**What approach should William take to get this data to his finance team?**



# Scenario 1



Oscar's company has multiple departments that work within AWS

Finance is asking for a clean separation of AWS costs between departments

Currently all resources are included within a single AWS account

What approach would meet this need for future costs with minimal effort?

**Solution: Create and leverage a Resource Tag for Department**



## Scenario 2



**Cindy's company is considering a transition to the cloud**

**They currently have two physical data centers that they own and maintain**

**Stakeholders are questioning whether this approach will save money**

**Which approach should Cindy take to make a case for the cloud?**

**Solution: Utilize the AWS TCO Calculator and provide reports to stakeholders**



## Scenario 3



**William is a web developer at his company**

**Given some recent downtime he is looking at moving their site to the cloud**

**Finance is asking for an estimate of costs for this transition to AWS**

**What approach should William take to get this data to his finance team?**

**Solution: Utilize the AWS Simple Monthly Calculator and share results**



# Supporting AWS Infrastructure

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# Overview

**Understanding the tools provided by AWS to support workloads in the cloud**

**Reviewing AWS Support plan tiers**

**Reviewing AWS Trusted Advisor recommendations**

**Exploring the AWS Personal Health Dashboard**

# Supporting Tools

AWS Support

AWS Personal  
Health Dashboard

AWS Trusted  
Advisor

**“AWS Personal Health Dashboard**  
provides alerts and remediation  
guidance when AWS is  
experiencing events that may  
impact you.”

**Amazon Web Services**

# Trusted Advisor Checks

Cost Optimization

Performance

Security

Fault Tolerance

Service Limits

# Infrastructure Support Scenarios

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## Scenario 1



**Sylvia's company is in the process of moving multiple workloads into AWS**

**One of these workloads is a mission critical application**

**Her CTO says that they need to be able to call support 24 hours a day**

**What is the most cost effective support plan that meets this criteria?**



## Scenario 2

**Edward's company is evaluating AWS for future workloads**

**One of the workloads supports multiple offices globally**

**The company needs to be able to call, text, or email support if an issue occurs**

**The company also needs a response from support in 15 minutes**

**What is the most cost effective support plan that meets this criteria?**



## Scenario 3

**William has an AWS account for a personal project**

**He doesn't expect to need technical guidance from AWS**

**He does want access to the AWS Trusted Advisor core checks**

**What is the most cost effective support plan that meets this criteria?**

## Scenario 1



**Sylvia's company is in the process of moving multiple workloads into AWS**

**One of these workloads is a mission critical application**

**Her CTO says that they need to be able to call support 24 hours a day**

**What is the most cost effective support plan that meets this criteria?**

**Solution: Business Support**



## Scenario 2

**Edward's company is evaluating AWS for future workloads**

**One of the workloads supports multiple offices globally**

**The company needs to be able to call, text, or email support if an issue occurs**

**The company also needs a response from support in 15 minutes**

**What is the most cost effective support plan that meets this criteria?**

**Solution: Enterprise Support**



## Scenario 3

**William has an AWS account for a personal project**

**He doesn't expect to need technical guidance from AWS**

**He does want access to the AWS Trusted Advisor core checks**

**What is the most cost effective support plan that meets this criteria?**

**Solution: Basic Support**

# Understanding AWS Core Services

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INTERACTING WITH AWS

# Overview

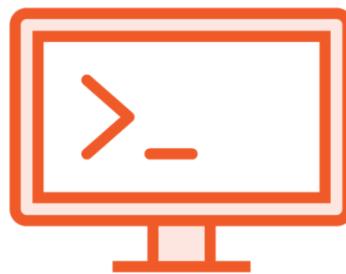
**Reviewing the ways you interact with AWS services**

**Exploring the AWS Console and its use**

**Introducing the AWS Command Line Interface and its use**

**Introducing the AWS Software Developer Kit and supported languages**

# Interacting with AWS Services



## AWS Console

Users can leverage their browser to configure resources

## AWS CLI

Command line access for administering AWS resources

## AWS SDK

Programmatic access to manage AWS resources

## Scenario-based Review

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## Scenario 1

**Roger's company runs several production workloads in AWS**

**They have a new web application that manages digital assets for marketing**

**They need to automatically create a user account in Amazon Cognito on sign-up**

**They want this step seamlessly integrated into the application**

**Which interaction method would Roger's company use for this?**

## Scenario 2



**Eliza's company is considering transitioning to AWS**

**They want to leverage Amazon Relational Database Service**

**Eliza wants to test out a single database on the service**

**What interaction method would Eliza use for this use case?**

## Scenario 3



**Jennifer's company is a startup**  
**They created a social network for entrepreneurs with a web and mobile app**  
**Jennifer has a set of tasks she needs to run on AWS each day to generate reports**  
**What interaction method would Jennifer use for this use case?**



## Scenario 1

**Roger's company runs several production workloads in AWS**

**They have a new web application that manages digital assets for marketing**

**They need to automatically create a user account in Amazon Cognito on sign-up**

**They want this step seamlessly integrated into the application**

**Which interaction method would Roger's company use for this?**

**Solution: Software Development Kit (SDK)**



## Scenario 2

**Eliza's company is considering transitioning to AWS**

**They want to leverage Amazon Relational Database Service**

**Eliza wants to test out a single database on the service**

**What interaction method would Eliza use for this use case?**

**Solution: AWS Console**



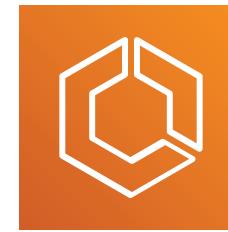
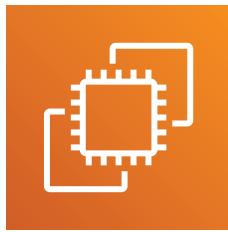
## Scenario 3

Jennifer's company is a startup  
They created a social network for entrepreneurs with a web and mobile app  
Jennifer has a set of tasks she needs to run on AWS each day to generate reports  
**What interaction method would Jennifer use for this use case?**  
**Solution: Command Line Interface (CLI)**

