

Amazon Web Services (AWS)

Being an AWS Cloud Practitioner



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Fundamental Cloud Concepts for AWS

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



Setting Up an AWS Account



Demo

Creating a new personal AWS account

Activating the new account

Configuring a budget alert for the account



Traditional Data Centers



Globomantics Social Network



GLOBOMANTICS

- Launching a new social network for professionals**
- Focusing on the United States at launch**
- Looking to expand into Europe and Asia if launch is successful**
- Securing funding for the initial infrastructure**



Social Network Data Centers



Large up-front investment

Forecasting demand is difficult

Slow to deploy new data centers and servers

Maintaining data centers is expensive

You own all of the security and compliance burden

Traditional Data Centers



Benefits of Cloud Computing



**Trade capital expense for
variable expenses**

**Benefit from massive
economies of scale**

Stop guessing capacity

Increase speed and agility

**Stop spending money
maintaining data centers**

Go global in minutes

**Advantages of Cloud
Computing**



“Elasticity is the ability to acquire resources as you need them and release resources when you no longer need them. In the cloud, you want to do this automatically.”

Well-Architected Framework, Amazon Web Services



Reliability

A solution's ability to provide functionality for its users when it is needed. Amazon's global infrastructure is built to maximize reliability for your cloud workloads.



Agility

- The cloud lowers the cost of trying new ideas or business processes**
- Reduces the time required to maintain infrastructure**
- Reduces risk for the organization around security and compliance**
- Provides access to emerging technologies**



Types of Cloud Computing



“Cloud computing is the on-demand delivery of compute power, database storage, applications, and other IT resources through a cloud services platform via the Internet with pay-as-you-go pricing.”

Amazon Web Services



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



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?



Summary



Summary

Reviewed the course resources

Created an AWS account for personal use

Examined how organizations leverage traditional data centers

Explored the benefits of cloud computing

Reviewed cloud computing models

Understood cloud computing deployment models



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



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



AWS Regions and Availability Zones



AWS Regions

Each region is in a specific geographic location

Each geographic location has a cluster of data centers

AWS currently has 22 launched regions



AWS Regions

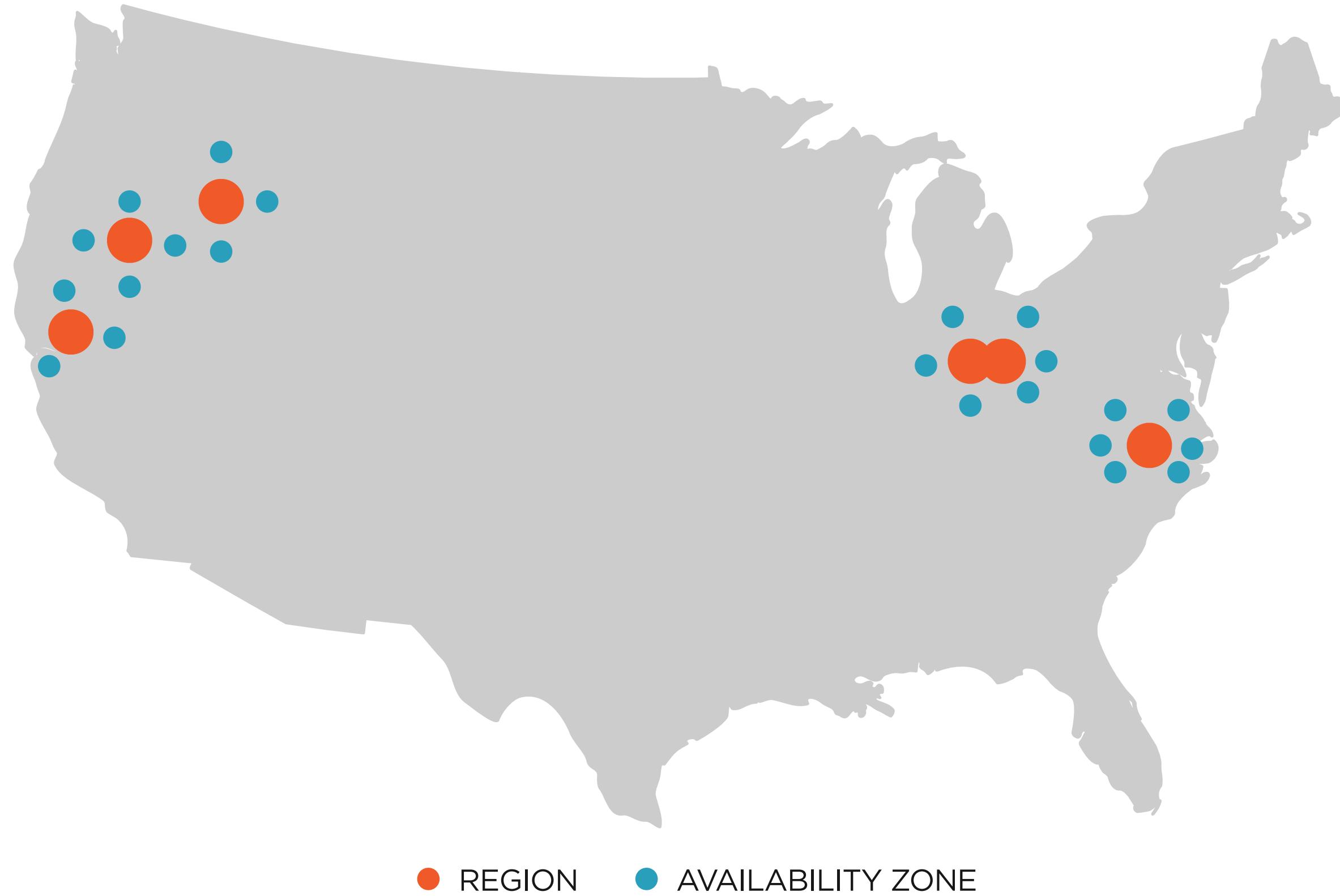


Availability Zones

- Consists of one or more data centers**
- Multiple availability zones are included with each AWS Region**
- Located within the geographic area of the AWS Region**
- Redundant power, networking and connectivity**
- There are currently 69 availability zones globally**



US AWS REGIONS



Availability

Extent to which an application is fulfilling its intended business purpose. Applications that are highly-available are built in a manner where a single failure won't lessen the application's ability to be fully operational.



Region and Availability Zone Naming

us-east-2a

— Area —

— Sub-area —

— Number AZ —

— Region Name —

— Availability Zone Name —



AWS Regions

Region	Region Identifier	Region	Region Identifier
US East (Ohio)	us-east-2	Canada (Central)	ca-central-1
US East (N. Virginia)	us-east-1	Europe (Frankfurt)	eu-central-1
US West (N. California)	us-west-1	Europe (Ireland)	eu-west-1
US West (Oregon)	us-west-2	Europe (London)	eu-west-2
Asia Pacific (Hong Kong)	ap-east-1	Europe (Paris)	eu-west-3
Asia Pacific (Mumbai)	ap-south-1	Europe (Stockholm)	eu-north-1
Asia Pacific (Seoul)	ap-northeast-3	Middle East (Bahrain)	me-south-1
Asia Pacific (Singapore)	ap-northeast-2	South America (São Paulo)	sa-east-1
Asia Pacific (Sydney)	ap-southeast-1		
Asia Pacific (Tokyo)	ap-southeast-2		



AWS Edge Locations



Edge Locations

Used as nodes of a global content delivery network (CDN)

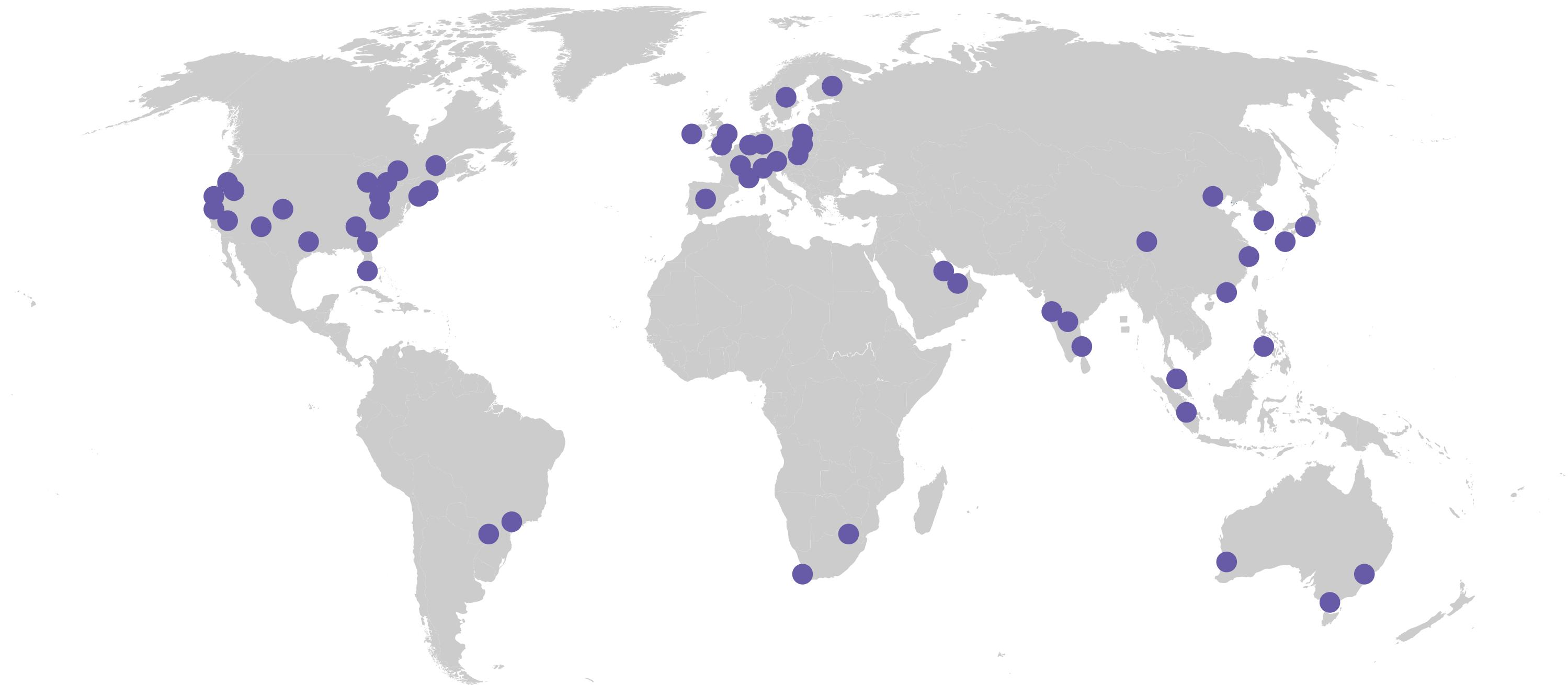
Utilized by Amazon CloudFront and Amazon Route 53

Located globally at over 200 different locations

Allows AWS to serve content from locations closest to users



AWS Edge Locations



Visualizing AWS Global Infrastructure



Demo

Reviewing the method of accessing the AWS global infrastructure site

Reviewing regions and availability zones within the site

Reviewing edge locations within the site



Scenarios



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?



Summary



Summary

Reviewed the three elements of the AWS global infrastructure

Understood the use of AWS Regions

Understood Availability Zones within AWS Regions

Reviewed the purpose of Edge Locations

Utilized the AWS global infrastructure visualization



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



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**.

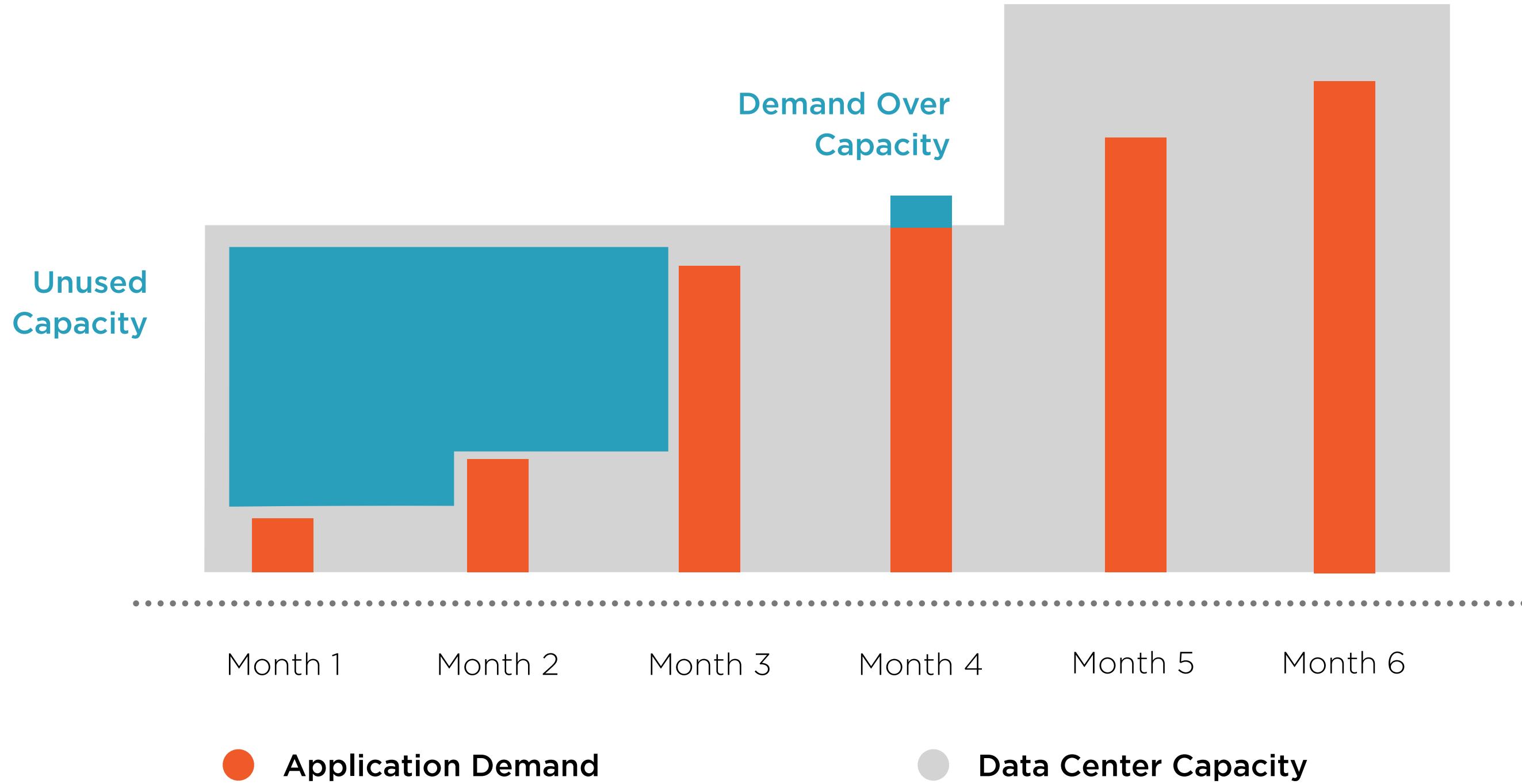


Operating Expenditure (OpEx)

