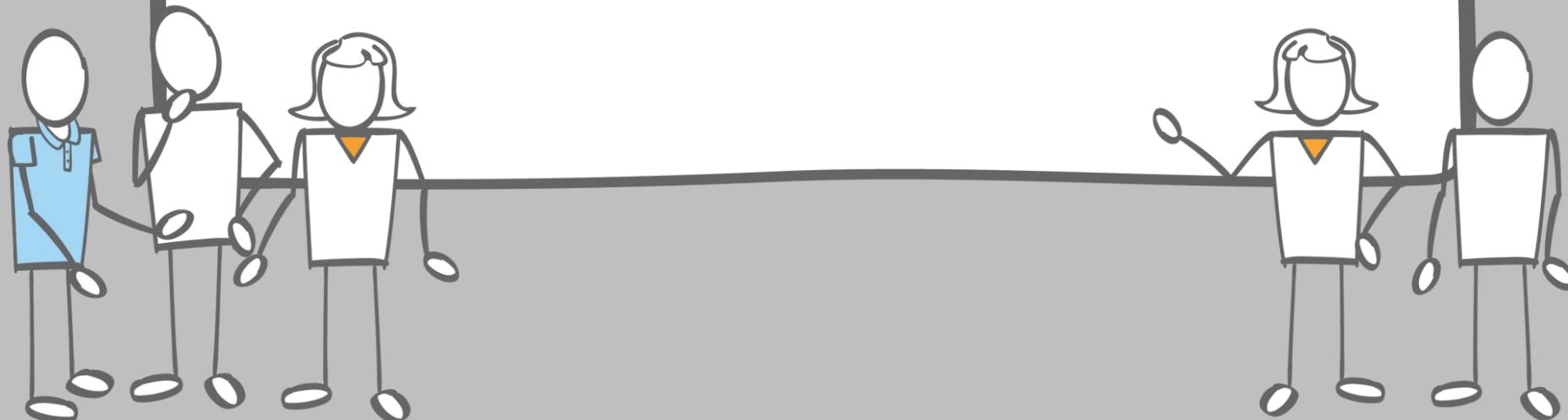
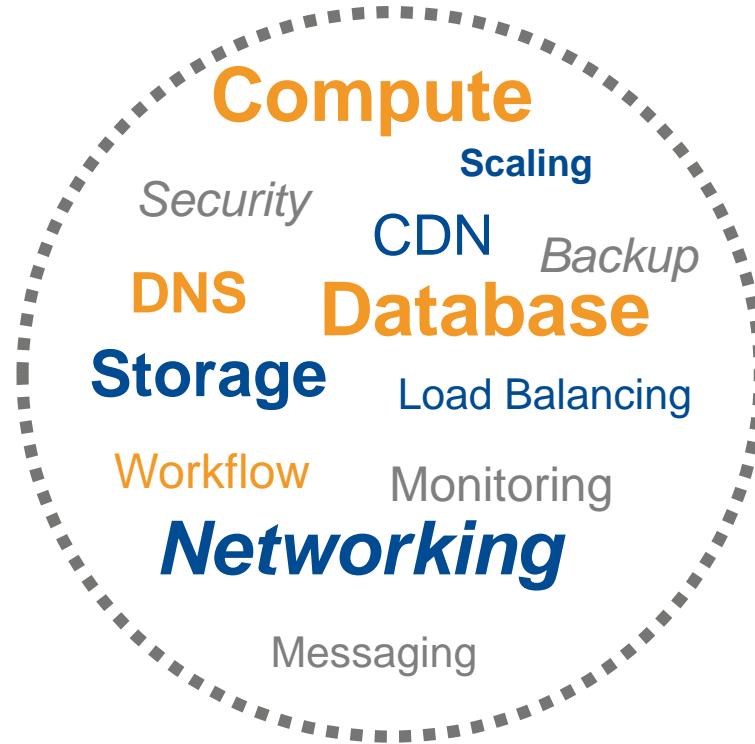
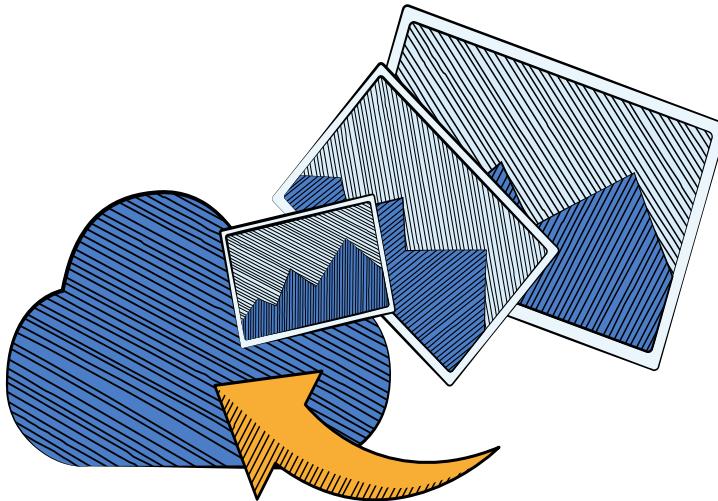