# Compute Services

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# Compute Services on AWS



## Amazon EC2

Provides secure and resizable virtual servers on AWS

## AWS Elastic Beanstalk

Platform for scaling and deploying web apps and services

## AWS Lambda

Enables compute without managing servers

# Overview

**Introducing Amazon EC2 capabilities**

**Exploring pricing approaches for EC2 instances**

**Introducing the capabilities of AWS Elastic Beanstalk**

**Reviewing use cases for Elastic Beanstalk**

**Introducing AWS Lambda**

# Amazon EC2 Purchase Options

## On-Demand

You pay by the second for the instances that are launched

## Reserved

You purchase at a discount instances in advance for 1-3 years

## Spot

You can leverage unused EC2 capacity in a region for a large discount

# Reserved Instance Cost Models

## All Upfront

Entire cost for the 1 or 3 year period is paid upfront

## Partial Upfront

Part of 1 or 3 year cost is paid upfront along with a reduced monthly cost

## No Upfront

No upfront payment is made, but there will be a reduced monthly cost

Maximum  
Savings

Minimum  
Upfront Cost

## Spot Instances

**Can provide up to 90% discount over on-demand pricing**

**There is a market price for instance types per availability zone called the Spot price**

**When you request instances, if your bid is higher than Spot price they will launch**

**If the Spot price grows to exceed your bid, the instances will be terminated**

**Spot instances can be notified 2 minutes prior to termination**

# Amazon EC2 Purchase Options



If you have an instance that is consistent and always needed, you should purchase a Reserved Instance.



If you have batch processing where the process can start and stop without affecting the job, you should leverage Spot Instances.



If you have an inconsistent need for instances that cannot be stopped without affecting the job, leverage On-Demand Instances.

# AWS Elastic Beanstalk



**Automates the process of deploying and scaling workloads on EC2 (PaaS)**

**Supports a specific set of technologies**

**Leverages existing AWS services**

**Only pay for the other services you leverage**

**Handles provisioning, load balancing, scaling, and monitoring**

# Elastic Beanstalk Features

**Monitoring**

**Deployment**

**Scaling**

**EC2 Customization**

## Use Cases

**Deploy an application with minimal knowledge of other services**

**Reduce the overall maintenance needed for the application**

**Few customizations are required**

## Scenario Review

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## Scenario 1



**Sylvia's company is in the process of moving multiple workloads into AWS**

**One workload is an application that will be leveraged for at least 5 more years**

**The organization is looking to be as cost efficient as possible for its EC2 usage**

**What EC2 purchase option should be chosen for this application?**



## Scenario 2

**Edward is looking to deploy his PHP web application to a virtual server**

**He doesn't have experience managing EC2 instances on AWS**

**He needs the ability to scale this application to meet user demand**

**What is the best compute option for Edward based on this criteria?**

## Scenario 3



Cindy's company is transitioning to the cloud for its data processing workloads

These workloads happen daily and can start or stop without a problem

This workload will be leveraged for at least one year

What EC2 purchase option would be the most cost efficient choice?

## Scenario 1



**Sylvia's company is in the process of moving multiple workloads into AWS**

**One workload is an application that will be leveraged for at least 5 more years**

**The organization is looking to be as cost efficient as possible for its EC2 usage**

**What EC2 purchase option should be chosen for this application?**

**Solution: All Upfront Reserved - 3 Years**



## Scenario 2

**Edward is looking to deploy his PHP web application to a virtual server**

**He doesn't have experience managing EC2 instances on AWS**

**He needs the ability to scale this application to meet user demand**

**What is the best compute option for Edward based on this criteria?**

**Solution: AWS Elastic Beanstalk**



## Scenario 3

**Cindy's company is transitioning to the cloud for its data processing workloads**

**These workloads happen daily and can start or stop without a problem**

**This workload will be leveraged for at least one year**

**What EC2 purchase option would be the most cost efficient choice?**

**Solution: Spot Instances**

# Content and Network Delivery Services

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# Networking & Content Delivery Services



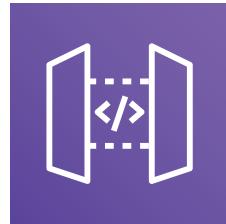
**Amazon Route  
53**



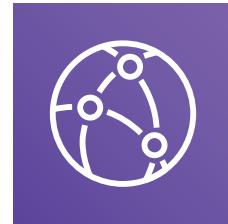
**Amazon VPC**



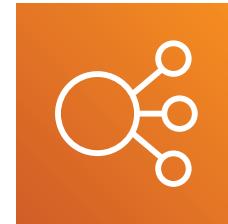
**AWS Direct  
Connect**



**Amazon API  
Gateway**



**Amazon  
CloudFront**



**Elastic Load  
Balancing**

# Overview

**Introducing Virtual Private Clouds on AWS**

**Understanding the purpose of AWS Direct Connect**

**Examining DNS with Amazon Route 53**

**Reviewing Amazon CloudFront**

**Reviewing API Gateway**

**Introducing Elastic Load Balancing and scaling approaches**

# Scaling on Amazon EC2

## 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

## Scenario Based Review

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## Scenario 1

**Jane's company maintains two corporate data centers**

**They want their data centers to work alongside AWS for specific workloads**

**She is wondering if there is a way to have a persistent connection to AWS**

**What service from AWS would you recommend her company implement?**

## Scenario 2



**Tim's company serves content through their site to users around the globe**

**They are looking to optimize performance to users around the world**

**They want to leverage a Content Delivery Network (CDN)**

**Which service would enable optimized performance globally for their content?**



## Scenario 3

**Ellen's company has an internal application that runs on an EC2 server**

**Currently there is downtime as demand is greater than capacity for the server**

**Ellen is trying to decide if she should use bigger servers or more servers**

**Which scaling approach would you recommend and what services should they use?**



## Scenario 1

**Jane's company maintains two corporate data centers**

**They want their data centers to work alongside AWS for specific workloads**

**She is wondering if there is a way to have a persistent connection to AWS**

**What service from AWS would you recommend her company implement?**

**Solution: AWS Direct Connect**



## Scenario 2

**Tim's company serves content through their site to users around the globe**

**They are looking to optimize performance to users around the world**

**They want to leverage a Content Delivery Network (CDN)**

**Which service would enable optimized performance globally for their content?**

**Solution: Amazon CloudFront**



## Scenario 3

**Ellen's company has an internal application that runs on an EC2 server**

**Currently there is downtime as demand is greater than capacity for the server**

**Ellen is trying to decide if she should use bigger servers or more servers**

**Which scaling approach would you recommend and what services should they use?**

**Solution: Horizontal Scaling using Elastic Load Balancing**

# File Storage Services

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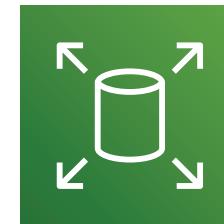
# AWS File Storage and Data Transfer Services