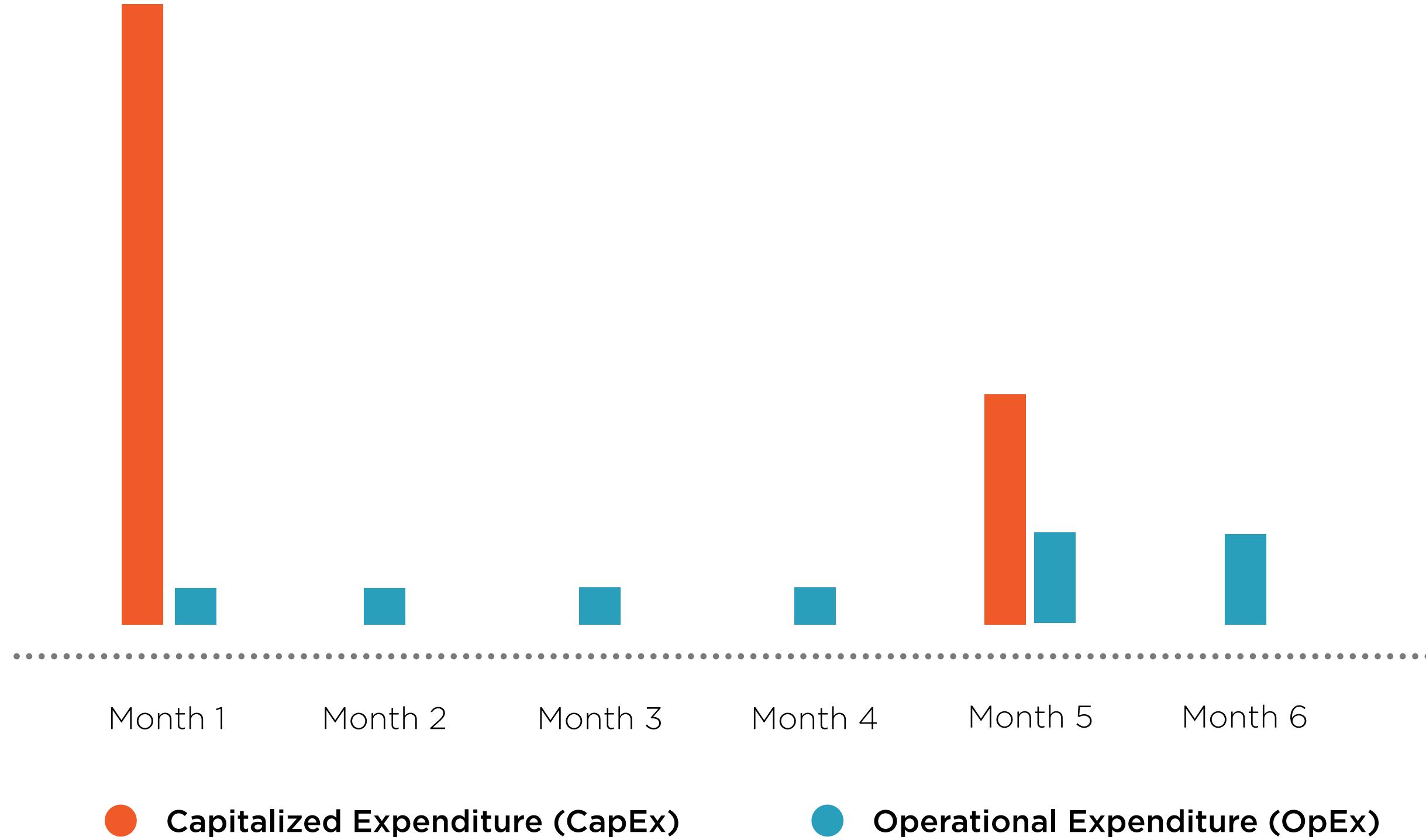
The regular day to day expenses of a business are considered **Operating Expenditures** or **OpEx**. After the initial build of a data center, ongoing connectivity, utility, and maintenance costs would be considered OpEx.



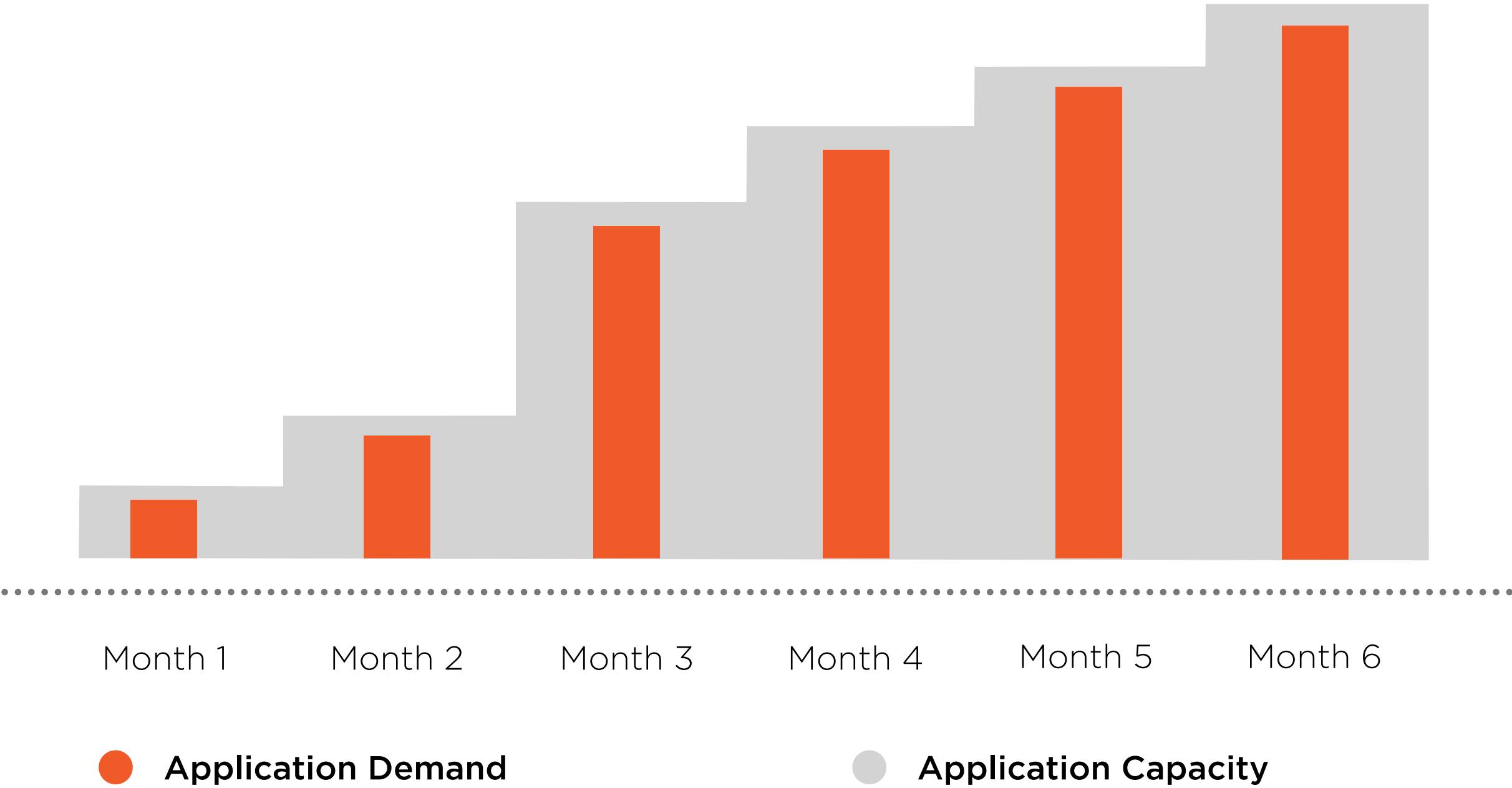
Handling Demand in Your Data Center



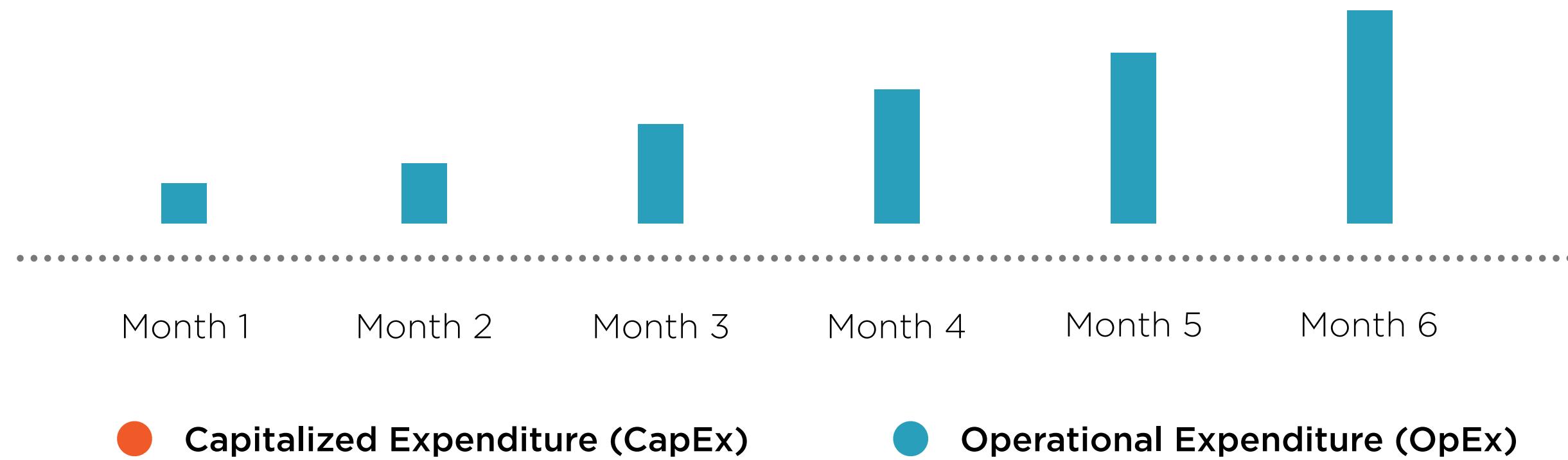
Building a Data Center



Handling Demand in The Cloud



Cost in the Cloud



Financial Implications

Manage Your Own Data Center

Large Up-front Costs (CapEx)

Potential for either Under-used Capacity or Unmet Demand

Increasing Capacity Takes Time and Additional Investment (CapEx)

Monthly Costs will Map to Predicted Infrastructure Needs

Leverage Cloud Infrastructure

No Up-front Investment

You Pay as You Go for Infrastructure (OpEx)

Capacity Scales to Meet User Demand and Can Be Provisioned Immediately

Monthly Costs will Map to User Demand



Organizing and Optimizing AWS Costs



AWS Cost Explorer

**User Interface for exploring
your AWS costs**

Provides breakdowns including:

- By service
- By cost tag

**Provides predictions for the next three
months of costs**

**Gives recommendations for cost
optimization**

Can be accessed via API



AWS Budgets

Utilizes data from AWS Cost Explorer to plan and track your usage across AWS services. It can track cost per service, service usage, reserved instance utilization and coverage, and Savings Plans utilization and coverage.



AWS Cost Planning Tools

AWS TCO Calculator

Enables an organization to determine what could be saved by leveraging cloud infrastructure

AWS Simple Monthly Calculator

Enables an organization to calculate the cost of running specific AWS infrastructure



AWS Resource Tags

Metadata assigned to a specific AWS resource

Includes a name and an optional value

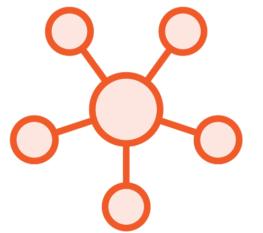
Common use cases include department, environment, or project

Cost allocation report includes costs grouped by active tags

Tags can be leveraged within the AWS Costs Explorer



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



Using the AWS TCO Calculator



Demo

Accessing the AWS TCO Calculator utility

Estimating costs savings for an organization using the TCO Calculator

Downloading a summary report from the TCO Calculator



Using the AWS Simple Monthly Calculator



Demo

Accessing the AWS Simple Monthly Calculator

Estimating costs for a workload on the cloud using the calculator

Saving and sharing the results with other individuals



Reviewing Costs with the Cost Explorer



Demo

Accessing the AWS Cost Explorer within an AWS Account

Reviewing charges by service for an AWS Account

Utilizing pre-defined reports included with the Cost Explorer

Downloading data from the AWS Cost Explorer



Applying Cloud Economics



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?