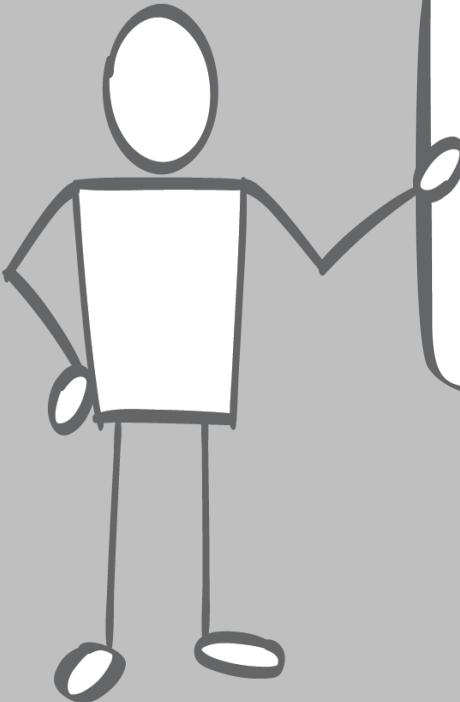
AWS

Amazon Web Services



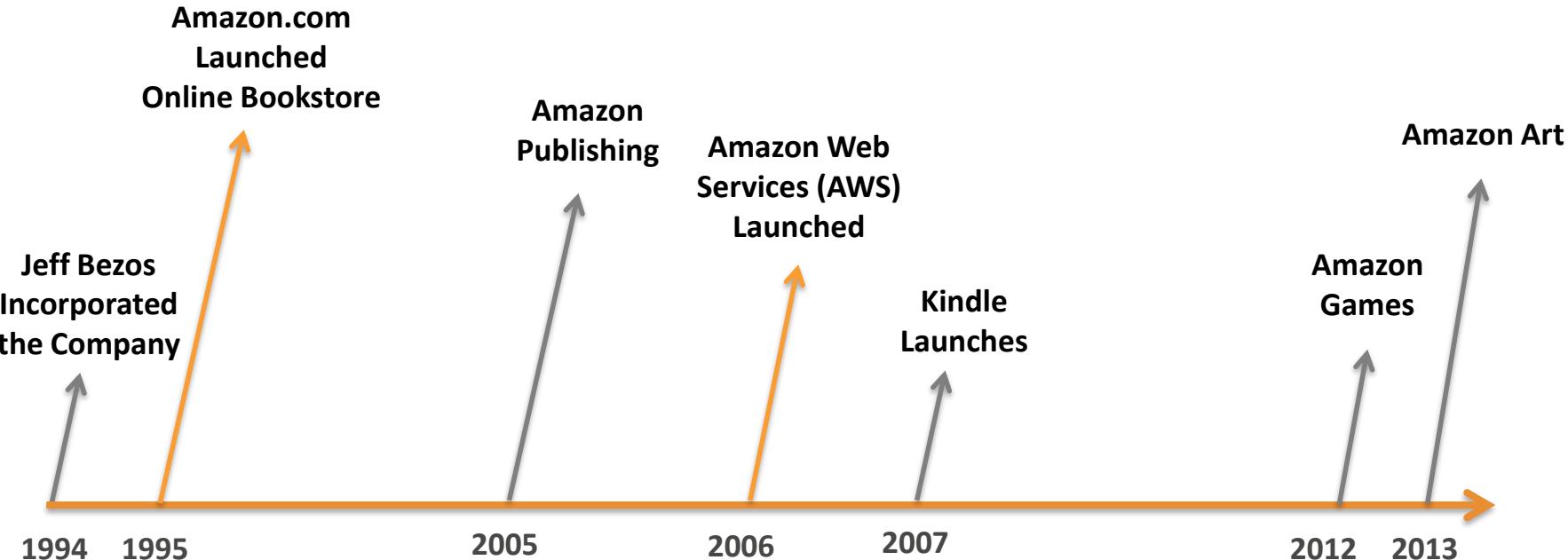
Cloud Computing





Introduction & History of AWS

Amazon History



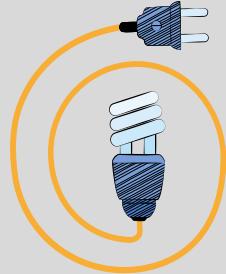
AWS History

Enable businesses and developers to use web services to build scalable, sophisticated applications.

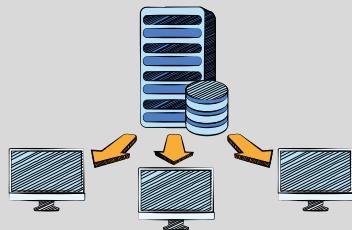


AWS Cloud Computing

On Demand



Uniform



Pay As You Go



Available



AWS Core Infrastructure & Services

Traditional Infrastructure



Security

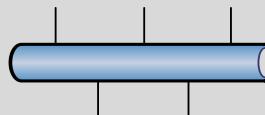
Amazon Web Services



Security Groups

NACLs

Access Mgmt



Networking



Servers

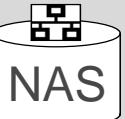


AMI

Servers
Amazon EC2



Instances



RDBMS

Storage &
Database



Glacier



EBS



S3



RDS

AWS Cloud Computing

Applications



Virtual
Desktops



Collaboration and Sharing

Platform Services

Databases

Relational

No SQL

Caching

Analytics

Cluster
Computing

Real-time

Data
Warehouse

Data
Workflows

App Services

Queuing
Orchestration

App Streaming

Transcoding

Email

Search

Deployment & Management

Containers

Dev/ops Tools

Resource Templates

Usage Tracking

Monitoring and Logs

Mobile Services

Identity

Sync

Mobile Analytics

Notifications

Foundation Services



Compute
(Virtual, Auto-scaling and
Load Balancing)



Networking



Storage
(Object, Block and Archive)