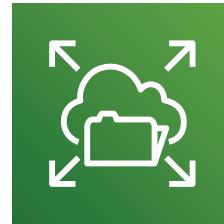
**Amazon S3**



**Amazon S3  
Glacier**



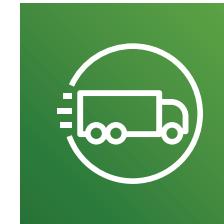
**Amazon Elastic  
Block Store**



**Amazon Elastic  
File System**



**AWS Snowball**



**AWS  
Snowmobile**

# Overview

**Reviewing the storage services on AWS**

**Examining Amazon S3 and its capabilities**

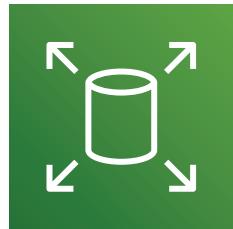
**Implementing a static website on Amazon S3**

**Exploring archive capabilities with Glacier and Glacier Deep Archive**

**Reviewing EC2 storage with EBS and EFS**

**Examining large-scale data transfer services into AWS**

# Amazon EC2 File Storage Services



## Amazon EBS

Persistent block  
storage for use with  
Amazon EC2

## Amazon EFS

Elastic file system for  
use with Linux-based  
workloads

# Amazon FSx for Windows File Server



**Fully managed native Windows file system**

**Includes native Windows features including**

- SMB support
- Active Directory integration
- Windows NTFS

**Utilizes SSD drives for low latency**

# AWS Large Scale Data Transfer Services



## **AWS Snowball**

Service to physically  
migrate petabyte  
scale data to AWS

## **AWS Snowmobile**

Service to physically  
migrate exabyte scale  
data onto AWS

# Large-scale Data Transfer into AWS

## AWS Snowball

**Designed for large-scale data transfer**

**Supports petabyte scale transfer**

**Physical device is delivered by AWS**

**You connect the Snowball to your network and upload your data**

**Device is returned by local carrier**

**AWS receives device and loads your data into S3**

## AWS Snowmobile

**Designed for large-scale data transfer**

**Supports exabyte scale transfer**

**Ruggedized shipping container is delivered to your location**

**AWS sets up a connection to your network**

**You load your data on the Snowmobile**

**AWS will load data into S3 when the container is received at an AWS location**

## Scenario Based Review

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## Scenario 1

**Elaine launched a site that offers daily tutorials for developers**

**She uses S3 to store the assets needed per tutorial**

**These assets are very popular within the week the tutorial is launched**

**After this initial week, these assets are rarely accessed**

**How could Elaine reduce her S3 costs while maintaining durability?**

## Scenario 2



**Esteban works for a social networking company and they are moving to AWS**

**They have 2 PB of user-generated content that they need to migrate**

**Esteban is trying to determine if there is a faster than uploading over the internet**

**Would there be another approach you would recommend for Esteban's company?**

## Scenario 3



**Emily works for a company that produces a messaging app**

**She is looking for a shared file system between 8 different Linux EC2 instances**

**The file system would need to support roughly 1 PB of data**

**What approach would you recommend for Emily?**



## Scenario 1

**Elaine launched a site that offers daily tutorials for developers**

**She uses S3 to store the assets needed per tutorial**

**These assets are very popular within the week the tutorial is launched**

**After this initial week, these assets are rarely accessed**

**How could Elaine reduce her S3 costs while maintaining durability?**

**Solution: S3 lifecycle rules with S3-Standard IA storage class**

## Scenario 2



**Esteban works for a social networking company and they are moving to AWS**

**They have 2 PB of user-generated content that they need to migrate**

**Esteban is trying to determine if there is a faster than uploading over the internet**

**Would there be another approach you would recommend for Esteban's company?**

**Solution: AWS Snowball**



## Scenario 3

**Emily works for a company that produces a messaging app**

**She is looking for a shared file system between 8 different Linux EC2 instances**

**The file system would need to support roughly 1 PB of data**

**What approach would you recommend for Emily?**

**Solution: Amazon Elastic File System**

# Database Services and Utilities

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# AWS Databases & Related Services