Summary



Summary

Understood funding between traditional data centers and the cloud

Utilized AWS tools for cost organization

Utilized AWS tools to make a case for moving to the cloud

Explored AWS costs using the AWS provided tools



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

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 Support

Enables support from AWS resources for workloads running in the cloud

Provided in different tiers based on need and scope

Includes tools to provide automated answers and recommendations

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

Amazon Web Services

AWS Trusted Advisor

Automated tool to check your AWS usage against best practices

Accessed from the AWS console

Different checks are provided based on the AWS Support plan tier

All AWS customers get access to seven core checks

Trusted Advisor Checks

Cost Optimization

Performance

Security

Fault Tolerance

Service Limits

AWS Support Plan Tiers

AWS Support Plan Differences

Communication Method

Response Time

Cost

Type of Guidance Offered

AWS Basic Support

Provided for all AWS customers

Access to Trusted Advisor (7 Core Checks)

24x7 Access to customer service, documentation, forums, & whitepapers

Access to AWS Personal Health Dashboard

No monthly cost

AWS Developer Support

- Includes all features of Basic Support**
- Business hours email access to support engineers**
- Limited to 1 primary contact**
- Starts at \$29 per month** (tied to AWS usage)

AWS Business Support

Includes all features of Developer Support

Full set of Trusted Advisor checks

24x7 phone, email, and chat access to support engineers

Unlimited contacts

Provides third-party software support

Starts at \$100 per month (tied to AWS usage)

AWS Enterprise Support

- Includes all features of Business Support**
- Includes designated Technical Account Manager (TAM)**
- Includes concierge support team**
- Starts at \$15,000 per month (tied to AWS usage)**

Support Response Times

	Developer	Business	Enterprise
General Guidance	24 Business Hours	24 Hours	24 Hours
System Impaired	12 Business Hours	12 Hours	12 Hours
Production System Impaired		4 Hours	4 Hours
Production System Down		1 Hours	1 Hour
Business-Critical System Down			15 Minutes

AWS Support Tools

Demo

Accessing AWS Trusted Advisor in the console

Reviewing AWS Trusted Advisor Recommendations

Accessing the AWS Personal Health Dashboard

Reviewing information provided in the AWS Personal Health Dashboard

Infrastructure Support Scenarios

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?

Summary

Summary

Understood the tools provided by AWS to support workloads in the cloud

Reviewed AWS Support plan tiers

Reviewed AWS Trusted Advisor recommendations

Explored the AWS Personal Health Dashboard

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

INTERACTING WITH AWS

Overview

Reviewing the ways you interact with AWS services

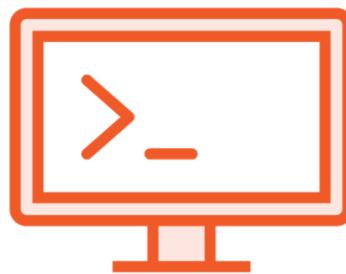
Exploring the AWS Console and its use

Introducing the AWS Command Line Interface and its use

Introducing the AWS Software Developer Kit and supported languages

Methods of Interacting with AWS

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

AWS Management Console

A web and app based interface for interacting with most all of the 150+ AWS services. All major browsers and mobile operating systems are supported.

A Chrome window showing the AWS Management Console home page. The title bar says "AWS Management Console". The address bar shows "console.aws.amazon.com/console/home?region=us-east-1". The navigation bar includes "Services", "Resource Groups", and "Support". The top right shows a user profile for "David Tucker" and a region selector for "N. Virginia".

AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

 Example: Relational Database Service, database, RDS

▼ Recently visited services

 Trusted Advisor

 Cognito

 AWS Cost Explorer

 EC2

 Billing

► All services

Access resources on the go



Access the Management Console using the AWS Console Mobile App. [Learn more](#)

Explore AWS

Event-Driven Architecture

Decoupled apps with automatic scaling and simplified auditing. Write less code, save money, and move faster than ever. [Learn more](#)

Amazon GuardDuty

Protect your AWS accounts and workloads with intelligent threat detection. [Learn more](#)

AWS Command Line Interface (CLI)

Tool to manage your use of AWS services from the command line on Windows, Mac, and Linux. Most every task that can be done in the console can be done in with the CLI.

Using the AWS CLI

```
> aws iam list-users

{
  "Users": [
    {
      "Path": "/",
      "UserName": "test.user",
      "UserId": "AIDARCBHTJLQEYXXXXXXX",
      "Arn": "arn:aws:iam::XXXXXXXXXXXX:user/test.user",
      "CreateDate": "2019-09-17T19:51:57Z"
    }
  ]
}
```

AWS Software Developer Kit (SDK)

Programming language-specific resources that allow you to interact with AWS services via code. This approach enables you to automate many aspects of how you interact with the platform.

AWS SDK Languages

Java

.NET

Node.js

JavaScript
(Browser)

PHP

Python

Ruby

Go

C++

Interacting with AWS

Console is a great method for testing out AWS services

Repeating tasks can be automated using the CLI or SDK

SDK enables automation of AWS tasks within custom applications

Most all services and actions can be performed in any of the three

Using the AWS Console

Demo

- Accessing the AWS Console in the browser**
- Reviewing login differences for root and IAM users**
- Selecting a specific regions**
- Reviewing the list of services supported in the AWS Console**

Using the AWS CLI

Demo

Accessing AWS access keys

Reviewing installation instructions

Configuring the AWS CLI for a specific user

Interacting with AWS utilizing the CLI

Scenario-based Review



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?

Summary

Summary

- Reviewed the ways you interact with AWS services**
- Explored the AWS Console and its use**
- Introduced the AWS Command Line Interface and its use**
- Introduced the AWS Software Developer Kit and supported languages**



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

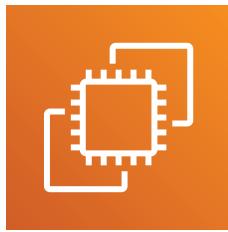
Jennifer's company is a startup
They created a social network for entrepreneurs with a web and mobile app
Jennifer has a set of tasks she needs to run on AWS each day to generate reports
What interaction method would Jennifer use for this use case?
Solution: Command Line Interface (CLI)

Compute Services

Compute Services

A service that enables you to leverage cloud-based virtual machines for workloads. This could be serving web content to visitors, running a database, or calculating statistics from a data set.

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 Overview

“Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It is designed to make web-scale computing easier for developers.”

Amazon Web Services

Amazon EC2 Use Cases



- Web application hosting**
- Batch processing**
- Web services endpoint**
- Desktop in the cloud**

Amazon EC2 Concepts

Instance Types

Root Device Type

Amazon Machine Image (AMI)

Purchase Options

Amazon EC2 Instance Types

Defines the processor, memory, and storage type

Cannot be changed without downtime

Provided in the following categories

- General purpose
- Compute, memory, and storage optimized
- Accelerated computing

Pricing is based on instance type

Some instance types have unique capabilities

Example EC2 Instance Type Pricing

	vCPU	Memory	Linux Pricing
t3.medium	2	4 GiB	\$0.0416 per Hour
m5.large	4	16 GiB	\$0.096 per Hour
c5d.24xlarge	96	375 GiB	\$4.608 per Hour
p3.16xlarge	64	488 GiB	\$24.48 per Hour
i3.16xlarge	64	488 GiB	\$4.992 per Hour

Root Device Type

Instance Store

Ephemeral storage that is physically attached to the host the virtual server is running on

Elastic Block Store (EBS)

Persistent storage that exists separately from the host the virtual server is running on

Amazon Machine Image (AMI)

Template for an EC2 instance including configuration, operating system, and data

AWS provides many AMI's that can be leveraged

AMI's can be shared across AWS accounts

Custom AMI's can be created based on your configuration

Commercial AMI's are available in the AWS Marketplace

Amazon EC2 Purchase Types

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.

Reserved Instance EC2 Pricing Example

	On-Demand	All Upfront	Effective Hourly	Savings
t3.medium	\$0.0416 per Hour	\$213.00 (1 Year) \$412.00 (3 Years)	\$0.024 (1 Year) \$0.015 (3 Years)	\$151.42 (1 Year) \$681.25 (3 Years)
c5d.24xlarge	On-Demand	Partial Upfront (1 Yr)	Effective Hourly	Savings
i3.16xlarge	\$4.608 per Hour	\$12,124 (Upfront) \$1,010.32 (Monthly)	\$2.768	\$16118.40 (40%)
	On-Demand	No Upfront (3 Yr)	Effective Hourly	Savings
	\$4.992 per Hour	\$1,765.87 (Monthly)	\$2.419	\$22539.48 (52%)

Spot Instance EC2 Pricing Example

	On-Demand	Spot Pricing	Percentage Savings
t3.medium	\$0.0416 per Hour	\$0.0125 per Hour	70%
c5d.24xlarge	\$4.608 per Hour	\$0.9122 per Hour	80%
i3.16xlarge	\$4.992 per Hour	\$1.4976 per Hour	70%

Launching EC2 Instances

Demo

Launching a new EC2 instance based on an AWS AMI

Exploring the EC2 launch wizard in the AWS Console

Configuring EC2 instance to be used as a web server

Terminating an EC2 instance

AWS Elastic Beanstalk Overview

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

Java
.NET
PHP
Node.js
Python
Ruby
Go
Docker

Supported Application
Platforms

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

Launching an App on Elastic Beanstalk

Demo

Accessing the sample Elastic Beanstalk applications

Launching a sample application on Elastic Beanstalk

Deleting a deployed Elastic Beanstalk application

AWS Lambda Overview

“AWS Lambda lets you run code without provisioning or managing servers. You pay only for the compute time you consume. You can run code for virtually any type of application or backend service - all with zero administration.”

Amazon Web Services

AWS Lambda



Enables the running of code without provisioning infrastructure

Only charged for usage based on execution time

Can configure available memory from 128 MB to 3008 MB

Integrates with many AWS services

Enables event-driven workflows

Primary service for serverless architecture

Reduced maintenance requirements

Enables fault tolerance without additional work

Scales based on demand

Pricing is based on usage

AWS Lambda Advantages

Scenario Review

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?

Summary

Summary

- Introduced Amazon EC2 capabilities**
- Explored pricing approaches for EC2 instances**
- Introduced the capabilities of AWS Elastic Beanstalk**
- Reviewed use cases for Elastic Beanstalk**
- Introduced AWS Lambda**

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

Networking & Content Delivery Services



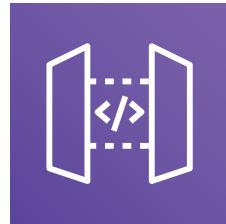
**Amazon Route
53**



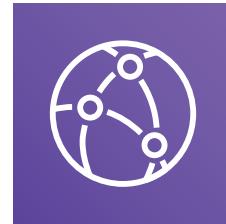
Amazon VPC



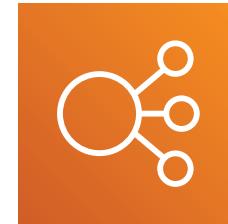
**AWS Direct
Connect**



**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

Amazon VPC and Direct Connect

Amazon Virtual Private Cloud (VPC)

A logically isolated section of the AWS Cloud where you can launch AWS resources in a virtual network that you define.

Amazon Virtual Private Cloud (VPC)



Enables virtual networks in AWS

Supports IPv4 and IPv6

Allows for configuration of

- IP address range
- Subnets
- Route tables
- Network gateways



- Supports public & private subnets**
- Can utilize NAT for private subnets**
- Enables a connection to your data center**
- Can connect to other VPC's**
- Supports private connections to many AWS services**

AWS Direct Connect

A cloud service solution that makes it easy to establish a dedicated network connection from your data center to AWS.

Amazon Route 53

Amazon Route 53



Domain name service (DNS)
Global AWS service (not regional)
Highly available
Enables global resource routing

“DNS translates more readily memorized domain names to the numerical IP addresses needed for locating and identifying computer services and devices with the underlying network protocols.”

Wikipedia

Safari File Edit View History Bookmarks Develop Window Help

console.aws.amazon.com

AWS Services Resource Groups David Tucker Global Support

Dashboard

- Hosted zones
- Health checks
- Traffic flow
- Traffic policies
- Policy records
- Domains
- Registered domains
- Pending requests
- Resolver
- VPCs
- Inbound endpoints
- Outbound endpoints
- Rules

DNS management

1 Hosted zones

A visual tool that lets you easily create policies for multiple endpoints in complex configurations.

Create policy

Traffic management

Health checks monitor your applications and web resources and direct DNS queries to the best resources.

Create health check

Availability monitoring

Route 53 does not require region selection.

- US East (N. Virginia)
- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- EU (Frankfurt)
- EU (Ireland)
- EU (London)
- EU (Paris)
- EU (Stockholm)
- South America (São Paulo)

Register domain

Find and register an available domain, or [transfer your existing domains](#) to Route 53.