Infrastructure

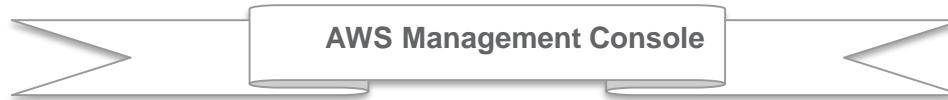
Regions

Availability Zones



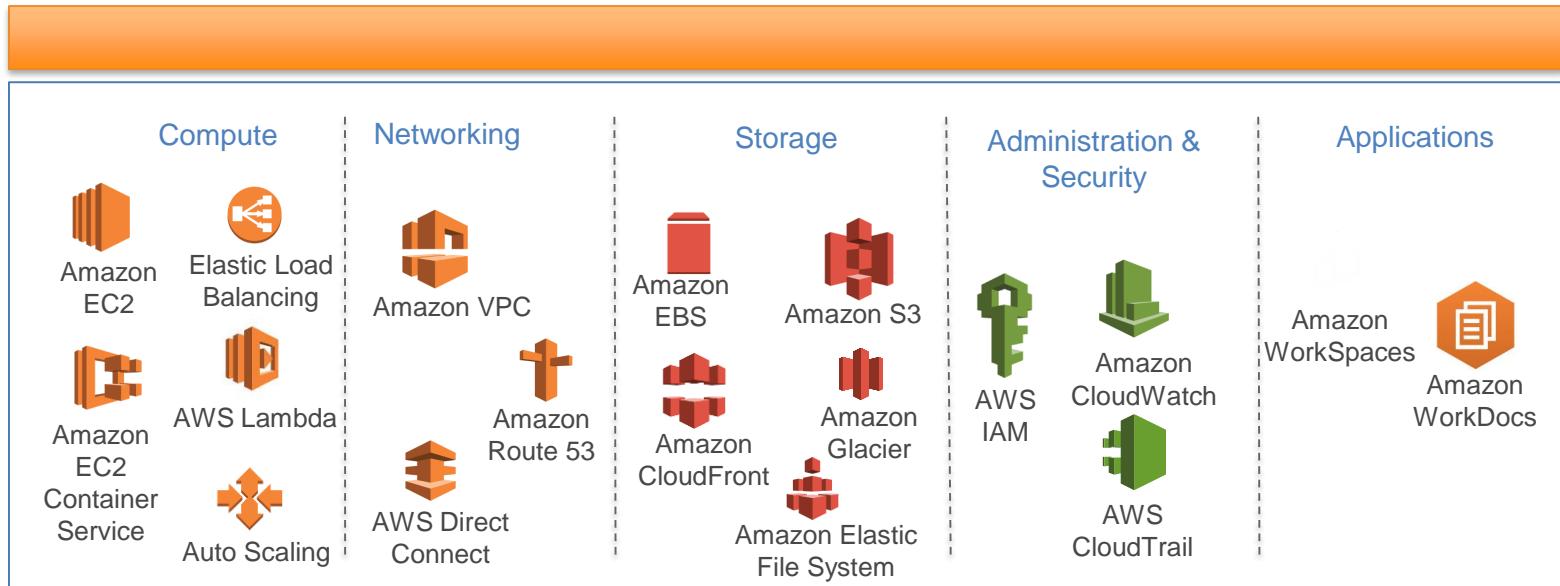
Edge Locations

AWS Foundation Services

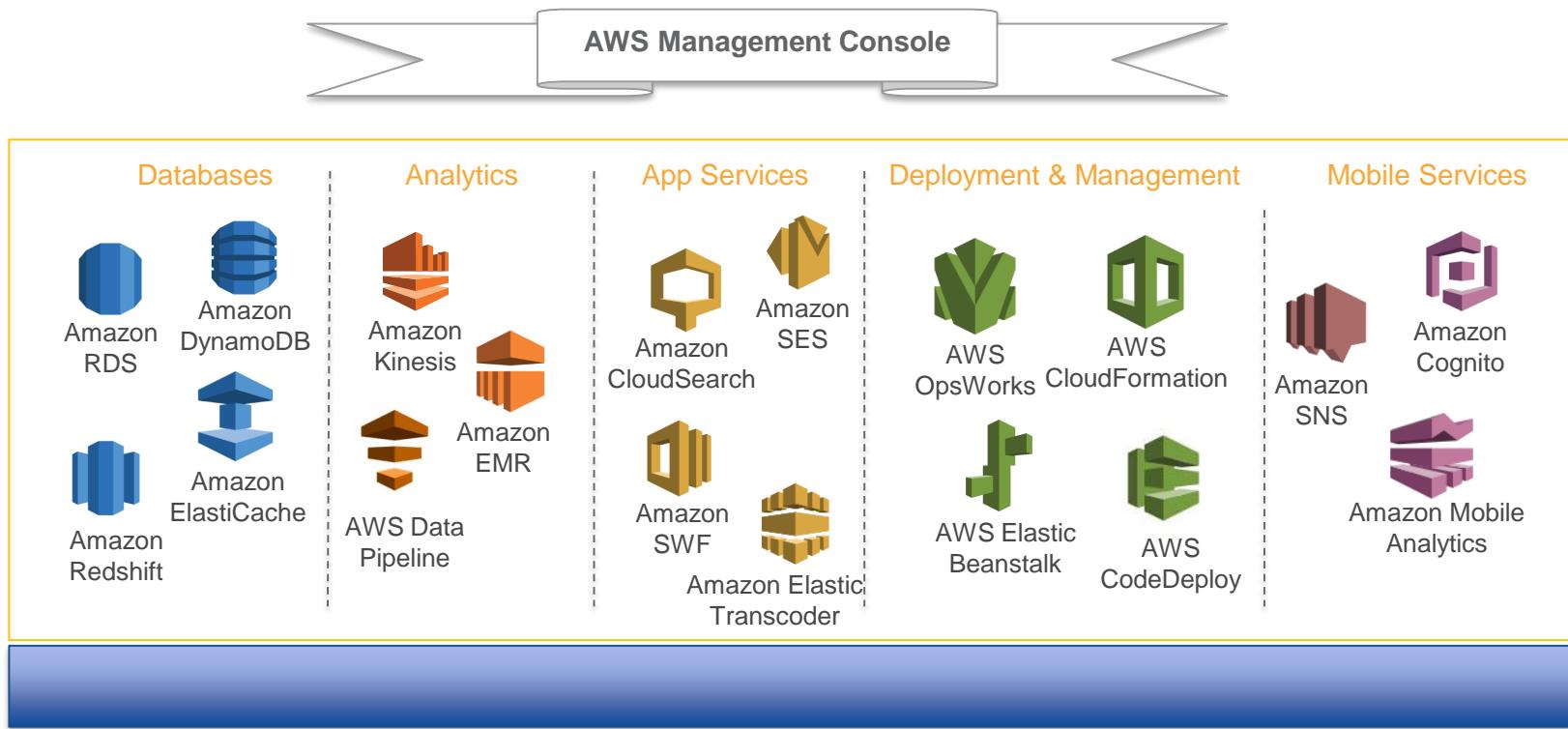


Platform
Services

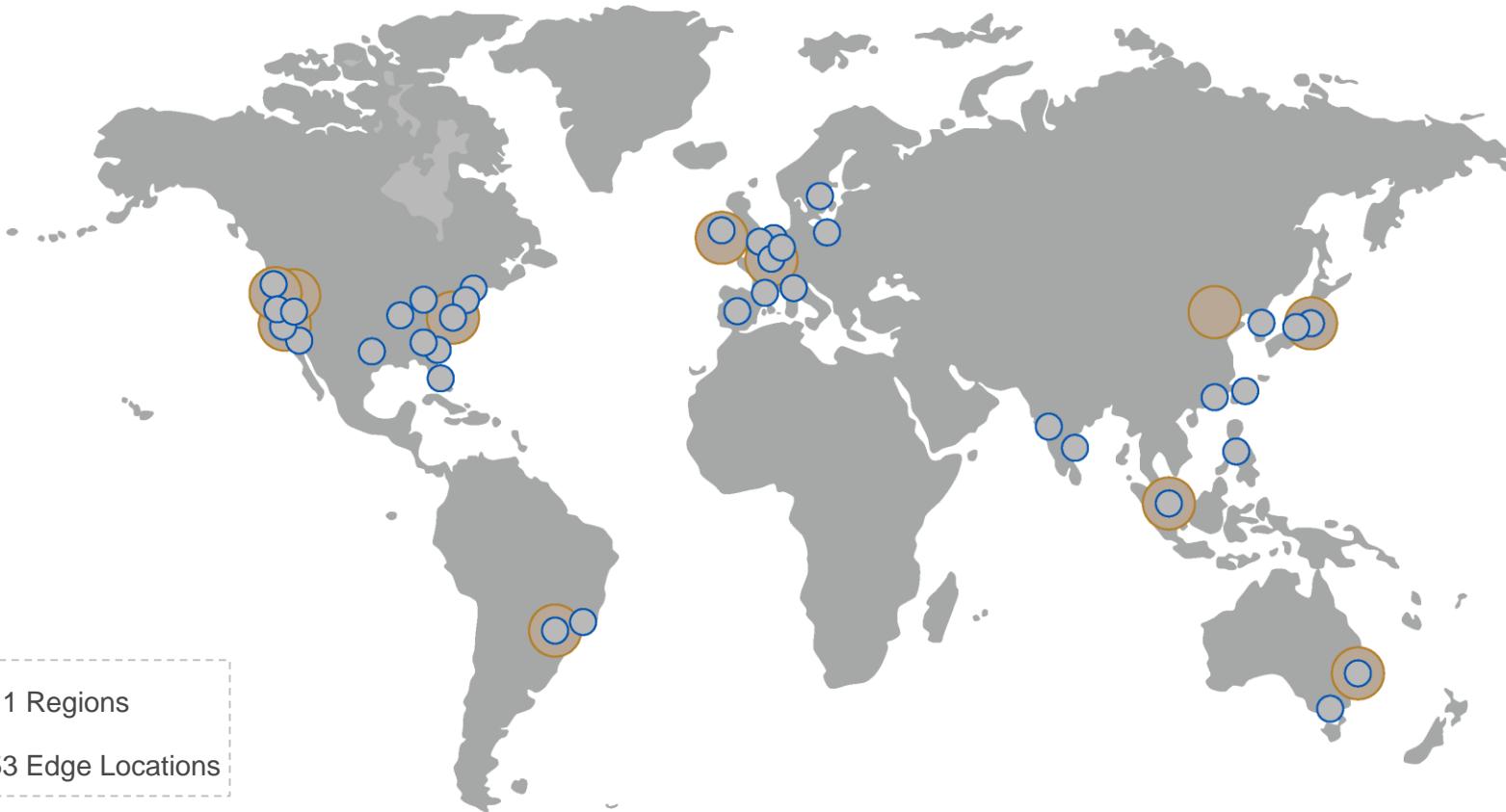
Foundation
Services



AWS Platform Services

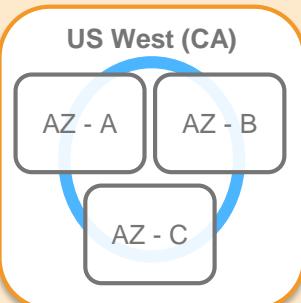
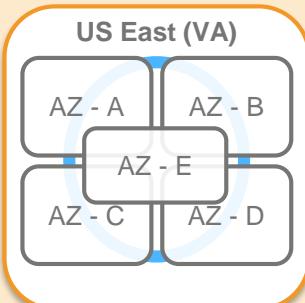