Amazon RDS



Amazon Aurora



Amazon  
DynamoDB



Amazon Redshift



Amazon  
Elasticache



AWS Database  
Migration Service

# Cloud Computing Models

**Infrastructure as a Service** (IaaS)



Maximum Control

**Database on EC2**

**Platform as a Service** (PaaS)



**Software as a Service** (SaaS)



Minimum Maintenance

**Relation Database Service (RDS)**

**DynamoDB  
Elasticache  
Redshift**

# Overview

**Reviewing the cloud computing models for databases on AWS**

**Introducing the Relational Database Service (RDS)**

**Examining the capabilities of Amazon Aurora**

**Introducing the DynamoDB service**

**Reviewing the ElastiCache service**

**Examining data warehousing of data on AWS**

## Scenario Based Review

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## Scenario 1

**Jennifer is an IT executive in a financial services company**

**They are transitioning their data warehouse to AWS for analysis**

**The data warehouse would need to support up to 2 PB of data**

**Which approach would you recommend for Jennifer?**



## Scenario 2

**Sam is a DevOps engineer at a tech company**

**Sam needs to launch a MySQL database for a new web application**

**They need to have direct access to the virtual server that MySQL is running on**

**What approach would you recommend for Sam's company?**



## Scenario 3

**Frank is the CTO at a gaming company**

**They are trying to determine how to store realtime user analytics**

**They need low latency and the ability to scale to handle up to 1 million players**

**Frank wants to minimize the amount of time it takes to maintain the database**

**Which AWS approach would you recommend for Frank?**



## Scenario 1

**Jennifer is an IT executive in a financial services company**

**They are transitioning their data warehouse to AWS for analysis**

**The data warehouse would need to support up to 2 PB of data**

**Which approach would you recommend for Jennifer?**

**Solution: Amazon Redshift**



## Scenario 2

**Sam is a DevOps engineer at a tech company**

**Sam needs to launch a MySQL database for a new web application**

**They need to have direct access to the virtual server that MySQL is running on**

**What approach would you recommend for Sam's company?**

**Solution: EC2 (this is a tricky question)**



## Scenario 3

**Frank is the CTO at a gaming company**

**They are trying to determine how to store realtime user analytics**

**They need low latency and the ability to scale to handle up to 1 million players**

**Frank wants to minimize the amount of time it takes to maintain the DB**

**Which AWS approach would you recommend for Frank?**

**Solution: DynamoDB**

# App Integration Services

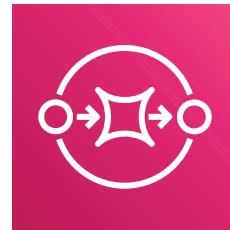
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# AWS App Integration Services



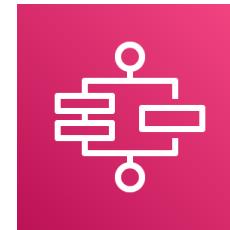
## Amazon SNS

Managed pub/sub  
messaging service



## Amazon SQS

Managed message  
queue service



## AWS Step Functions

Serverless workflow  
management service

# Overview

**Introducing Amazon Simple Notification Service (SNS)**

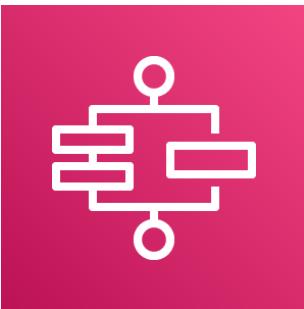
**Introducing Amazon Simple Queue Service (SQS)**

**Exploring architectures leveraging SNS and SQS**

**Examining AWS Step Functions**

**Reviewing sample AWS Step Function usage**

# AWS Step Functions



**Enables orchestration of workflows through a fully managed service**

**Supports serverless architectures**

**Can support complex workflows including error handling**

**Charged per state transition along with the other AWS services leveraged**

**Workflows are defined using Amazon States Language**

**Compute services**

**Database services**

**Messaging services**

**Data processing services**

**Machine learning services**



AWS Step Function  
Integrations

## Scenario Based Review

---



## Scenario 1

**Ruth started a non-profit that assigns volunteers to opportunities**

**Recently their database server went down and users were unable to signup**

**While the situation is better, there is still some downtime expected in the future**

**She wants to explore an AWS service that could prevent lost user signups**

**What service would you recommend to Ruth?**

## Scenario 2



Jessi created a list of onboarding steps for new customers for their new app

These steps detail integrations with their CRM, emails to the user, and analytics

Jessi is worried about the time it will take to build all of this from scratch

**Is there an AWS service that can help with this approach?**



## Scenario 3

**Roger's company is an eCommerce company building a custom platform**

**They are still adding new functionality**

**He wants aspects of the platform to listen for events like orders and refunds**

**They don't yet know all of the elements that would need to respond to events**

**Is there a service that would allow current and future parts of the platform to listen for these events?**



## Scenario 1

Ruth started a non-profit that assigns volunteers to opportunities

Recently their database server went down and users were unable to signup

While the situation is better, there is still some downtime expected in the future

She wants to explore an AWS service that could prevent lost user signups

**What service would you recommend to Ruth?**

**Solution: Simple Queue Service (SQS)**



## Scenario 2

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**These steps detail integrations with their CRM, emails to the user, and analytics**

**Jessi is worried about the time it will take to build all of this from scratch**

**Is there an AWS service that can help with this approach?**

**Solution: AWS Step Functions**



## Scenario 3

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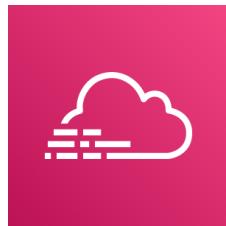
**Is there a service that would allow current and future parts of the platform to listen for these events?**

**Solution: Simple Notification Service (SNS)**

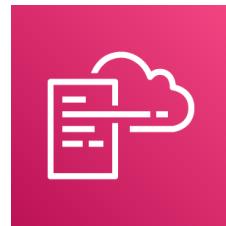
# Management and Governance Services

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# AWS Management & Governance Services



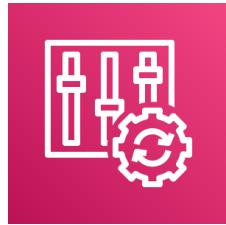
**AWS CloudTrail**



**AWS  
CloudFormation**



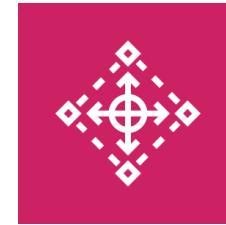
**Amazon  
CloudWatch**



**AWS Config**



**AWS Systems  
Manager**



**AWS Control  
Tower**

# Overview

- Reviewing the ecosystem of services that are provided for management
- Examining how to create an audit trail with AWS CloudTrail
- Exploring how you track infrastructure with CloudWatch and Config
- Introducing infrastructure automation with CloudFormation
- Looking at operational insights with Systems Manager
- Reviewing AWS Organizations leveraging Control Tower