Type a domain name .com - \$12.00 Check

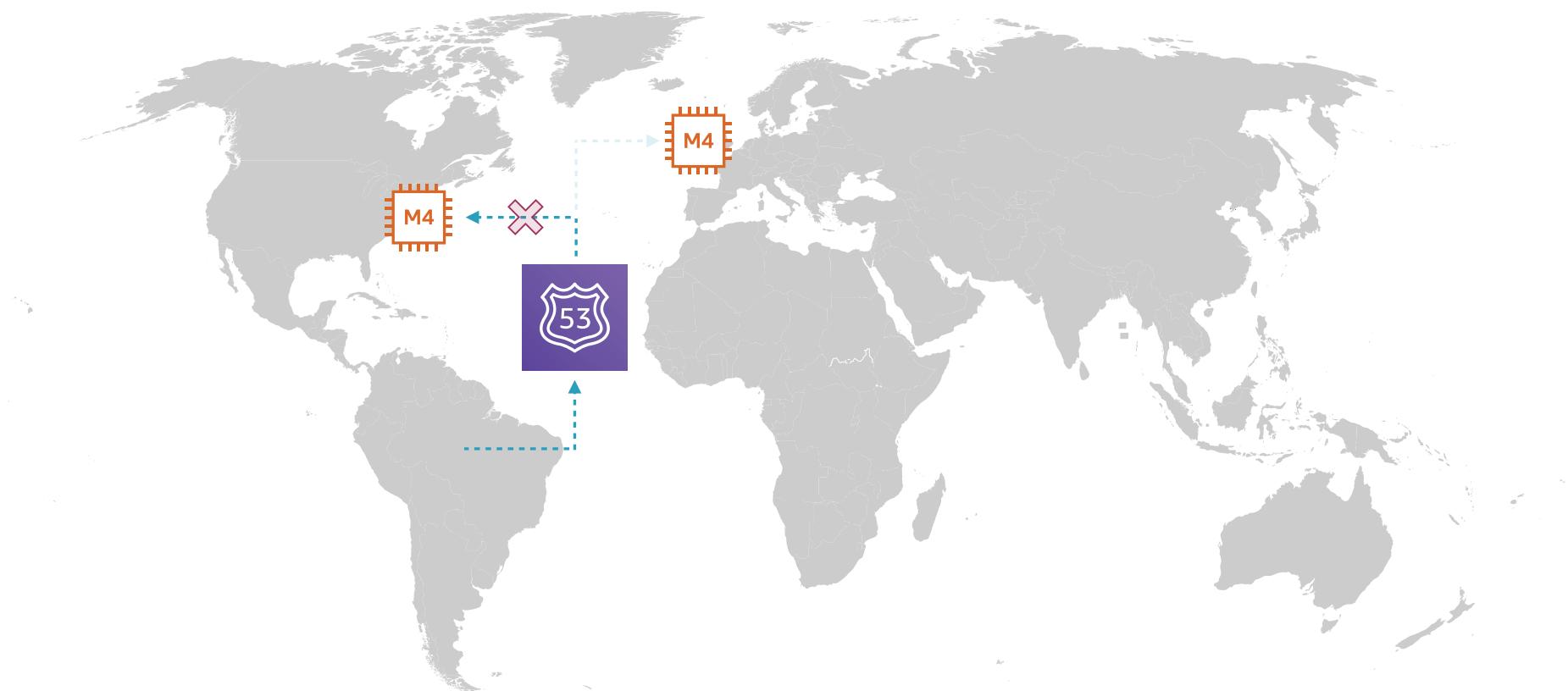
Alerts

No alerts to show

Resource Status

Feedback English (US) © 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

Route 53 High Availability



Elastic Load Balancing

Elasticity

The ability for the infrastructure supporting an application to grow and contract based on how much it is used at a point in time.

Elastic Load Balancing



Distributes traffic across multiple targets

Integrates with EC2, ECS, and Lambda

Supports one or more AZ's in a region

Three types of load balancers

- Application Load Balancer (ALB)
- Network Load Balancer (NLB)
- Classic Load Balancer

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 CloudFront and API Gateway

Amazon CloudFront



Content delivery network (CDN)

Enables users to get content from server closest to them

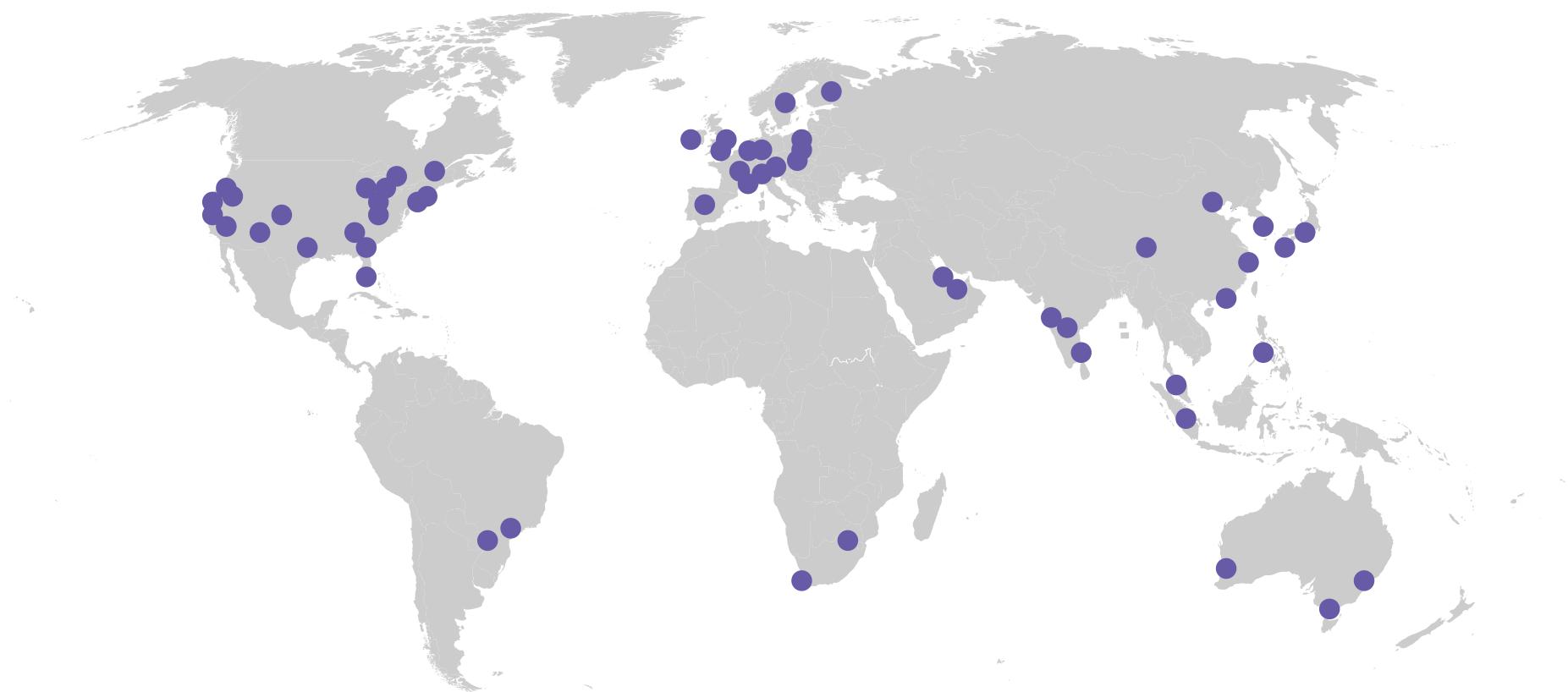
Supports static and dynamic content

Utilizes AWS edge locations

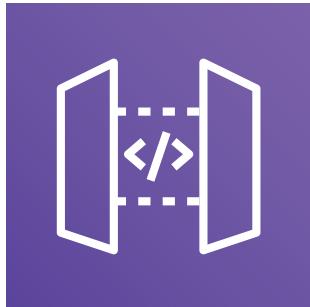
Includes advanced security features

- AWS Shield for DDoS
- AWS WAF

AWS Edge Locations



Amazon API Gateway



- Fully managed API management service**
- Directly integrates with multiple AWS services**
- Provides monitoring & metrics on API calls**
- Supports VPC and on-premise private applications**

Scenario Based Review



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?

Summary

Overview

Introduced Virtual Private Clouds on AWS

Understood the purpose of AWS Direct Connect

Examined DNS with Amazon Route 53

Reviewed Amazon CloudFront

Reviewed API Gateway

Introduced Elastic Load Balancing and scaling approaches



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

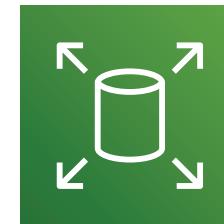
AWS File Storage and Data Transfer Services



Amazon S3



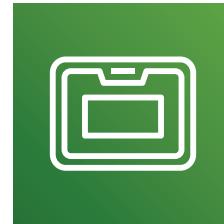
**Amazon S3
Glacier**



**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 S3 Overview

Amazon Simple Storage Service (S3)



- Stores files as objects in buckets**
- Provides different storage classes for different use cases**
- Stores data across multiple availability zones**
- Enables URL access for files**
- Offers configurable rules for data lifecycle**
- Can serve as a static website host**

Amazon S3 Non-archival Storage Classes

S3 Standard is the default storage class and is for frequently accessed data

S3 Intelligent-Tiering will move your data to the correct storage class based on usage

S3 Standard-IA is for infrequently accessed data with the standard resilience

S3 One Zone-IA is for infrequently access data that is only stored in one AZ

**Automatically moves files
based on access**

**Moves between frequent
and infrequent access**

**Same performance as
S3-Standard**

S3 Intelligent Tiering
Storage Class

S3 Lifecycle Policies

- Objects in a bucket can transition or expire based on your criteria
- Transitions can enable objects to move to another storage class based on time
- Expiration can delete objects based on age
- Policies can also factor in versions of a specific object in the bucket

S3 Transfer Acceleration

Feature that can be enabled per bucket that allows for optimized uploading of data using the AWS Edge Locations as a part of Amazon CloudFront.

Hosting a Website on Amazon S3

Demo

Creating a new S3 bucket

Uploading objects to an S3 bucket

Accessing object from S3 bucket from URL

Configuring a bucket for website hosting

Glacier and Glacier Deep Archive

Amazon S3 Glacier



Designed for archiving of data within S3 as separate storage classes

Offers configurable retrieval times

Can send files directly or through lifecycle rules in S3

Provides two different storage classes

- S3 Glacier
- S3 Glacier Deep Archive

Amazon S3 Glacier Storage Classes

S3 Glacier

Designed for archival data

90 day minimum storage duration change

Can be retrieved in either minutes or hours

You pay a retrieval fee per GB retrieved

Over 5 times less expensive than S3 Standard storage class

S3 Glacier Deep Archive

Designed for archival data

180 day minimum storage duration change

Can be retrieved in hours

You pay a retrieval fee per GB retrieved

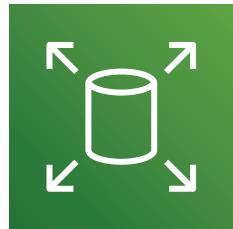
Over 23 times less expensive than S3 Standard storage class

“The AWS Management console can be used to quickly set up Amazon S3 Glacier. Data can then be uploaded and retrieved programmatically.”

Amazon Web Services

Elastic Block Store

Amazon EC2 File Storage Services



Amazon EBS

Persistent block
storage for use with
Amazon EC2

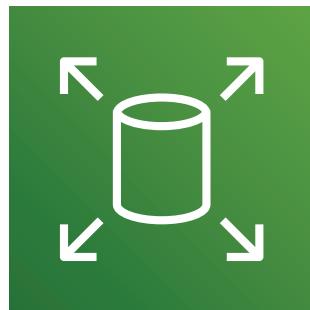
Amazon EFS

Elastic file system for
use with Linux-based
workloads

Amazon Elastic Block Store (EBS)

Block storage designed to be connected to a single EC2 instance that can scale to support petabytes of data and supports multiple volume types based on need.

Amazon Elastic Block Store (EBS)



- Enables redundancy within an AZ**
- Allows users to take snapshots of its data**
- Offers encryption of its volumes**
- Provides multiple volume types**
 - General purpose SSD
 - Provisioned IOPS SSD
 - Throughput optimized HDD
 - Cold HDD

Amazon EBS Volume Types

General Purpose SSD is a cost effective type designed for general workloads

Provisioned IOPS SSD high performance volume for low latency applications

Throughput Optimized HDD is designed for frequently accessed data

Cold HDD is designed for less frequently accessed workloads

Elastic File System

Amazon Elastic File System (EFS)



Fully managed NFS file system

Designed for Linux workloads

Supports up to petabyte scale

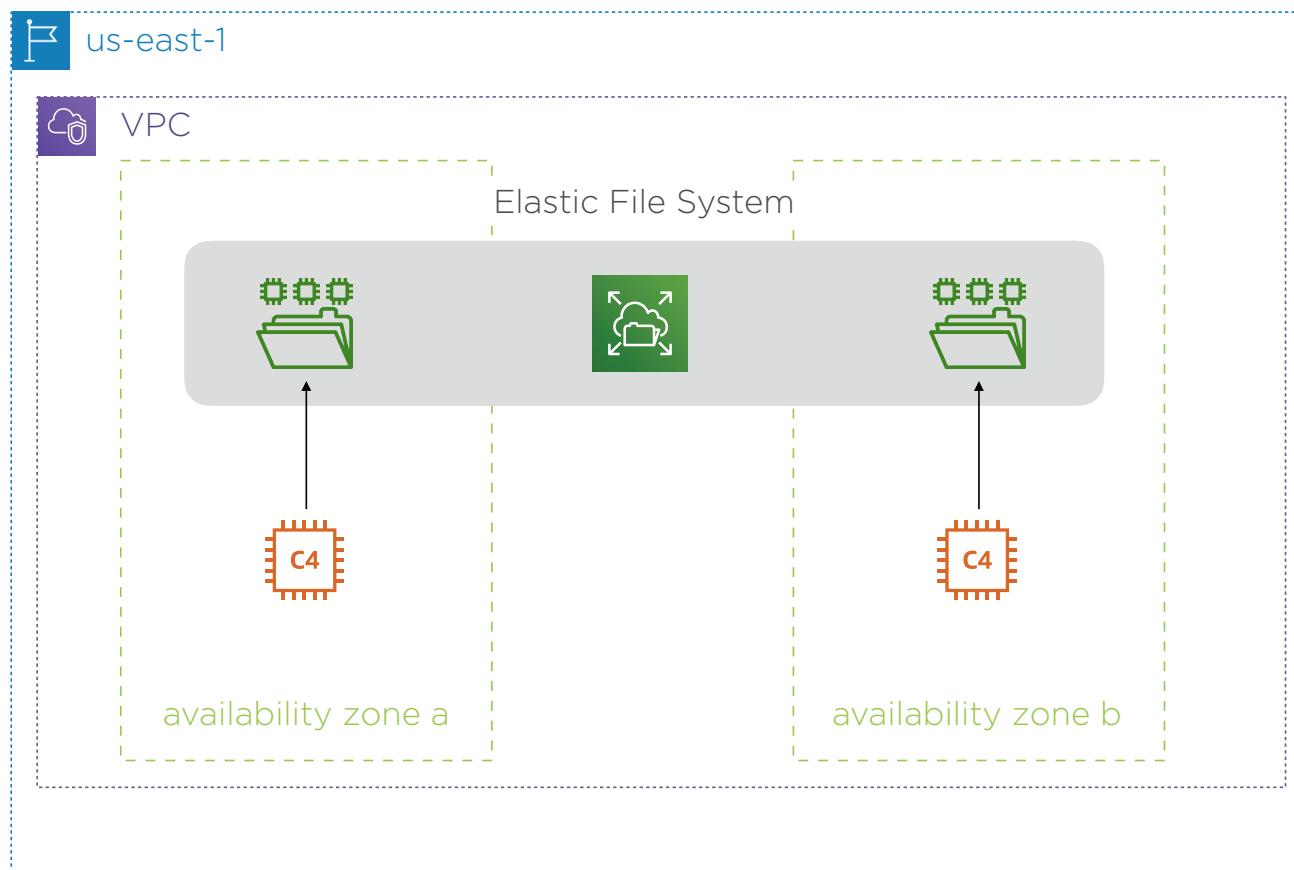
Stores data across multiple AZ's

Provides two different storage classes

- Standard
- Infrequent access

Provides configurable lifecycle data rules

Elastic File System Example



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

Data Transfer with AWS Snowball

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



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?