AWS Global Infrastructure

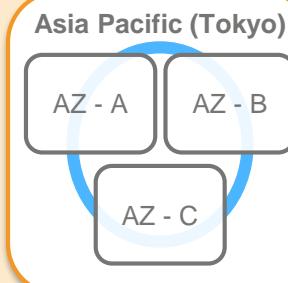


AWS Regions and Availability Zones (AZ)

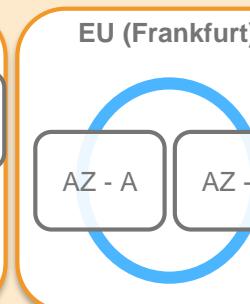
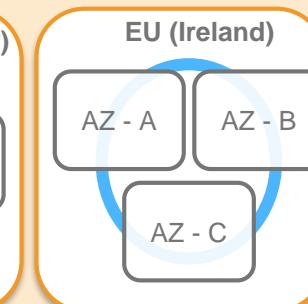
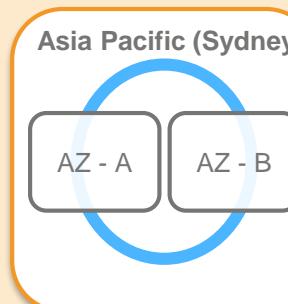
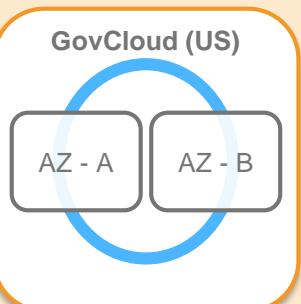
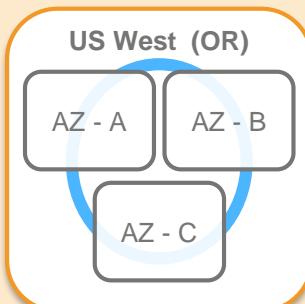
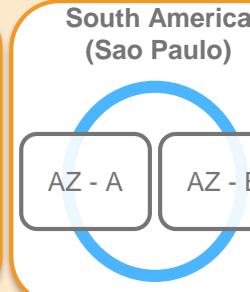
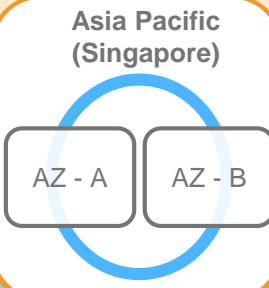
US Regions



Global Regions

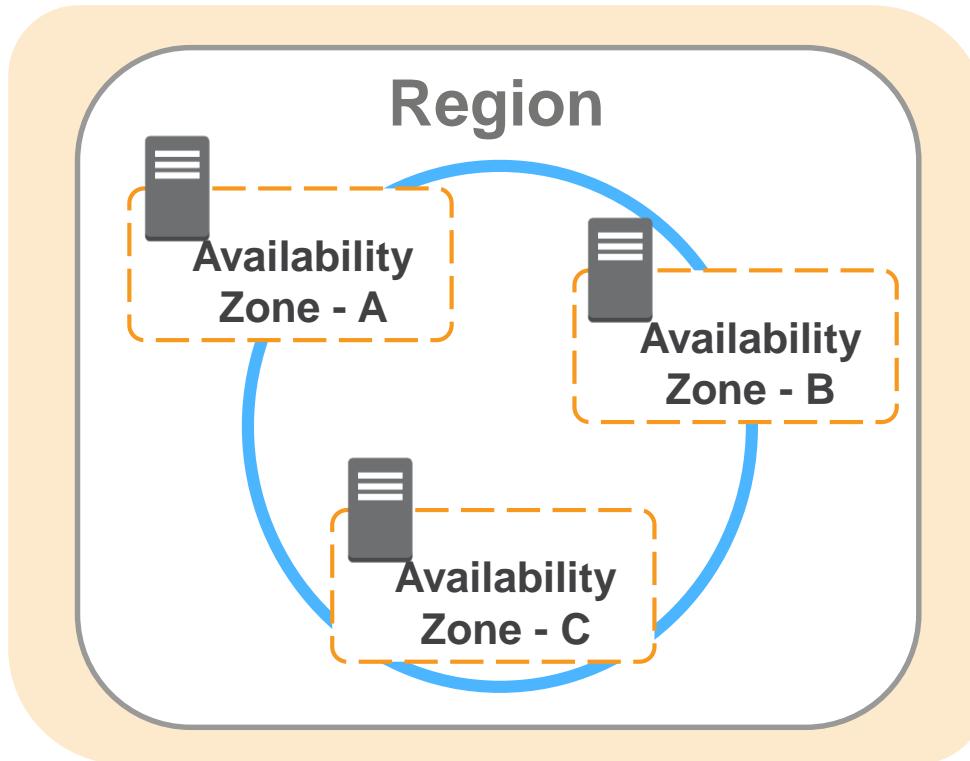


Global Regions



Note: Conceptual drawing only. The number of Availability Zones (AZ) may vary.

Achieving High Availability Using Multi-AZ



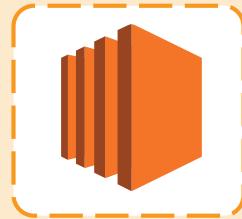
AWS Management Console Demonstration



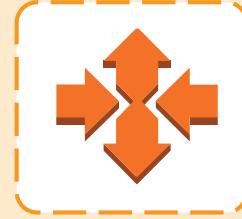


AWS Compute Services

AWS Compute Products

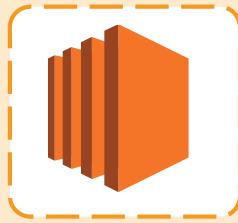


Amazon
Elastic
Compute
Cloud



Auto
Scaling

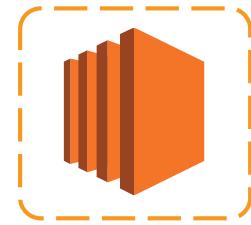
Amazon Elastic Compute Cloud (EC2)



Amazon
EC2

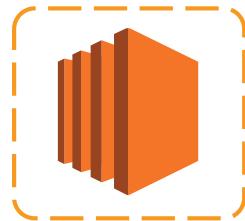
- **Resizable** compute capacity
- Complete control of your computing resources
- **Reduces the time required** to obtain and boot new server instances to minutes

Amazon EC2 Facts



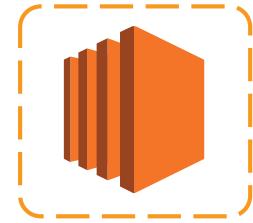
- Scale capacity as your computing requirements change
- Pay only for capacity that you actually use
- Choose Linux or Windows
- Deploy across AWS regions and Availability Zones for reliability