# AWS CloudTrail



**Inserts audit trail in an S3 bucket or into CloudWatch Logs**

**Logs events in the regions in which they occur**

**Meets many compliance requirements for infrastructure auditing**

**As a best practice, it should be enabled on every AWS account**

**Can be consolidated into an Organizational trail using AWS Organizations**

**Compliance requirement**

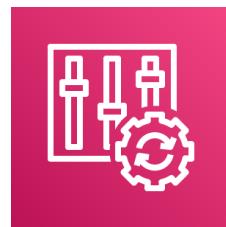
**Forensic analysis**

**Operational analysis**

**Troubleshooting**

AWS CloudTrail Use Cases

# Managing Infrastructure



## **Amazon CloudWatch**

**Provides metrics, logs, and alarms for infrastructure**

## **AWS Config**

**Continually evaluates infrastructure against a set of rules**

## **AWS Systems Manager**

**Provides operational data and automation across infrastructure**

# AWS Config



- Provides configuration history for infrastructure**
- Works against rules that you can customize or even create custom validations**
- Includes conformance packs for compliance standards including PCI-DSS**
- Can work with AWS Organizations for both cross-region and cross-account setup**
- Provides remediation steps for infrastructure not meeting criteria**

# AWS Systems Manager



**Provides multiple tools that make it easier to manage your AWS infrastructure**

**Enables automation tasks for common maintenance actions**

**Gives a secure way to access servers using only AWS credentials**

**Stores commonly used parameters securely for operational use**

# AWS Organizations



Allows organizations to manage multiple accounts under a single master account

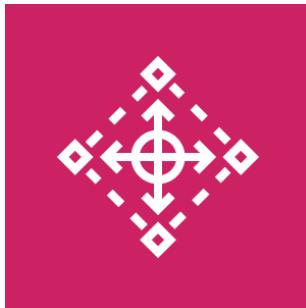


Provides organizations with the ability to leverage Consolidated Billing for all accounts



Enables organizations to centralize logging and security standards across accounts

# AWS Control Tower



**Centralizes users across all AWS accounts**

**Provides a way to create new AWS accounts based on templates**

**Integrates Guardrails for accounts**

**Includes a dashboard to gain operational insights from a single view**

## Scenario Based Review

---



## Scenario 1

**Elliott is an operations engineer at a financial services company**

**He recently discovered that someone had disabled a security setting on a server**

**He is concerned that events like this might go unnoticed until a breach**

**Which service would allow the organization to continually track configuration of infrastructure?**



## Scenario 2

**James is the lead architect at a SaaS company**

**They will be launching a new application that includes several components**

**He is looking to minimize manual work required when creating infrastructure**

**What service would enable James to automate much of this effort?**



## Scenario 3

**Candace is the CTO at a manufacturing company**

**A cloud server needed to support their manufacturing process was deleted**

**They want to make sure they follow up with the person who deleted this instance**

**Which service could show the individual that deleted this specific server?**



## Scenario 1

**Elliott is an operations engineer at a financial services company**

**He recently discovered that someone had disabled a security setting on a server**

**He is concerned that events like this might go unnoticed until a breach**

**Which service would allow the organization to continually track configuration of infrastructure?**

**Solution: AWS Config**



## Scenario 2

**James is the lead architect at a SaaS company**

**They will be launching a new application that includes several components**

**He is looking to minimize manual work required when creating infrastructure**

**What service would enable James to automate much of this effort?**

**Solution: AWS CloudFormation**



## Scenario 3

**Candace is the CTO at a manufacturing company**

**A cloud server needed to support their manufacturing process was deleted**

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**Which service could show the individual that deleted this specific server?**

**Solution: AWS CloudTrail**

# Introduction to Security and Architecture on AWS

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AWS ARCHITECTURE CORE CONCEPTS

# Overview

**Reviewing core concepts around security and architecture**

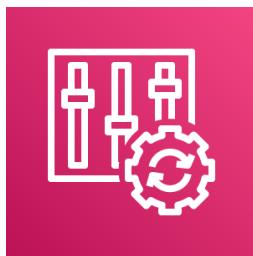
**Exploring the AWS Shared Responsibility Model**

**Introducing the AWS Well Architected Framework**

**Examining fault tolerance and high availability on AWS**

**Understanding provided tools for compliance**

# Compliance Services



## AWS Config

Provides conformance packs for standards

## AWS Artifact

Provides self-service access to reports

## Amazon GuardDuty

Provides intelligent threat detection

## Scenario Based Review

---



## 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?**

## 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?**

## 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?**



## 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?**

**Solution: AWS Artifact**

## 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?**

**Solution: Review the Shared Responsibility Model**

## 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?**

**Solution: AWS Well Architected Framework**

# AWS Identities and User Management

---

# Overview

**Introducing AWS Identity and Access Management (IAM)**

**Reviewing the IAM identity types**

**Enabling Multi-factor Authentication (MFA)**

**Introducing Amazon Cognito**

## Scenario Based Review

---

## 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?**

## 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?**



## 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?**

## 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?**

**Solution: Use an IAM Group for the team**



## 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?**

**Solution: Use an IAM Role with EC2**



## 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?**

**Solution: Use Multi-factor Authentication (MFA)**

# Data Architecture on AWS

---

# Overview

**Reviewing approaches for integrating data from your own data center**

**Examining approaches for processing data**

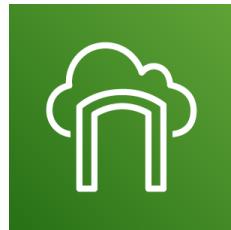
**Exploring data analysis approaches**

**Integrating machine learning and AI into data analysis**

## Integrating On-premise Data

---

# On-premise Data Integration Services



**AWS Storage  
Gateway**

Hybrid-cloud storage  
service

**AWS  
DataSync**

Automated data  
transfer service

# AWS Storage Gateway



**Integrates cloud storage into your local network**

**Deployed as a VM or specific hardware appliance**

**Integrates with S3 and EBS**

**Supports three different gateway types**

- Tape Gateway
- Volume Gateway
- File Gateway

# Gateway Types

## File Gateway

Stores files in Amazon S3 while providing cached low-latency local access

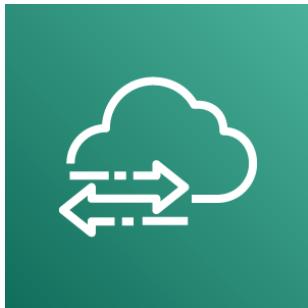
## Tape Gateway

Enables tape backup processes to store data in the cloud on virtual tapes

## Volume Gateway

Provides cloud based iSCSI volumes to local applications

# AWS DataSync



**Leverages the DataSync agent deployed as a VM on your network**

**Integrates with S3, EFS, and FSx for Windows File Server on AWS**

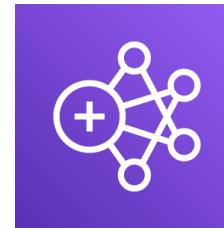
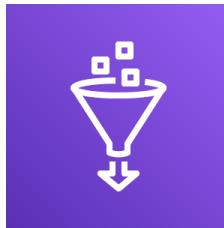
**Greatly improved speed of transfer due to custom protocol and optimizations**