Summary

Overview

Reviewed the storage services on AWS

Examined Amazon S3 and its capabilities

Implemented a static website on Amazon S3

Explored archive capabilities with Glacier and Glacier Deep Archive

Reviewed EC2 storage with EBS and EFS

Examined large-scale data transfer services into AWS



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

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

Amazon Relational Database Service

Amazon Relational Database Service (RDS)



Fully managed service for relational databases

Handles provisioning, patching, backup, and recovery of your database

Supports deployment across multiple availability zones (multi-AZ)

Some platforms support read replicas

Launches into a VPC

Provides both general purpose SSD and provisioned IOPS SSD drive options

Amazon RDS Platforms

MySQL

PostgresSQL

MariaDB

Oracle Database

SQL Server

Amazon Aurora

“**Amazon Aurora** is a MySQL and PostgreSQL-compatible relational database built for the cloud, that combines the performance and availability of traditional enterprise databases with the simplicity and cost-effectiveness of open source databases.”

Amazon Web Services

Amazon Database Migration Service (DMS)



Enables you to move data into AWS from existing databases

Supports both one time and continual migration of data

Supports many popular commercial and open source databases

Only pay for compute leveraged in the migration process

Amazon DynamoDB Overview

Amazon DynamoDB



Fully managed NoSQL database service

Provides both key-value and document database

Enables extremely low latency at virtually any scale

Supports automated scaling based on configuration

Offers in-memory cache with the DynamoDB Accelerator (DAX)

DynamoDB can handle more than 10 trillion requests per day and can support peaks of more than 20 million requests per second.”

Amazon Web Services

**Scale without excessive
maintenance**

Serverless applications

**Implementations where
low latency is key**

**Data models without
BLOB storage**

DynamoDB Use Cases

Amazon ElastiCache & Redshift

Amazon ElastiCache



Fully managed in-memory data stores

Supports both Memcached and Redis

Provides low latency in response times

Enables scaling and replicas to meet application demand

Handles common use cases including

- Database layer caching
- Session storage

Amazon Redshift



- Scalable data warehouse service**
- Supports petabyte scale warehousing of data**
- Leverages high performance disks and columnar storage**
- Offers the ability to fully encrypt contents**
- Provides isolation with a VPC**
- Enables querying of exabytes of data in Amazon S3 using Redshift Spectrum**

Scenario Based Review



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?

Summary

Summary

Reviewed the cloud computing models for databases on AWS

Introduced the Relational Database Service (RDS)

Examined the capabilities of Amazon Aurora

Introduced the DynamoDB service

Reviewed the Elasticache service

Examined data warehousing of data on AWS



Scenario 1

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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

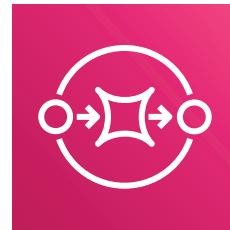
App Integration Services

AWS App Integration Services



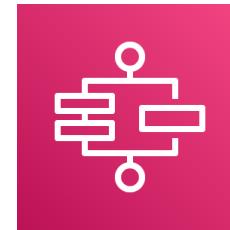
Amazon SNS

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 Messaging Services

Amazon Simple Notification Service (SNS)



Fully managed pub/sub messaging service

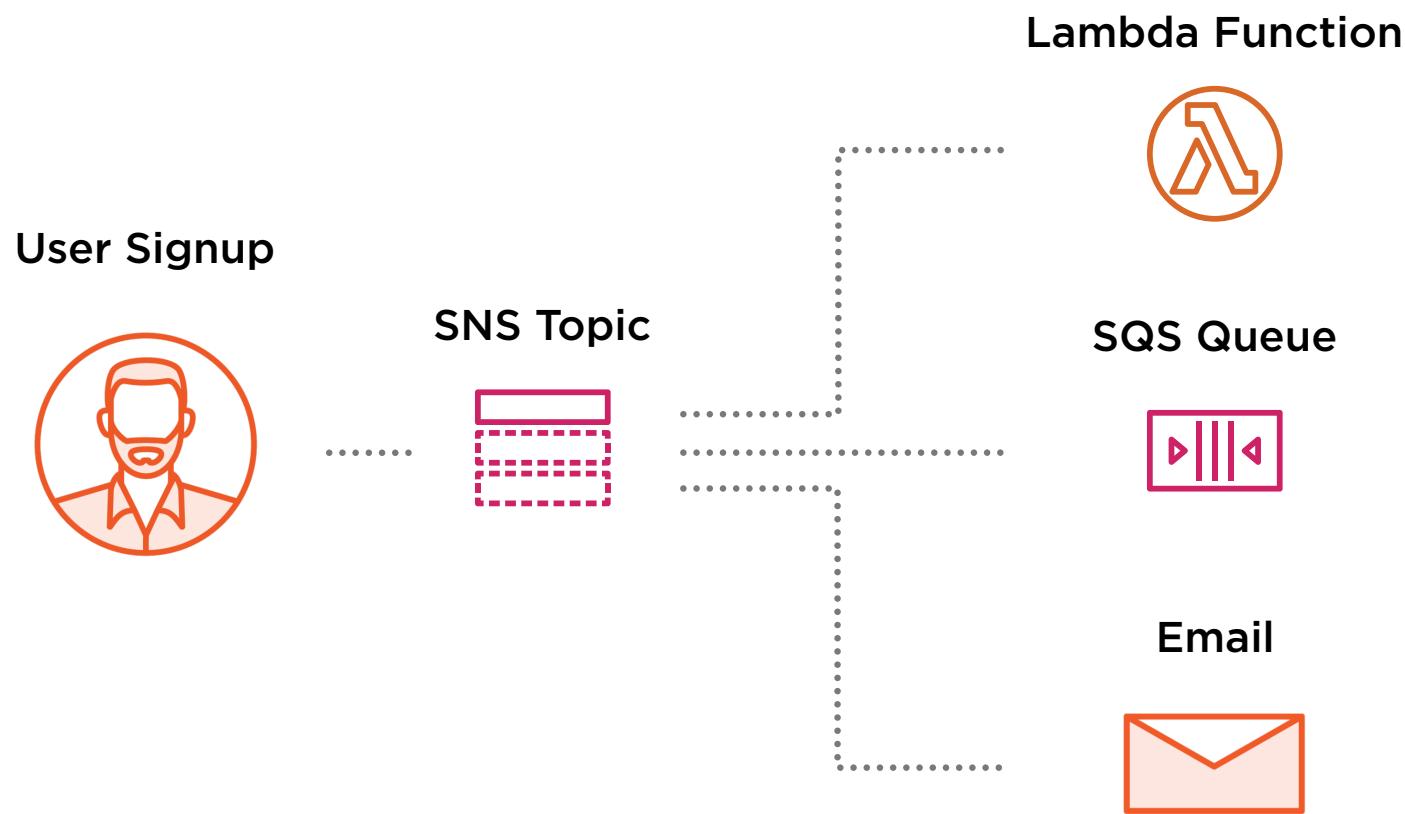
Enables you to create decoupled applications

Organized according to topics

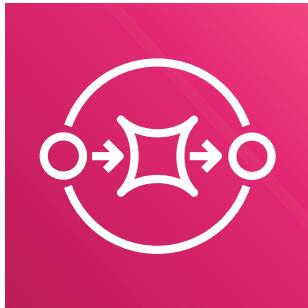
Integrates with multiple AWS services

Provides end user notifications across SMS, email, and push notifications

Example Amazon SNS Architecture



Amazon Simple Queue Service (SQS)



Fully managed message queue service

Enables you to build decoupled and fault tolerant applications

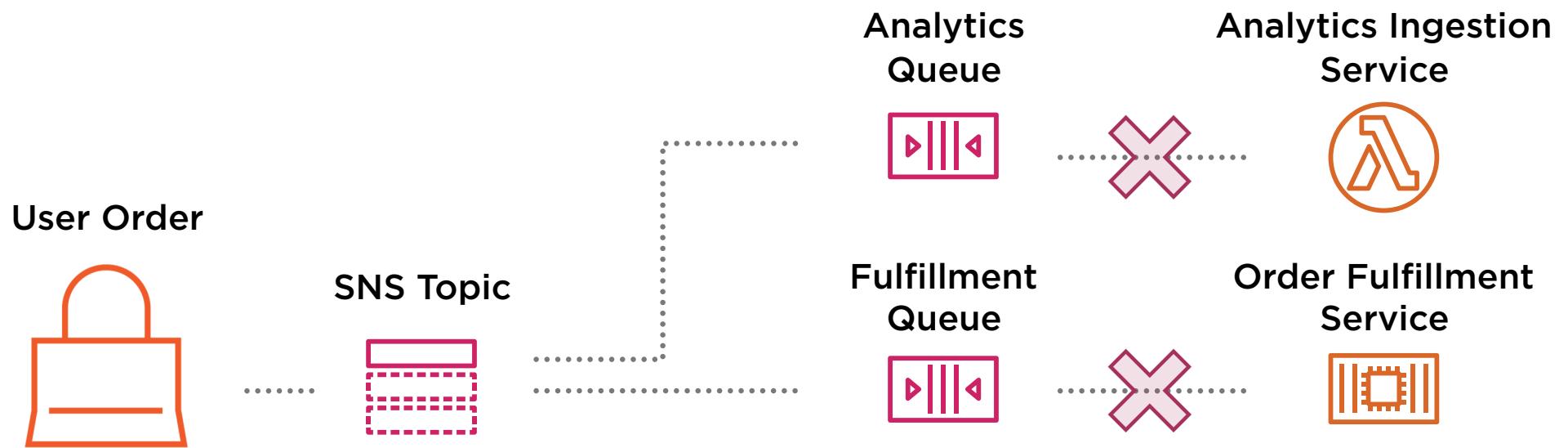
Supports up to 256 KB data payload

Allows messages to be stored up to 14 days

Provides two types of queues

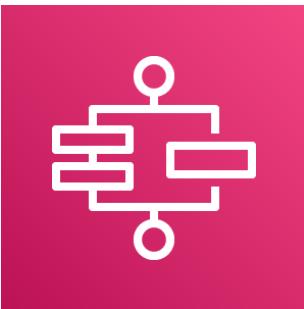
- Standard queue
- FIFO queue (first in first out)

Example Amazon SNS & SQS Architecture



AWS Step Functions

AWS Step Functions



Enables orchestration of workflows through a fully managed service

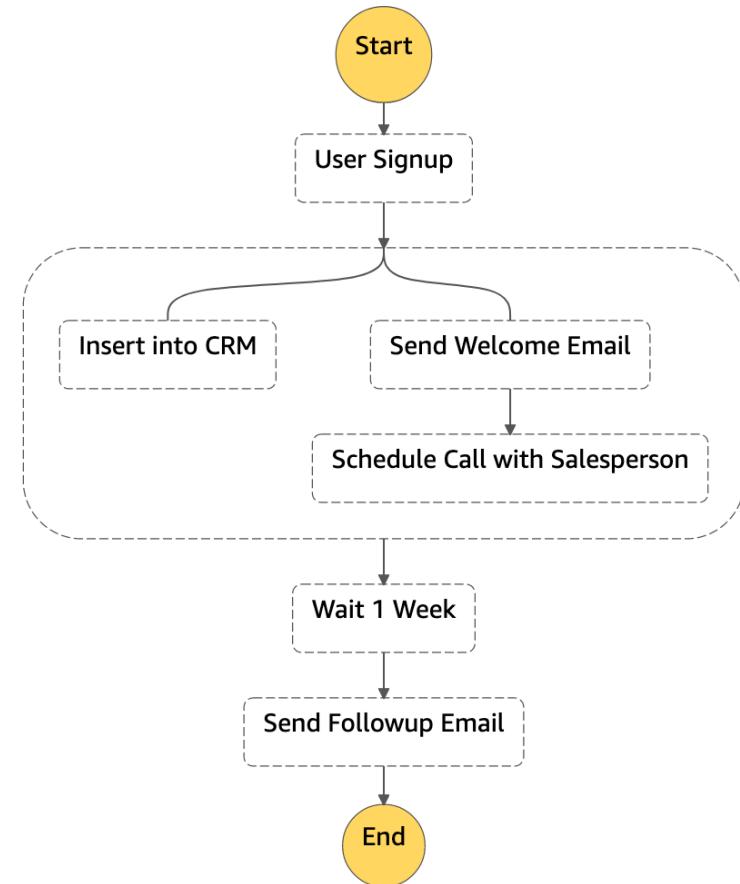
Supports serverless architectures

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

```
{  
  "Comment": "Signup workflow",  
  "StartAt": "User Signup",  
  "States": {  
    "User Signup": {  
      "Type": "Pass",  
      "Next": "Parallel"  
    },  
    "Parallel": {  
      "Type": "Parallel",  
      "Next": "Wait 1 Week",  
      "Branches": [  
        {  
          "StartAt": "Insert CRM",  
          "States": ...  
        }  
      ]  
    }  
  }  
}
```



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?