How to Use Amazon EC2



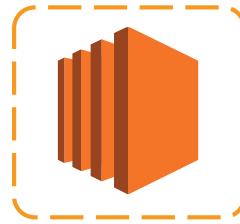
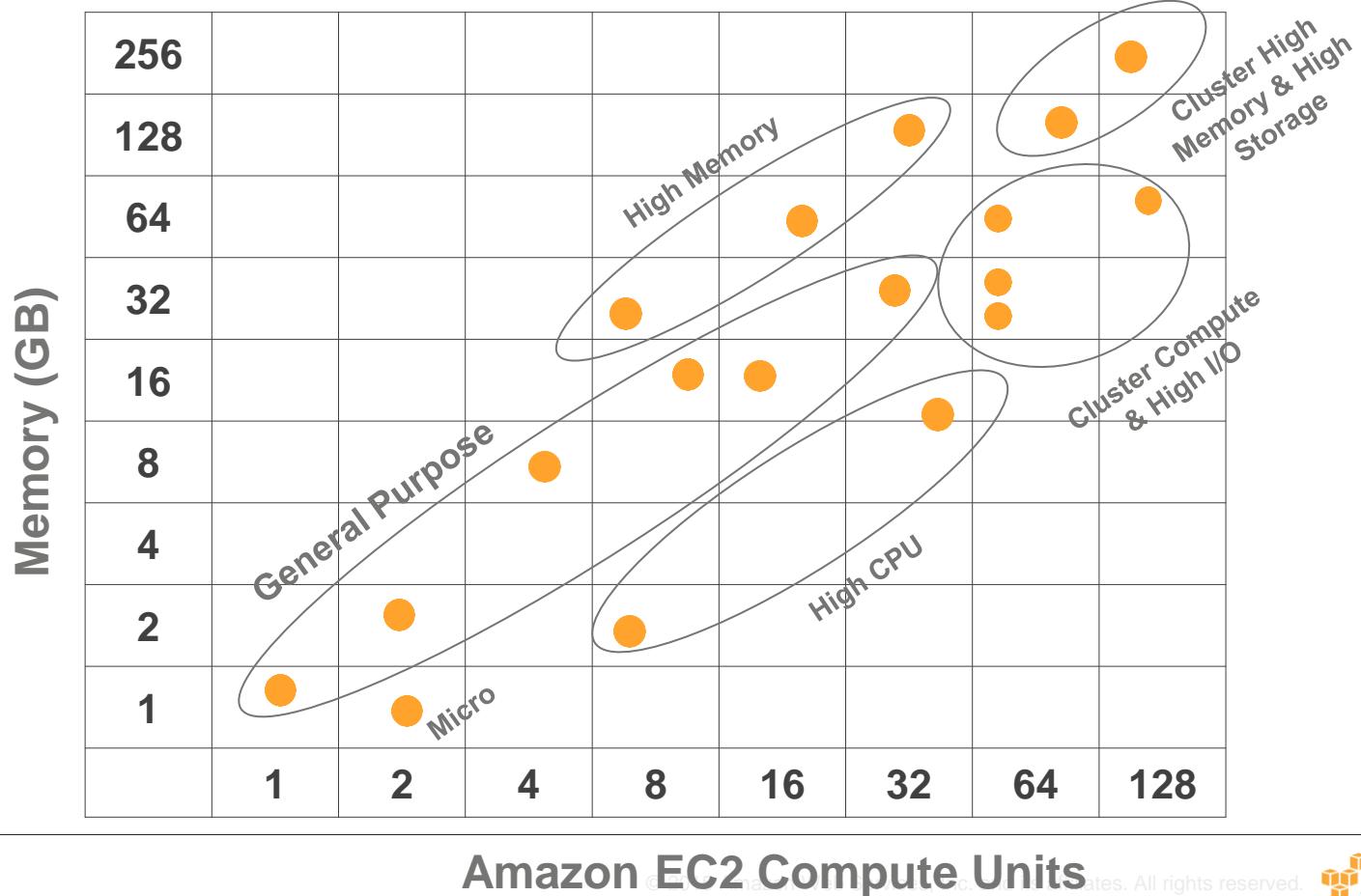
1. Determine the AWS region to launch the Amazon EC2 instance.
2. Launch an Amazon EC2 instance from a pre-configured Amazon Machine Image (AMI).
3. Choose an instance type based on CPU, memory, storage, and network requirements.
4. Configure network, IP address, security groups, storage volume, tag, and key pair.

Infrastructure and Applications



- Oracle
- SAP
- Microsoft
-  aws marketplace

Amazon EC2 Instances



Choosing the Right Amazon EC2 Instance



- EC2 Instance types are optimized for different use cases & come in multiple sizes. This allows you to optimally scale resources to your workload requirements.
- AWS uses Intel® Xeon® processors for EC2 Instances providing customers with high performance and value.
- Consider the following when choosing your instances: Core count, Memory size, Storage size & type, Network performance, & CPU technologies.
- Hurry Up & Go Idle - A larger compute instance can save you time and money, therefore paying more per hour for a shorter amount of time can be less expensive.

Get the Intel® Advantage



Intel's latest 22nm Haswell microarchitecture on new C4 instances, with custom **Intel® Xeon® v3** processors, provides new features:

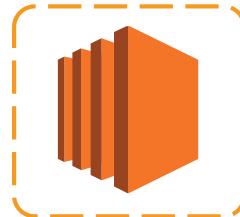
- **Haswell microarchitecture** has better branch prediction; greater efficiency at prefetching instructions and data; along with other improvements that can **boost existing applications' performance by 30% or more**
- **P state and C state control** provides the ability to individually tune each cores performance and sleep states to improve application performance
- **Intel® AVX2.0** instructions can double the floating-point performance for compute-intensive workloads over Intel® AVX, and provide additional instructions useful for compression and encryption

Intel® Processor Technologies



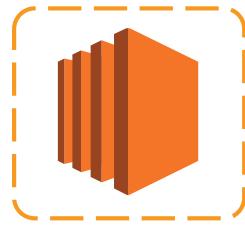
- **Intel® AVX** – Get dramatically better performance for highly parallel HPC workloads such as life science engineering, data mining, financial analysis, or other technical computing applications. AVX also enhances image, video, and audio processing.
- **Intel® AES-NI** – Enhance your security with these new encryption instructions that reduce the performance penalty associated with encrypting/decrypting data.
- **Intel® Turbo Boost Technology** – Get more computing power when you need it with performance that adapts to spikes in your workload with Intel® Turbo Boost Technology 2.0

EC2 Instances with Intel® Technologies



AWS Instance Type:	Compute Optimized C4	Memory Optimized R3	I/O Optimized I2	General Purpose Balanced M3 & T2	GPU G2	Storage Optimized HS1	
Intel® processor	Intel® Xeon® E5-2666 v3	Intel® Xeon® E5-2670 v2	Intel® Xeon® E5-2670 v2	Intel® Xeon® E5-2670 v2	Intel® Xeon® family	Intel® Xeon® E5-2670	Intel® Xeon® family
Intel® process technology	22nm Haswell	22nm Ivy Bridge	22nm Ivy Bridge	22nm Ivy Bridge	✓	32nm Sandy Bridge	✓
Intel® AVX	AVX 2.0	✓	✓	✓	✓	✓	✓
Intel® AES-NI	✓	✓	✓	✓	✓		
Intel® Turbo Boost	✓	✓	✓	✓	✓		
SSD Storage	EBS-OPT by default	✓	✓	✓		✓	

Amazon EC2 Purchasing Options



On-Demand Instances

- ✓ **Pay as you go** for compute power
- ✓ Pay only for what you use, **no up-front commitments** or long-term contracts



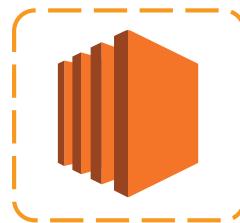
Reserved Instances

- ✓ 1- or 3-year terms
- ✓ Pay 1-time **low up-front fee**, receive significant **hourly discount**
- ✓ Compute capacity is available when needed

Spot Instances

- ✓ Bid on **unused Amazon EC2 capacity**
- ✓ **Spot Price** based on supply/demand, determined automatically
- ✓ Spot Price below bid, instances **start**
- ✓ Spot Price above bid, instances **terminate**