**Charged per GB of data transferred**

# Processing Data

---

# Data Processing Services



## AWS Glue

Managed Extract,  
Transform, and Load  
(ETL) Service

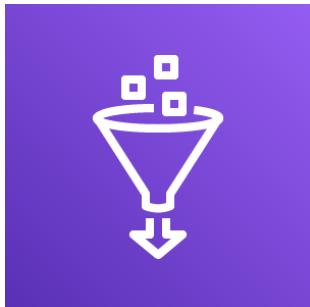
## Amazon EMR

Big-data cloud  
processing using  
popular tools

## AWS Data Pipeline

Data workflow  
orchestration service  
across AWS services

# AWS Glue



**Fully managed ETL (extract, transform, and load) service on AWS**

**Supports data in Amazon RDS, DynamoDB, Redshift, and S3**

**Supports a serverless model of execution**

# Amazon EMR



**Enables big-data processing on Amazon EC2 and S3**

**Supports popular open-source frameworks and tools**

**Operates in a clustered environment without additional configuration**

**Supports many different big-data use cases**

# Supported Amazon EMR Frameworks

**Apache Spark**

**Apache Hive**

**Apache HBase**

**Apache Flink**

**Apache Hudi**

**Presto**

# AWS Data Pipeline



**Managed ETL (extract, transform, and load) service on AWS**

**Manages data workflow through AWS services**

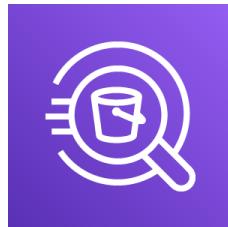
**Supports S3, EMR, Redshift, DynamoDB, and RDS**