Summary

Summary

Introduced Amazon Simple Notification Service (SNS)

Introduced Amazon Simple Queue Service (SQS)

Explored architectures leveraging SNS and SQS

Examined AWS Step Functions

Reviewed sample AWS Step Function usage



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)



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

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

Solution: AWS Step Functions



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They are still adding new functionality

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

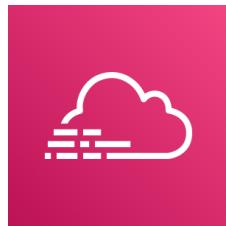
They don't yet know all of the elements that would need to respond to events

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

Solution: Simple Notification Service (SNS)

Management and Governance Services

AWS Management & Governance Services



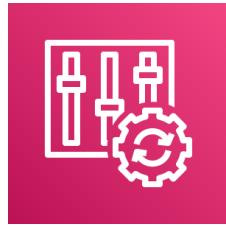
AWS CloudTrail



**AWS
CloudFormation**



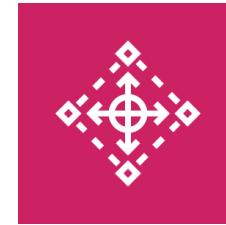
**Amazon
CloudWatch**



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

“With **CloudTrail**, you can log, continuously monitor, and retain account activity related to actions across your AWS infrastructure. CloudTrail provides event history of your AWS account activity, including actions taken through the AWS Management Console, AWS SDKs, command line tools, and other AWS services.”

Amazon Web Services

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

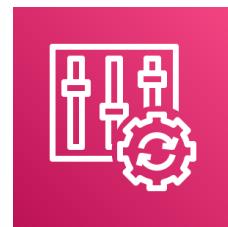
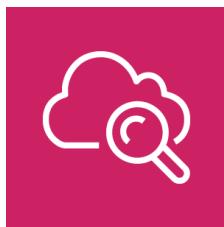
Operational analysis

Troubleshooting

AWS CloudTrail Use Cases

Amazon CloudWatch and AWS Config

Managing Infrastructure



Amazon CloudWatch

Provides metrics, logs, and alarms for infrastructure

AWS Config

Continually evaluates infrastructure against a set of rules

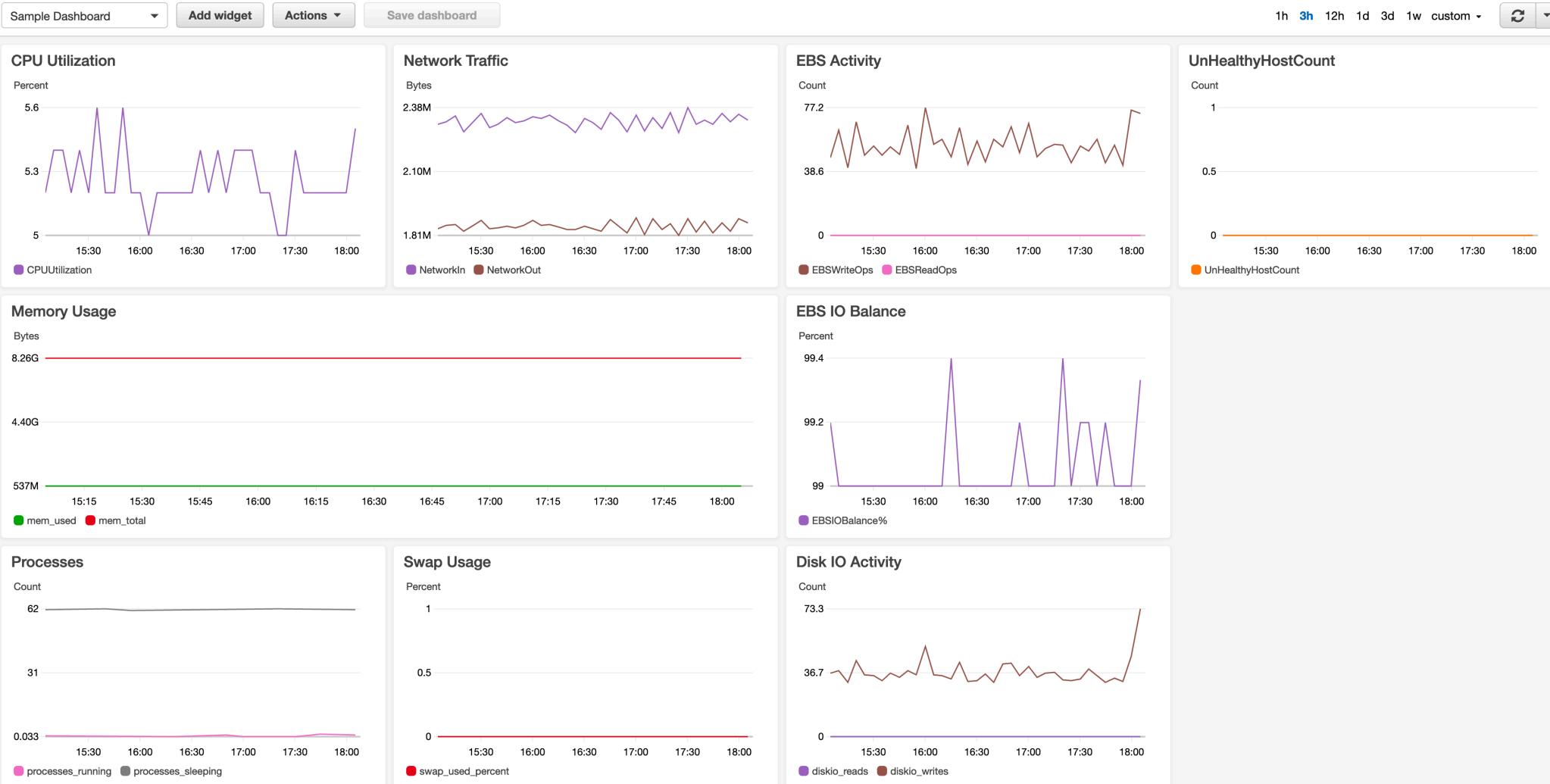
AWS Systems Manager

Provides operational data and automation across infrastructure

Amazon CloudWatch



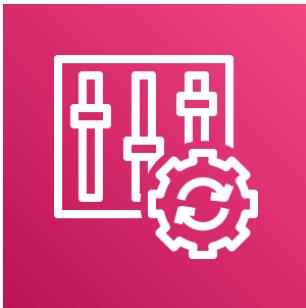
- Monitoring and management service**
- Collects logs, metrics, and events from most AWS services**
- Enables alarms based on metrics**
- Provides visualization capabilities for metrics**
- Allows for custom dashboards based on collected metrics**



“AWS Config continuously monitors and records your AWS resource configurations and allows you to automate the evaluation of recorded configurations against desired configurations.”

Amazon Web Services

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

“AWS Systems Manager provides a unified user interface so you can view operational data from multiple AWS services and allows you to automate operational tasks across your AWS resources.”

Amazon Web Services

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 CloudFormation

AWS CloudFormation



- Managed service for provisioning infrastructure based on templates**
- No additional charge**
- Templates can be YAML or JSON**
- Enables infrastructure as code**
- Manages dependencies between resources**
- Provides drift detection to find changes in your infrastructure**

Description: Creates an S3 bucket

Resources:

 SampleS3Bucket:

 Type: AWS::S3::Bucket

 Properties:

 BucketName: sample-s3-bucket

Example CloudFormation YAML

The code above if placed within a full CloudFormation template would create a single S3 bucket

AWS Organizations and Control Tower

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

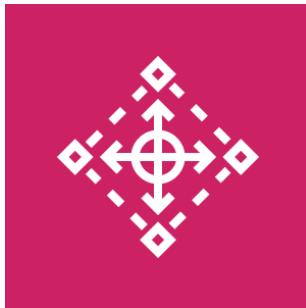


Enables organizations to centralize logging and security standards across accounts

AWS Control Tower

A service to create a multi-account environment on AWS that follows the recommended best practices in operational efficiency, security, and governance.

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?

Summary

Summary

- Reviewed the ecosystem of services that are provided for management
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- Introduced infrastructure automation with CloudFormation
- Looked at operational insights with Systems Manager
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Solution: AWS Config



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Solution: AWS CloudFormation



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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

AWS ARCHITECTURE CORE CONCEPTS

Security and Architecture Overview

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

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.

Acceptable Use Policy

Sending unsolicited mass emails is prohibited

Hosting or distributing harmful content is prohibited

Penetration tests are allowed for a list of specific services

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.

Shared Responsibility Model

“Security and Compliance is a shared responsibility between AWS and the customer.”

Amazon Web Services, Shared Responsibility Model

Shared Responsibility Summary

AWS Responsibility

AWS is responsible for the security
of the cloud

Customer Responsibility

Customer is responsible for security
in the cloud

Shared Responsibility Model

AWS Responsibility

Access & Training for Amazon Employees

Global Data Centers & Underlying Network

Hardware for Global Infrastructure

Configuration Management for Infrastructure

Patching Cloud Infrastructure & Services

Customer Responsibility

Individual Access to Cloud Resources & Training

Data Security & Encryption (both in transit and at rest)

Operating System, Network, and Firewall Configuration

All Code Deployed onto Cloud Infrastructure

Patching guest OS and custom applications

AWS Well-architected Framework

AWS Well-architected Framework

The Well-architected Framework is a collection of best practices across five key pillars for how to best create systems that create business value on AWS.

Pillars of the Well-architected Framework

Operational Excellence

Running and monitoring systems for business value

Security

Protecting information and business assets

Reliability

Enabling infrastructure to recover from disruptions

Performance Efficiency

Using resources efficiently to achieve business value

Cost Optimization

Achieving minimal costs for the desired value

A Firefox window showing the AWS Well-Architected landing page.

The page title is "AWS Well-Architected - Build Secure, Resilient, and Efficient Infrastructure".

The URL in the address bar is <https://aws.amazon.com/architecture/well-architected/>.

The AWS logo is in the top left corner.

Top navigation links include: Contact Sales, Support, English, My Account, and Sign In to the Console.

Main navigation links: Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, Customer Enablement, Events, Explore More, and a search icon.

AWS Well-Architected

Learn, measure, and build using architectural best practices

Navigation links below the main banner: AWS Architecture Center, This is My Architecture, and AWS Solutions.

AWS Well-Architected

The **Well-Architected Framework** has been developed to help cloud architects build secure, high-performing, resilient, and efficient infrastructure for their applications. Based on five pillars — operational excellence, security, reliability, performance efficiency, and cost optimization — the Framework provides a consistent approach for customers and partners to evaluate architectures, and implement designs that will scale over time.

The **AWS Well-Architected Tool** is now available. The user guide can be located [here](#).

APN Partners are available to help you along the way as you build and manage your workloads. [Engage an AWS Well-Architected Partner](#). If you are an APN Partner interested in joining the Well-Architected Partner Program, [click here](#).

High-availability and Fault Tolerance

“Everything fails all the time.”

Werner Vogels - CTO, Amazon

Reliability on AWS

Fault Tolerance

Being able to support the failure of components within your architecture

High Availability

Keeping your entire solution running in the expected manner despite issues that may occur

Building Solutions on AWS

Most managed AWS services provide high-availability out of the box

When building solutions directly on EC2 fault tolerance must be architected

Multiple availability zones should be leveraged

Some services can enable fault tolerance in your custom applications

- Simple Queue Service (SQS)
- Route 53

Compliance

Common Compliance Standards

PCI-DSS

Compliance standard for processing credit cards

HIPAA

Compliance standard for healthcare data

SOC 1, SOC 2, SOC 3

Third-party reviews of operational processes

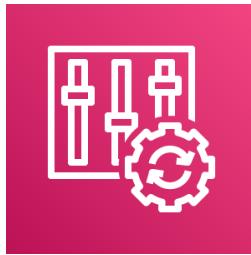
FedRAMP

Standards for US government data handling

ISO 27018

Standard for handling Personally Identifiable Info

Compliance Services



AWS Config

Provides conformance packs for standards

AWS Artifact

Provides self-service access to reports

Amazon GuardDuty

Provides intelligent threat detection

Demo

Examining compliance reports in AWS Artifact

Exploring conformance packs in AWS Config

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?

Summary

Summary

Reviewed core concepts around security and architecture

Explored the AWS Shared Responsibility Model

Introduced the AWS Well-architected Framework

Examined fault tolerance and high availability on AWS

Understood provided tools for compliance



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

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.