Amazon EC2 Instances



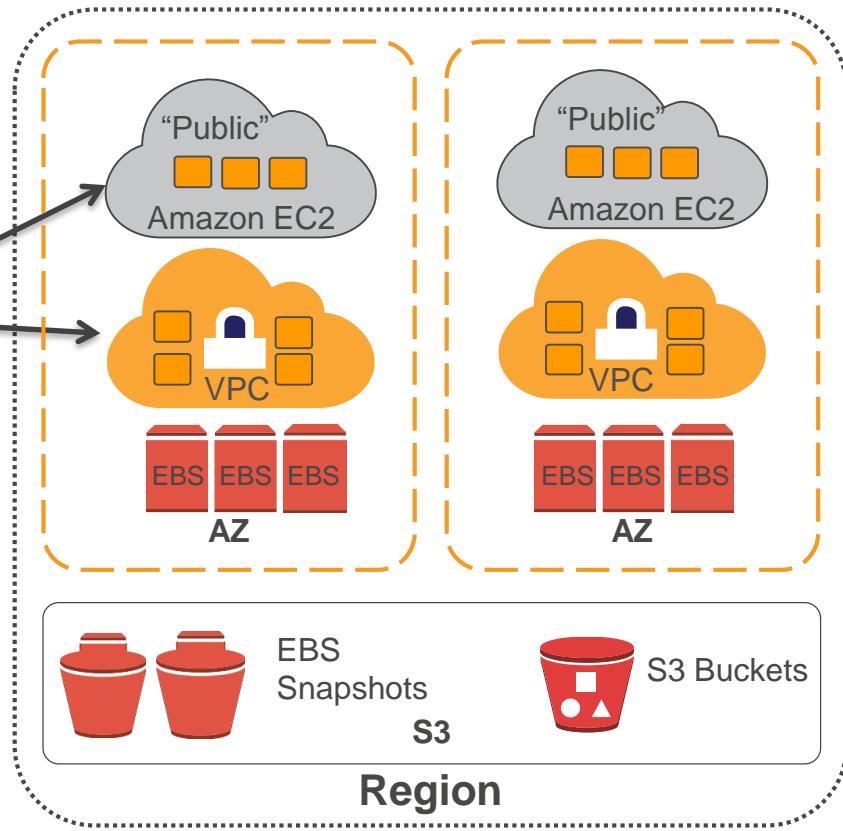
AMI



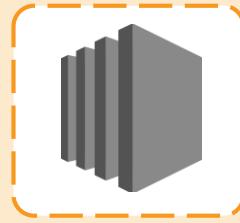
Instances

Virtual Machine Configuration

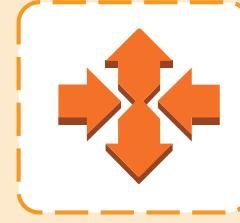
Running or Stopped VM



AWS Compute Products

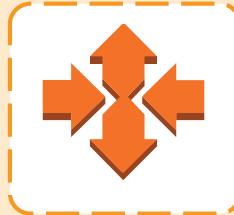


Amazon
Elastic
Compute
Cloud



Auto
Scaling

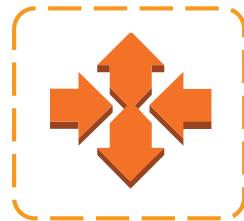
Auto Scaling



Auto
Scaling

- **Scale** your Amazon EC2 capacity **automatically**
- Well-suited for applications that experience **variability in usage**
- Available at no additional charge

Auto Scaling Benefits



Elastic Capacity



Ease of Use



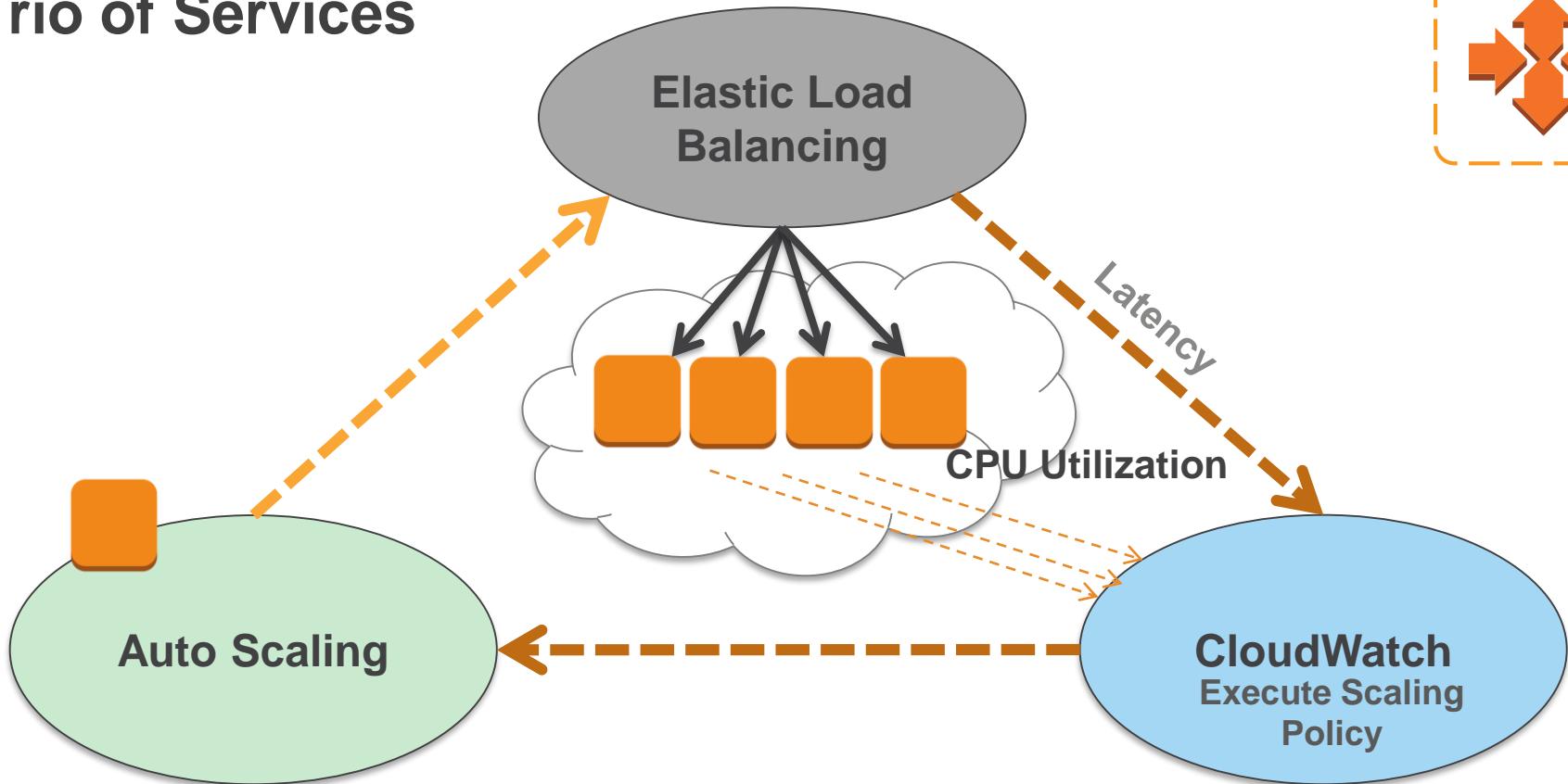
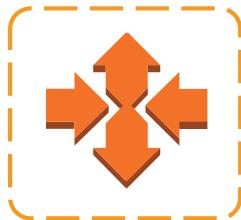
Cost Savings



Geographic Flexibility



Trio of Services



AWS Compute EC2 Demo



Knowledge Check

Q: Where can you locate AWS products and services?