**Can integrate on-premise data stores**

# Analyzing Data

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# Data Analysis Services



**Amazon Athena**  
Service that enables querying of data stored in Amazon S3

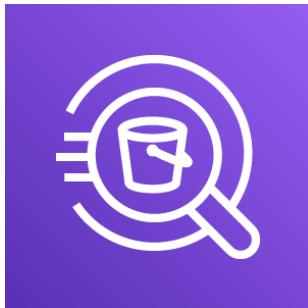


**Amazon Quicksight**  
Business intelligence service enabling data dashboards



**Amazon CloudSearch**  
Managed search service for custom applications

# Amazon Athena



**Fully-managed serverless service**

**Enables querying of large-scale data stored within Amazon S3**

**Queries are written using standard SQL**

**Charged based on data scanned for query**

# Amazon Quicksight

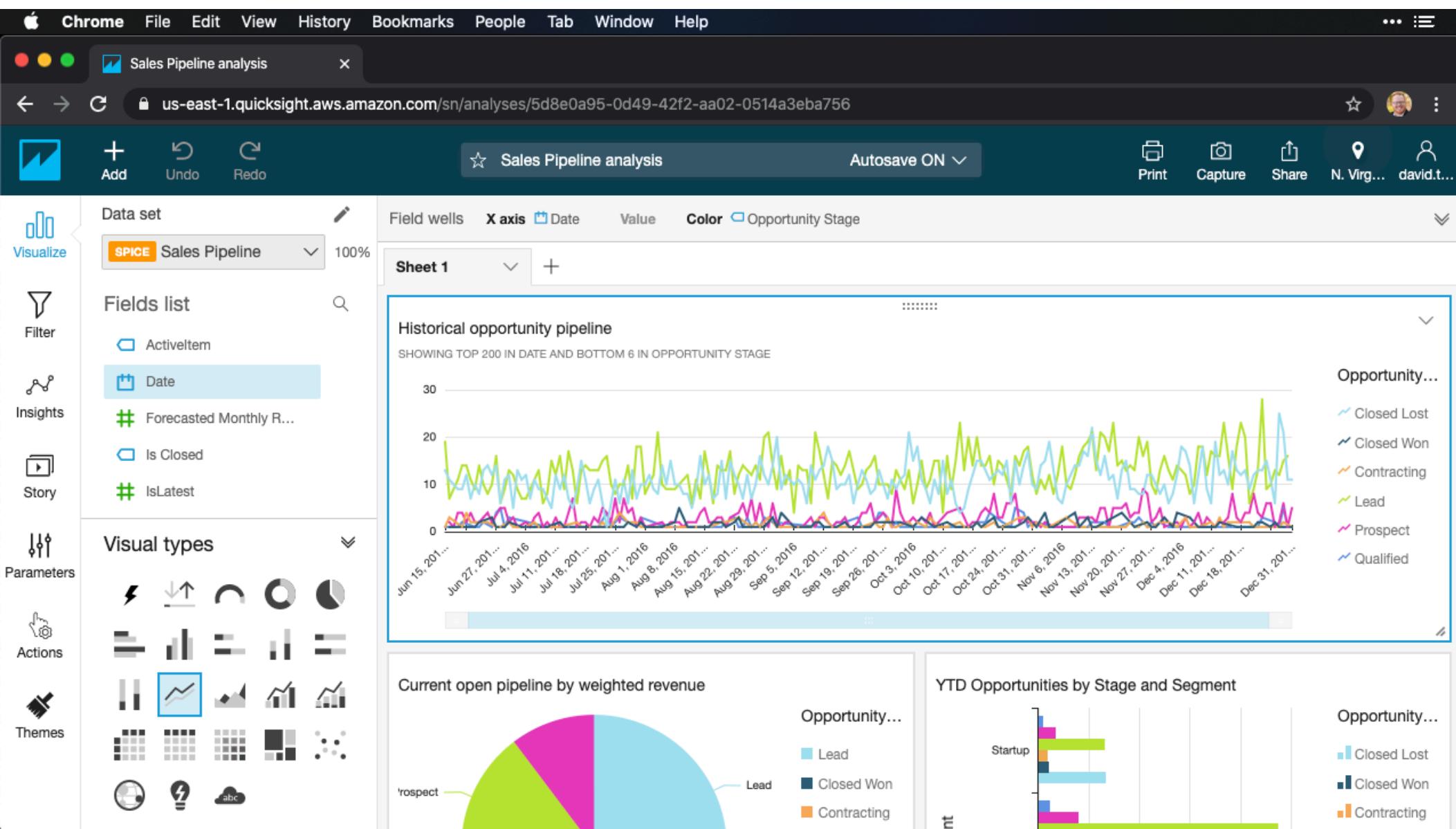


**Fully managed business intelligence service**

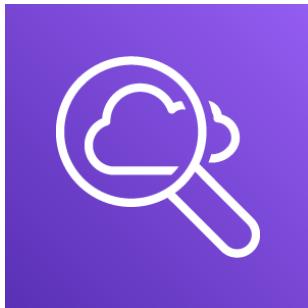
**Enables dynamic data dashboard based on data stored in AWS**

**Charged on a per-user and per-session pricing model**

**Multiple versions provided based on needs**



# Amazon CloudSearch



**Fully-managed search service on AWS**

**Support scaling of search infrastructure to meet demand**

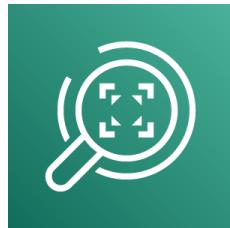
**Charged per hour and instance type of search infrastructure**

**Enables developers to integrate search into custom applications**

# Integrating AI and Machine Learning

---

# AI and Machine Learning Services



## 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

# Amazon Rekognition



**Fully-managed image and video  
recognition deep learning service**

**Identifies objects in images**

**Identifies objects and actions in videos**

**Can detect specific people using facial  
analysis**

**Supports custom labels for your  
business objects**

# Amazon Translate



**Fully-managed service for translation of text**

**Currently supports 54 languages**

**Can perform language identification**

**Works both in batch and real-time**

# Amazon Transcribe



**Fully-managed speech recognition services**

**Recorded speech is converted into text in custom applications**

**Includes a specific sub-service for medical use**

**Supports batch and real-time transcription**

**Currently supports 31 languages**

## Scenario Based Review

---



## 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?**

## 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?**

## 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?**



## Scenario 1

**Ruth is a data scientist for a financial services company**

**Large-scale data set needs to be processed before analysis**

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**What service would you recommend to Ruth?**

**Solution: AWS Glue**



## 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?**

**Solution: Amazon Rekognition**



## Scenario 3

**Roger's company sells custom services around machine learning**

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**What AWS service would allow this access to the data by non-technical resources?**

**Solution: Amazon Quicksight**

# Disaster Recovery on AWS

---

**“Disaster recovery** (DR) is about preparing for and recovering from a disaster. Any event that has a negative impact on a company’s business continuity or finances could be termed a disaster. This includes hardware or software failure, a network outage, a power outage, physical damage to a building like fire or flooding, human error, or some other significant event.”

**Amazon Web Services**

# Needs for Disaster Recovery



**Data Center**



**Cloud Deployment**

# Overview

**Understanding the need for a disaster recovery strategy**

**Reviewing the four different disaster recovery approaches on AWS**

**Exploring the factors to know when selecting an approach**

**Examining specific scenarios and disaster recovery needs**

## Scenario Based Review

---



## 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?**

## 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?**



## Scenario 3

**Eliza is documenting her company's disaster recovery approach**

**They keep a few key servers up and 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?**



## 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?**

**Solution: Multi Site approach**

## 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?**

**Solution: Backup and Restore approach**



## Scenario 3

**Eliza is documenting her company's disaster recovery approach**

**They keep a few key servers up and 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?**

**Solution: Pilot Light approach**

# Architecting Applications on Amazon EC2

---

# Overview

**Reviewing scaling approaches and services for Amazon EC2**

**Examining approaches for controlling access to Amazon EC2 instances**

**Exploring services to protect infrastructure from hacking and attacks**

**Introducing developer tools on AWS**

**Reviewing approaches for launching pre-defined solutions on Amazon EC2**

# Scaling on Amazon EC2

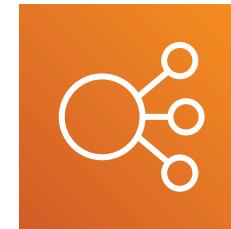
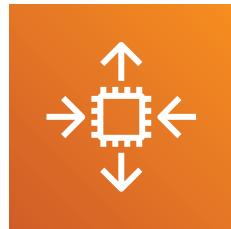
## Vertical Scaling

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

# Amazon EC2 Horizontal Scaling Services



## Auto-scaling Group

Set of EC2 instances  
with rules for scaling  
& management

## Elastic Load Balancer

Distributes traffic  
across multiple  
targets

# AWS Secrets Manager



**Secure way to integrate credentials, API keys, tokens, and other secret content**

**Integrates natively with RDS, DocumentDB, and Redshift**

**Can auto-rotate credentials with integrated services**

**Enables fine-grained access control to secrets**

# Security in Amazon VPC

## Security groups

Enables firewall-like controls for resources within the VPC

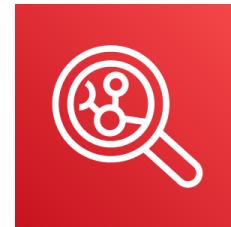
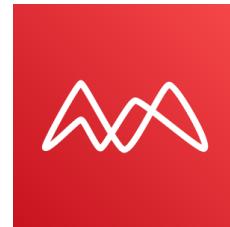
## Network ACL's

Controls inbound and outbound traffic for subnets within the VPC

## AWS VPN

Secure access to an entire VPC using an encrypted tunnel

# 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

## Distributed Denial of Service (DDoS)

A type of attack where a server or group of servers are flooded with more traffic than they can handle in a coordinated effort to bring the system down.