Overview

Introducing AWS Identity and Access Management (IAM)

Reviewing the IAM identity types

Enabling Multi-factor Authentication (MFA)

Introducing Amazon Cognito

Introduction to AWS IAM

AWS Identity & Access Management (IAM)



Service that controls access to AWS resources

Using the service is free

Manages both authentication and authorization

Supports identity federation through SAML providers including Active Directory

AWS IAM Identities



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

Policies in AWS IAM



A JSON document that defines permissions for an AWS IAM identity (principal)



Defines both the AWS services that the identity can access and what actions can be taken on that service



Can be either customer managed or managed by AWS

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Effect": "Allow",  
      "Action": "s3:*",  
      "Resource": [  
        "arn:aws:s3:::bucket-name",  
        "arn:aws:s3:::bucket-name/*"  
      ]  
    },  
    {  
      "Effect": "Deny",  
      "NotAction": "s3:*",  
      "NotResource": [  
        "arn:aws:s3:::bucket-name",  
        "arn:aws:s3:::bucket-name/*"  
      ]  
    }  
  ]  
}
```

- ◀ Statement is allowing an action
- ◀ Enables all actions on S3
- ◀ This is enables for this one bucket and its contents

- ◀ Next is a Deny statement
- ◀ It denies all S3 actions for any bucket that is not the one listed here

AWS IAM Best Practices

Multi-Factor Authentication

Provides additional security with either a physical or virtual device that generates a token for login

Least Privilege Access

Users should only be granted access to AWS resources that are required for their current tasks

Creating and Managing IAM Users

Demo

Creating an IAM user

Configuring permissions for IAM users

Creating an IAM group

Attaching permissions to an IAM group

Enabling Multi-factor Authentication

Demo

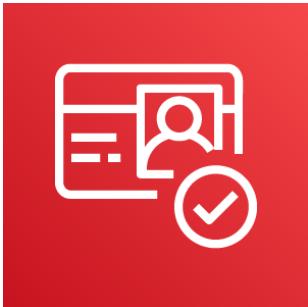
Enabling MFA for the root user
Enabling MFA for an IAM user

Amazon Cognito

Amazon Cognito

A managed service that enables you to handle authentication and aspects of authorization for your custom web and mobile applications through AWS.

Amazon Cognito



- User directory service for custom applications**
- Provides UI components for many platforms**
- Provides security capabilities to control account access**
- Enables controlled access to AWS resources**
- Can work with social and enterprise identity providers**

Amazon Cognito Identity Providers

Google

Amazon

Facebook

**Microsoft Active
Directory**

**SAML 2.0
Providers**

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?

Summary

Summary

Introduced AWS Identity and Access Management (IAM)

Reviewed the IAM identity types

Enabled Multi-factor Authentication (MFA)

Introduced Amazon Cognito

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

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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

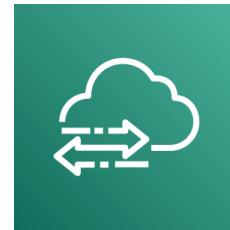
Examining approaches for processing data

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

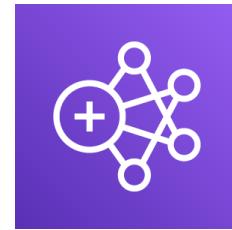
Integrates with S3, EFS, and FSx for Windows File Server on AWS

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

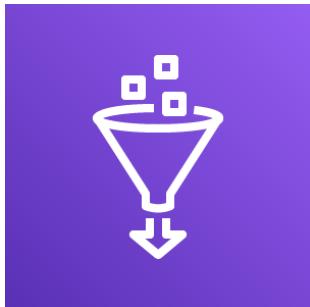
Amazon EMR

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

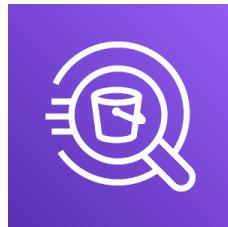
Manages data workflow through AWS services

Supports S3, EMR, Redshift, DynamoDB, and RDS

Can integrate on-premise data stores

Analyzing Data

Data Analysis Services



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

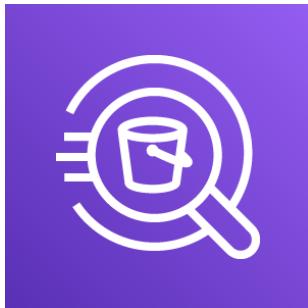


Amazon Quicksight
Business intelligence service enabling data dashboards



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

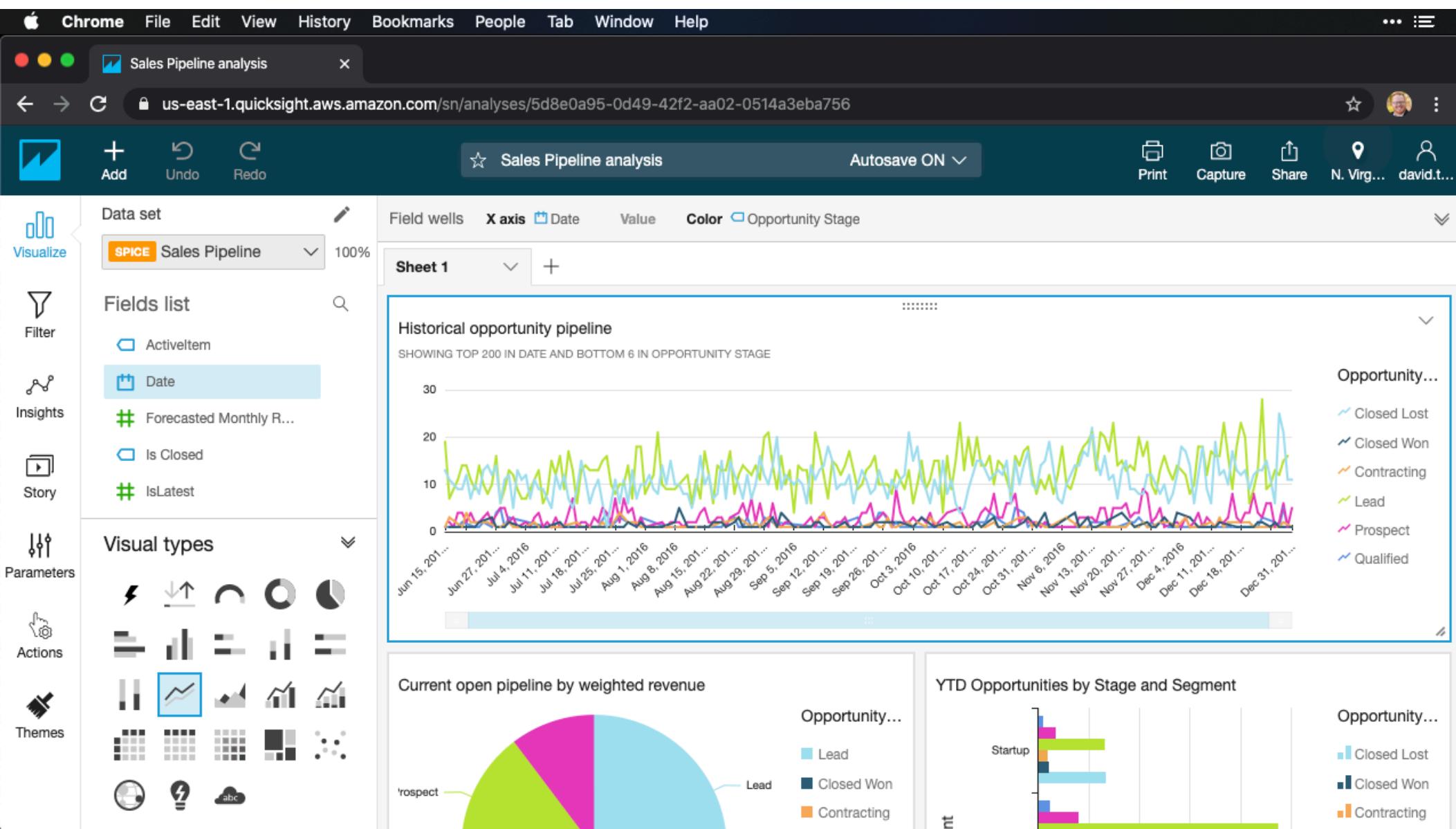


Fully managed business intelligence service

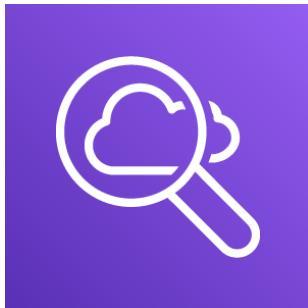
Enables dynamic data dashboard based on data stored in AWS

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

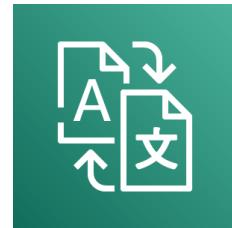
Integrating AI and Machine Learning

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?

Summary

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Reviewed approaches for integrating data from your own data center

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Explored data analysis approaches

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Solution: AWS Glue



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Solution: Amazon Rekognition



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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

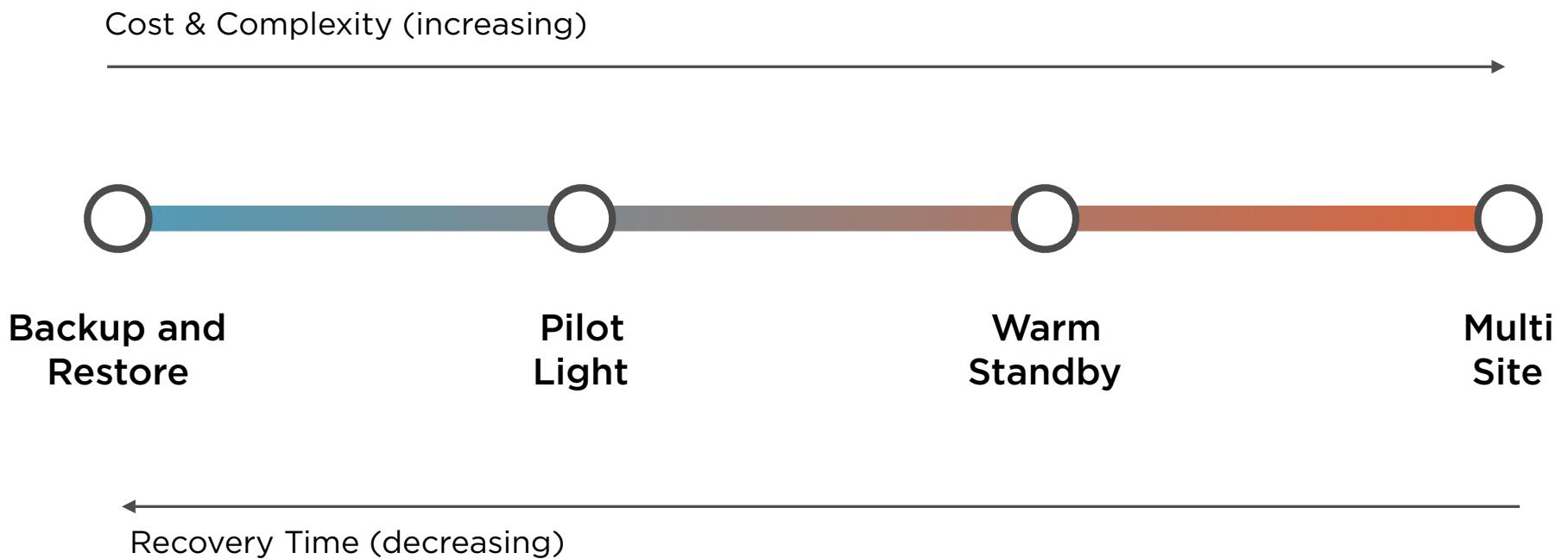
Reviewing the four different disaster recovery approaches on AWS

Exploring the factors to know when selecting an approach

Examining specific scenarios and disaster recovery needs

Disaster Recovery Architectures

Disaster Recovery Scenarios



Backup and Restore

Production data is backed up into Amazon S3

Data can be stored in either standard or archival storage classes

EBS data can be stored as snapshots in Amazon S3 also