Q: If you have more than one server, which feature will help achieve high availability?

Knowledge Check

Q: Where can you locate AWS products and services? **AWS Management Console**

Q: If you have more than one server, which feature will help achieve high availability? **Multiple Availability Zones**

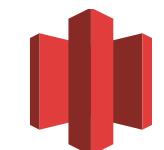


AWS Storage & Content Delivery

AWS Storage Products and Services



Amazon
Simple
Storage
Service



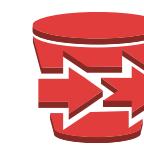
Amazon
Glacier



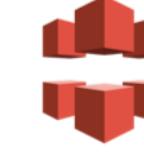
Amazon
Elastic
Block
Store



AWS
Storage
Gateway

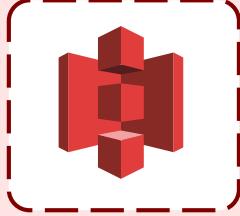


AWS
Import/Export



Amazon
CloudFront

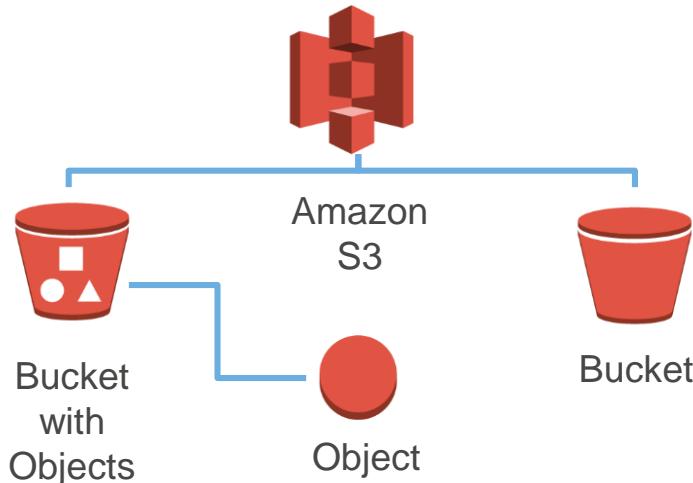
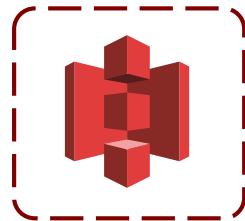
Amazon Simple Storage Service (S3)



Amazon S3

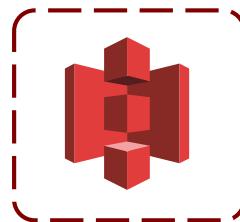
- Storage for the Internet
- Natively online, HTTP access
- Store and retrieve **any amount of data**, any time, from anywhere on the web
- **Highly scalable**, reliable, fast and durable

Amazon S3 Concepts



- Amazon S3 stores data as objects within buckets
- An object is comprised of a file and optionally any metadata that describes that file
- You can have up to 100 buckets in each account
- You can control access to the bucket and its objects

Amazon S3 Buckets



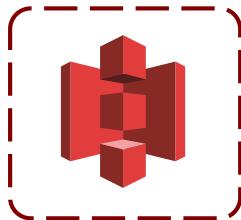
- **Objects** are stored in Buckets
- Objects can be **accessed via a URL**:

`http://johnsmith.s3.amazonaws.com/photos/puppy.jpg`



- Organize Amazon S3 namespace at highest level
- Identify account – storage and data transfer charges
- Access Control
- Unit of aggregation for usage reporting

Amazon S3 Objects

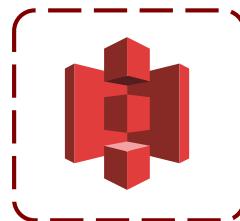


Objects are the fundamental entities stored in Amazon S3.
When using the console, you can think of them as files.

Objects consist of data and metadata. The data portion is opaque to Amazon S3. The metadata is a set of name-value pairs that describe the object.

- Default metadata such as the date last modified
- Standard HTTP metadata such as Content-Type
- Custom metadata at the time the object is stored
- A key that uniquely identifies as object within its bucket

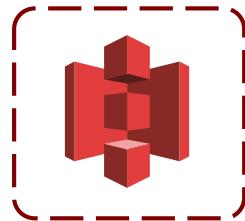
Amazon S3 Object Lifecycle



Lifecycle management defines how Amazon S3 manages objects during their lifetime. Some objects that you store in an Amazon S3 bucket might have a well-defined lifecycle:

- Log files
- Archive documents
- Digital media archives
- Financial and healthcare records
- Raw genomics sequence data
- Long-term database backups
- Data that must be retained for regulatory compliance

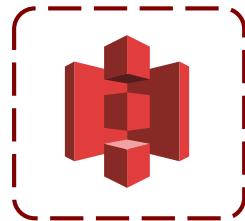
Amazon S3 Pricing



- Pay only for what you use
- No minimum fee
- Prices based on location of your Amazon S3 bucket
- Estimate monthly bill using the **AWS Simple Monthly Calculator**



Amazon S3 Facts

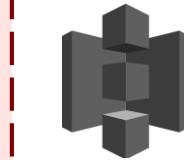


- Able to store **unlimited number of Objects** in a Bucket
- Objects **up to 5TB**; no bucket size limit
- Designed for **99.99999999% durability** and **99.99% availability** of objects over a given year
- HTTP/S endpoint to store and retrieve any amount of data, at any time, from anywhere on the web
- Highly scalable, reliable, fast, and inexpensive
- Optional server-side encryption using AWS or customer-managed provided client-side encryption
- Access Logs for auditing
- Provides standards-based REST and SOAP interfaces

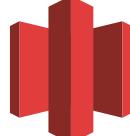
AWS Management S3 Bucket Demo



AWS Storage Products and Services



Amazon
Simple
Storage
Service



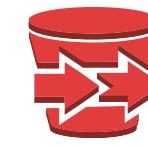
Amazon
Glacier



Amazon
Elastic
Block
Store



AWS
Storage
Gateway

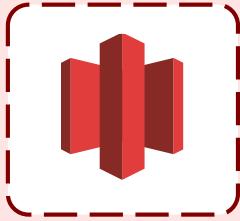


AWS
Import/Export



Amazon
CloudFront

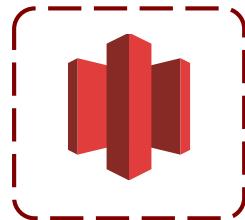
Amazon Glacier



Amazon
Glacier

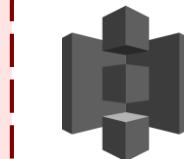
- Extremely **low-cost** storage
- Secure, durable storage for **data archiving and backup**
- Optimized for data that is **infrequently accessed**

Amazon Glacier Facts



- Offload the administrative burdens of operating and scaling archival storage to AWS, and make retaining data for long periods, whether measured in years or decades, especially simple.
- Optimized for data that is infrequently accessed and for which retrieval time of several hours are suitable.
- No limit to the amount of data you can store in Amazon Glacier.
- Automatic Server-side Encryption using AES 256-bit symmetric keys.
- Designed to provide average annual durability of 99.99999999% for an archive.