# AWS Shield



**Provides protection against DDoS attacks for apps running on AWS**

**Enables on-going threat detection and mitigation**

**Has two different service levels:**

- Standard
- Advanced

# Amazon Macie



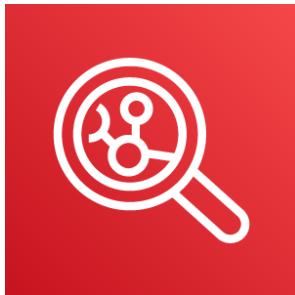
**Utilizes machine learning to analyze data stored in Amazon S3**

**It can detect personal information and intellectual property in S3**

**Provides dashboards that show how the data is being stored and accessed**

**Enables alerts if it detects anything unusual about data access**

# Amazon Inspector



**Enables scanning of Amazon EC2 instances for security vulnerabilities**

**Charged by instance per assessment run**

**Two types of rules packages:**

- Network reachability assessment
- Host assessment

# Deploying Pre-defined Solutions on AWS



## AWS Service Catalog

Managed catalog of IT services on AWS for an organization

## AWS Marketplace

Catalog of software to run on AWS from third-party providers

# AWS Service Catalog



**Targeted to serve as an organizational service catalog for the cloud**

**Can include single server image to multi-tier custom applications**

**Enables organizations to leverage services that meet compliance**

**Supports a lifecycle for services released in the catalog**

# AWS Marketplace



**Curated catalog of third-party solutions for customers to run on AWS**

**Provides AMI's, CloudFormation stacks, and SaaS based solutions**

**Enables different pricing options to overcome licensing in the cloud**

**Charges appear on your AWS bill**

A Firefox browser window showing the AWS Marketplace search results for "Public Sector Data".

The search results page displays 233 results, showing 1 - 10 of them.

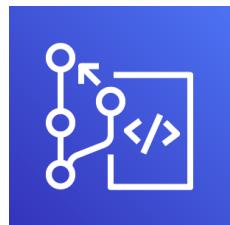
Results include:

- General government deficit | OECD**  
Delivered by CRUX  
Sold by Crux Informatics  
**Free | 12 month subscription available.**  
General government deficit is defined as the balance of income and expenditure of government, including capital income and capital expenditures.
- Insurance Statistics - Gross claims payments | OECD**  
Delivered by CRUX  
Sold by Crux Informatics  
**Free | 12 month subscription available.**  
This dataset includes gross claims payments in the reporting country, containing a breakdown between domestic companies, foreign-controlled companies and branches and agencies of foreign companies.
- Field Service Management (FSM) Solution Market 2020**  
ContentEngine Research Hub  
Sold by ContentEngine  
**Price \$3,900 | 12 month subscription available.**  
The global Field Service Management (FSM) Solution market is influenced by the introduction of

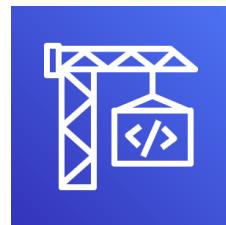
# Developer Tools

---

# AWS Developer Services



AWS  
CodeCommit



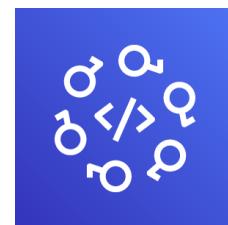
AWS  
CodeBuild



AWS  
CodeDeploy

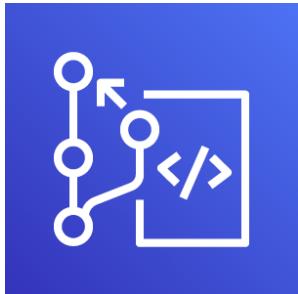


AWS  
CodePipeline



AWS  
CodeStar

# AWS CodeCommit



**Managed source control service**

**Utilizes Git for repositories**

**Control access with IAM policies**

**Serves as an alternative to Github and Bitbucket**

# AWS CodeBuild

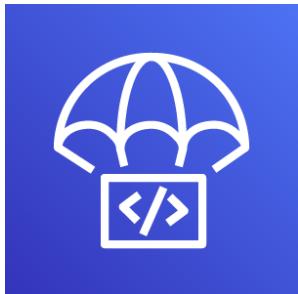


**Fully managed build and continuous integration service on AWS**

**Don't have to worry about maintaining infrastructure**

**Charged per minute for compute resources you utilize**

# AWS CodeDeploy

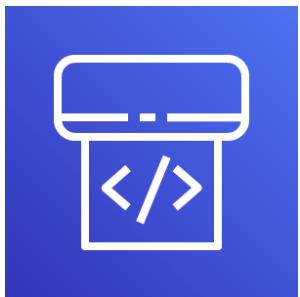


**Managed deployment service for  
deploying your custom applications**

**Deploys to Amazon EC2, AWS Fargate,  
AWS Lambda, and on-premise servers**

**Provides dashboard for deployments in  
the AWS Console**

# AWS CodePipeline

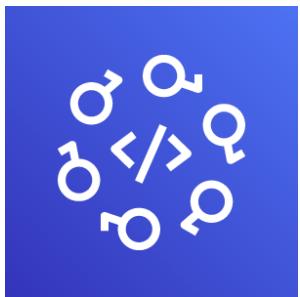


**Fully-managed continuous delivery service on AWS**

**Provides the capabilities to automate building, testing, and deploying**

**Integrates with other developer tools as well as Github**

# AWS CodeStar



**Workflow tool that automates the use of the other developer services**

**Creates a complete continuous delivery toolchain for a custom application**

**Provides custom dashboards and configurations in the AWS Console**

**You only are charged for the other services you leverage**

## Scenario Based Review

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## 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?**

## 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?**



## 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?**



## 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?**

**Solution: AWS Service Catalog**



## 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?**

**Solution: Create an EC2 Auto-scaling Group alongside an Elastic Load Balancer**



## 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?**

**Solution: Amazon Macie**