In a Disaster Recovery event, a process is started to launch new environment

This approach has the longest recovery time

Pilot Light

Key infrastructure components are kept running in the cloud

Designed to reduce recovery time over the Backup and Restore approach

Does incur cost of this infrastructure continually running in the cloud

AMI's are prepared for additional systems and can be launched quickly

“The **pilot light** method gives you a quicker recovery time than the backup-and-restore method because the core pieces of the system are already running and are continually kept up to date.”

Amazon Web Services

Warm Standby

A scaled-down version of the full environment is running in the cloud

Critical systems can be running on less capable instance types

Instance types and other systems can be ramped up for disaster recovery event

Does incur cost of this infrastructure continually running in the cloud

Multi Site

Full environment is running in the cloud at all times

Utilizes instance types needed for production not just recovery

Provides a near seamless recovery process

Incurs the most cost over the other approaches

Selecting a Disaster Recovery Architecture

Disaster Recovery Approach Considerations

**Recovery Time Objective
(RTO)**

**Recovery Point Objective
(RPO)**

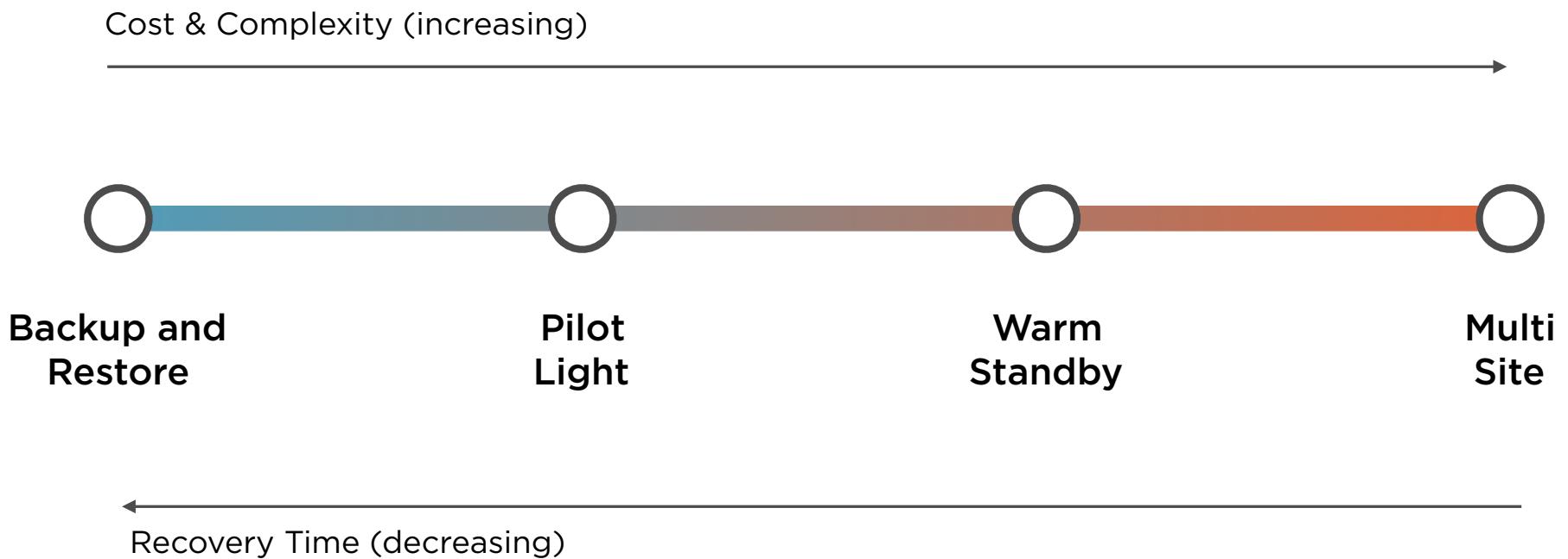
Recovery Time Objective (RTO)

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.

Disaster Recovery Scenarios



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?

Summary

Summary

Understood the need for a disaster recovery strategy

Reviewed the four different disaster recovery approaches on AWS

Explored the factors to know when selecting an approach

Examined specific scenarios and disaster recovery needs



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 EC2 Infrastructure

Scaling on Amazon EC2

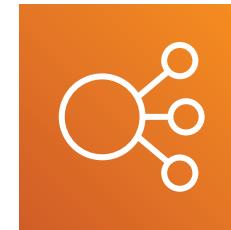
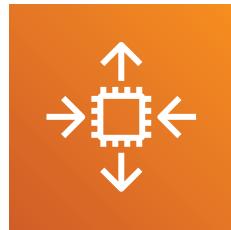
Vertical Scaling

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



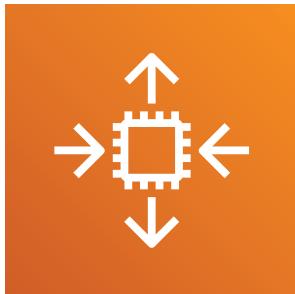
Auto-scaling Group

Set of EC2 instances
with rules for scaling
& management

Elastic Load Balancer

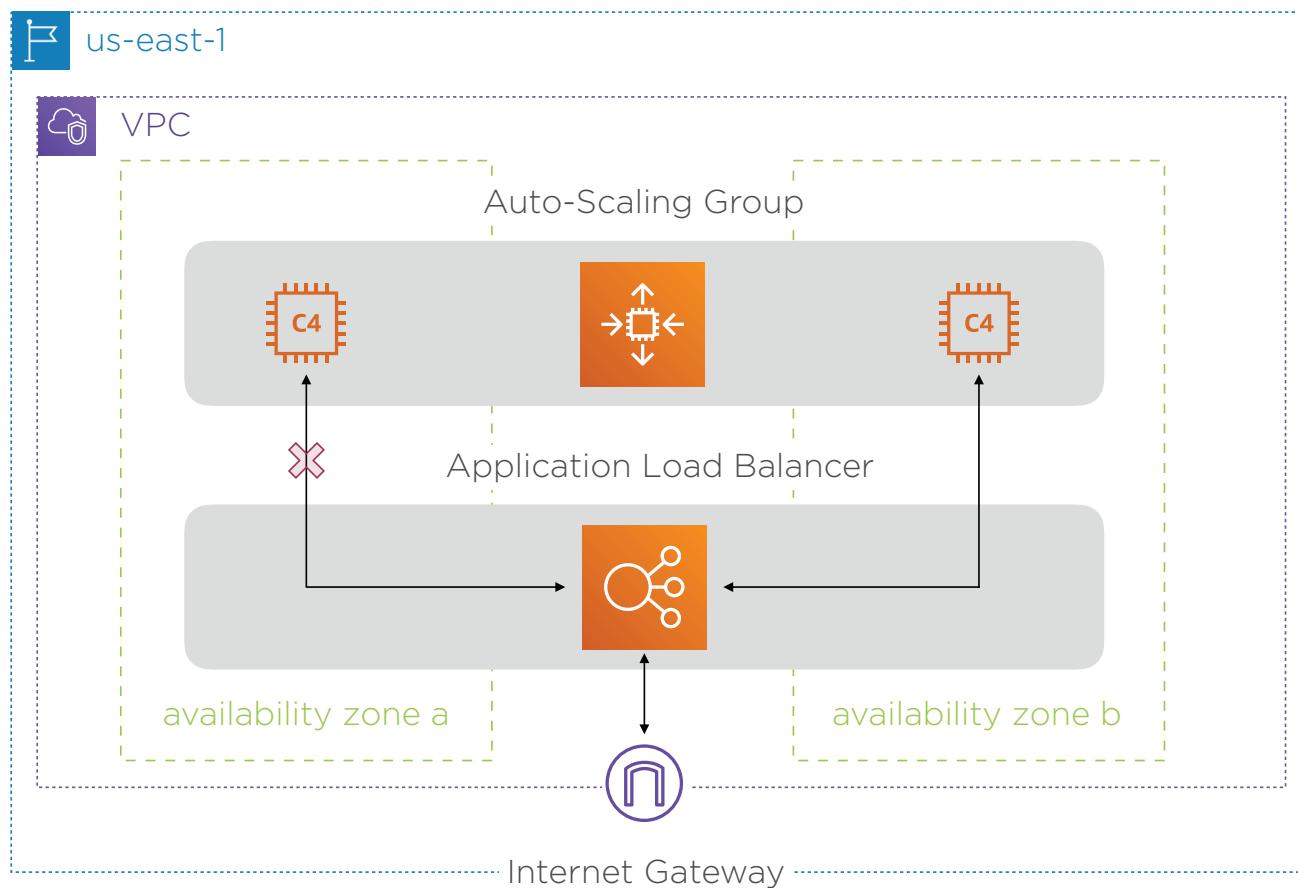
Distributes traffic
across multiple
targets

Amazon EC2 Auto-Scaling Group



- 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**

Amazon EC2 Horizontal Scaling Example



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

Controlling Access to EC2 Instances

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 Groups

- Serve as a firewall for your EC2 instances
- Control inbound and outbound traffic
- Works at the instance level
- EC2 instances can belong to multiple security groups
- VPC's have default security groups
- Must be explicitly associated with an EC2 instance
- By default all outbound traffic is allowed

Network ACL

Works at the subnet level with an VPC

Enables you to allow and deny traffic

Each VPC has a default ACL that allows all inbound and outbound traffic

Custom ACL's deny all traffic until rules are added

AWS VPN



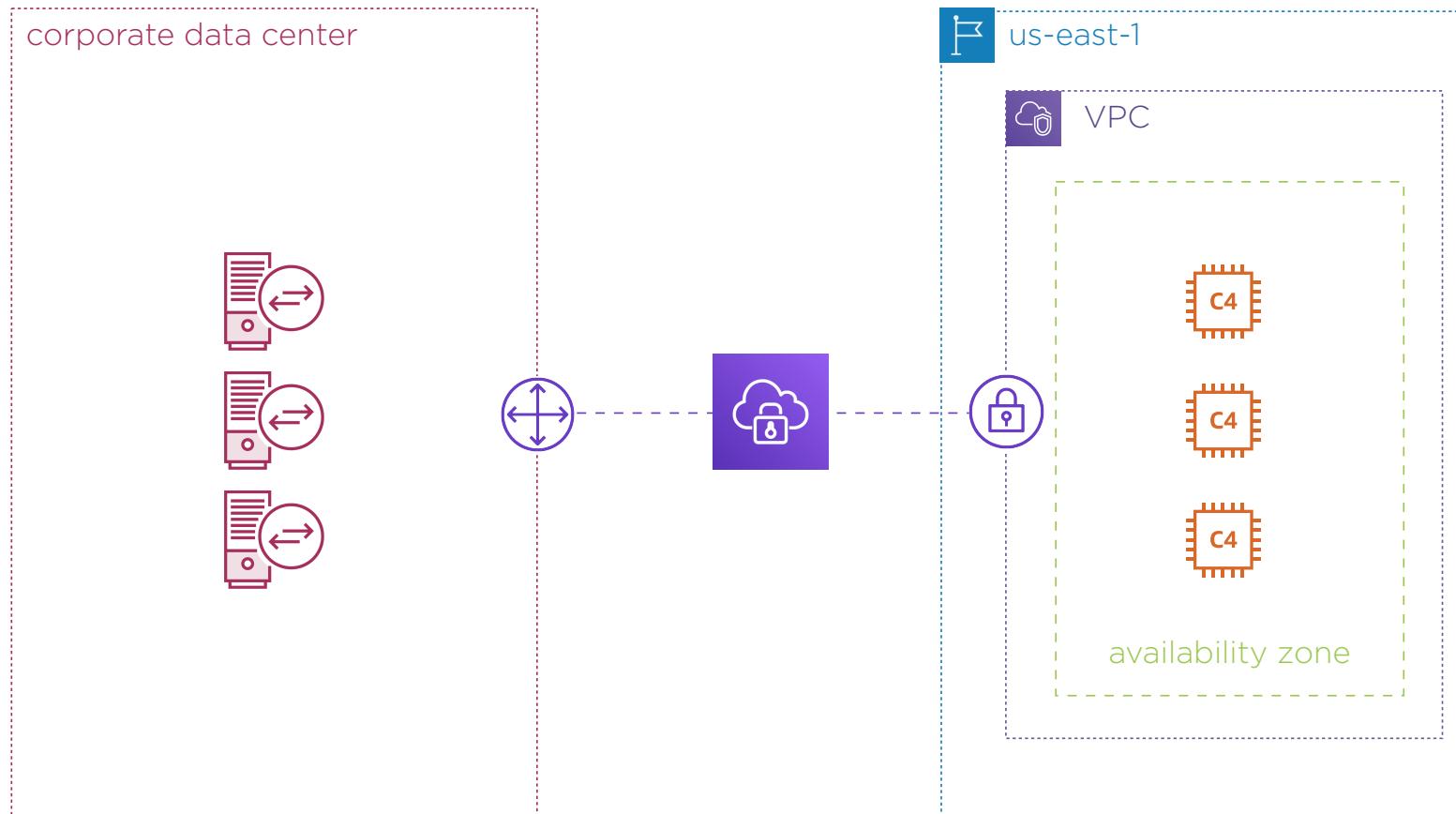
Creates an encrypted tunnel into your VPC

Can be used to connect your data center or even individual client machines

Supported in two services:

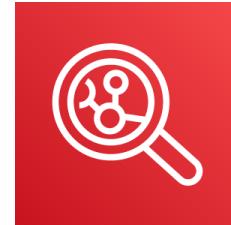
- Site-to-site VPN
- Client VPN

AWS Site-to-site VPN Example



Protecting Infrastructure from Attacks

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

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".

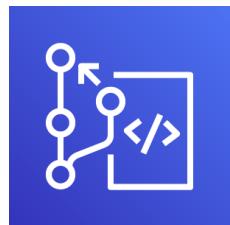
The search results page displays 233 results, showing 1 - 10 of them.

Results include:

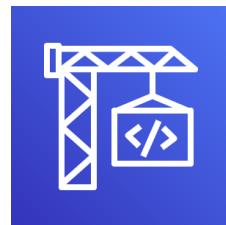
- General government deficit | OECD**
Delivered by CRUX
Sold by Crux Informatics
Free | 12 month subscription available.
General government deficit is defined as the balance of income and expenditure of government, including capital income and capital expenditures.
- Insurance Statistics - Gross claims 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



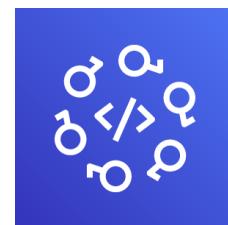
AWS
CodeBuild



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

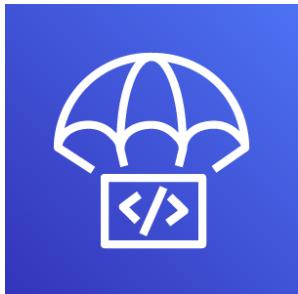


Fully managed build and continuous integration service on AWS

Don't have to worry about maintaining infrastructure

Charged per minute for compute resources you utilize

AWS CodeDeploy

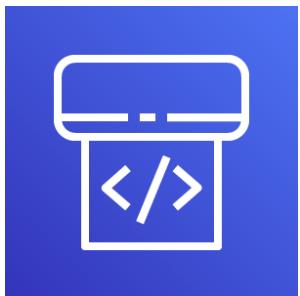


**Managed deployment service for
deploying your custom applications**

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

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

AWS CodePipeline

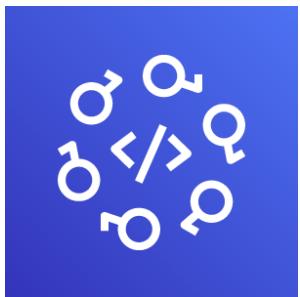


Fully-managed continuous delivery service on AWS

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



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?

Summary

Summary

Reviewed scaling approaches and services for Amazon EC2

Examined approaches for controlling access to Amazon EC2 instances

Explored services to protect infrastructure from hacking and attacks

Introduced developer tools on AWS

Reviewed approaches for launching pre-defined solutions on Amazon EC2



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