AWS Storage Products and Services



Amazon
Simple
Storage
Service



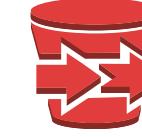
Amazon
Glacier



Amazon
Elastic
Block
Store



AWS
Storage
Gateway

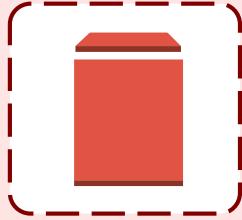


AWS
Import/Export



Amazon
CloudFront

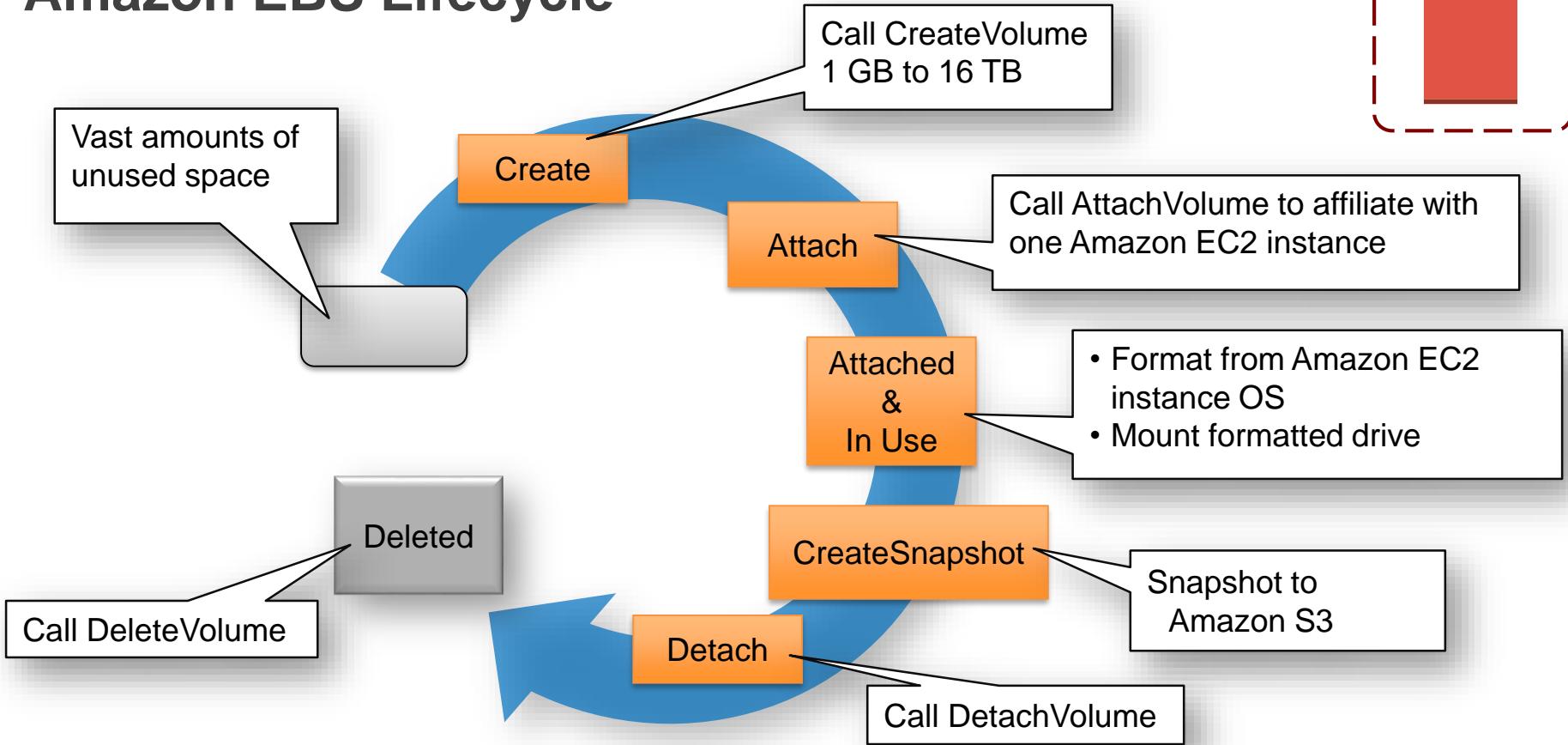
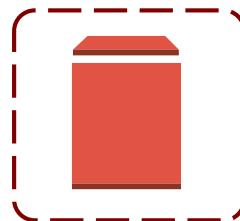
Amazon Elastic Block Store (EBS)



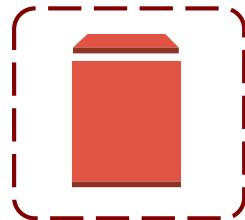
Amazon
EBS

- **Persistent block level storage** volumes offering consistent and low-latency performance
- Automatically replicated within its Availability Zone
- Snapshots stored durably in Amazon S3

Amazon EBS Lifecycle

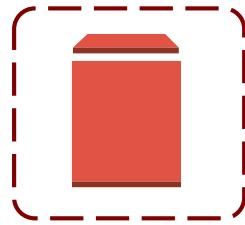


Amazon EBS Facts



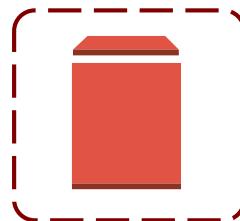
- Three volume types: General Purpose (SSD), Provisioned IOPS (SSD), and Magnetic
- Can use to create RAID configuration for a server
- Off-instance block storage that persists independently
- Volumes behave like unformatted block devices for Linux or Windows instances
- Designed for 99.999% availability
- Seamless AES-256 encryption of EBS data volumes and snapshots
- Encryption of data as it moves between EC2 instances and EBS data volumes
- Provisioned IOPS (SSD) volume supports a maximum volume size of 16 TB and 20,000 IOPS/volume

Amazon EBS Use Cases



- OS – use for boot/root volume, secondary volumes
- Databases – scales with your performance needs
- Enterprise applications – provides reliable block storage to run mission-critical applications
- Business continuity – Minimize data loss and recovery time by regularly backing up using EBS Snapshots

Amazon EBS Pricing



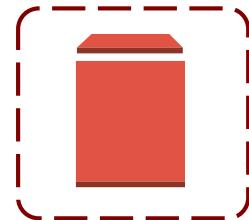
Pay for what you Provision:

- Pricing based on Region
- AWS GovCloud (US) Pricing page
- Review Pricing Calculator online



* Check Amazon EBS Pricing page for current pricing for all regions.

Amazon EBS Best Practices



Amazon EBS Volumes are in a Single Availability Zone

EBS Volume 1



EBS Volume 2



Volume data is replicated across multiple servers in an Availability Zone.

Amazon EBS and Amazon S3



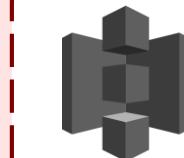
	Amazon EBS	Amazon S3
Paradigm	File system	Object store
Performance	Very fast	Fast
Redundancy	Across multiple servers in an Availability Zone	Across multiple facilities and on multiple devices within each facility
Security	EBS Encryption – Data volumes and Snapshots	Server Side Encryption
Access from the Internet?	No (1)	Yes (2)
Typical use case	It is a disk drive	Write once, read many

- (1) Accessible from the Internet if mounted to server and set up as FTP, etc.
- (2) Only with proper credentials, unless ACLs are world-readable

AWS Management EBS Volume Demo



AWS Storage Products and Services



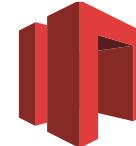
Amazon
Simple
Storage
Service



Amazon
Glacier



Amazon
Elastic
Block
Store



AWS
Storage
Gateway

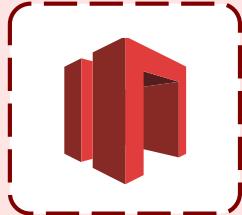


AWS
Import/Export



Amazon
CloudFront

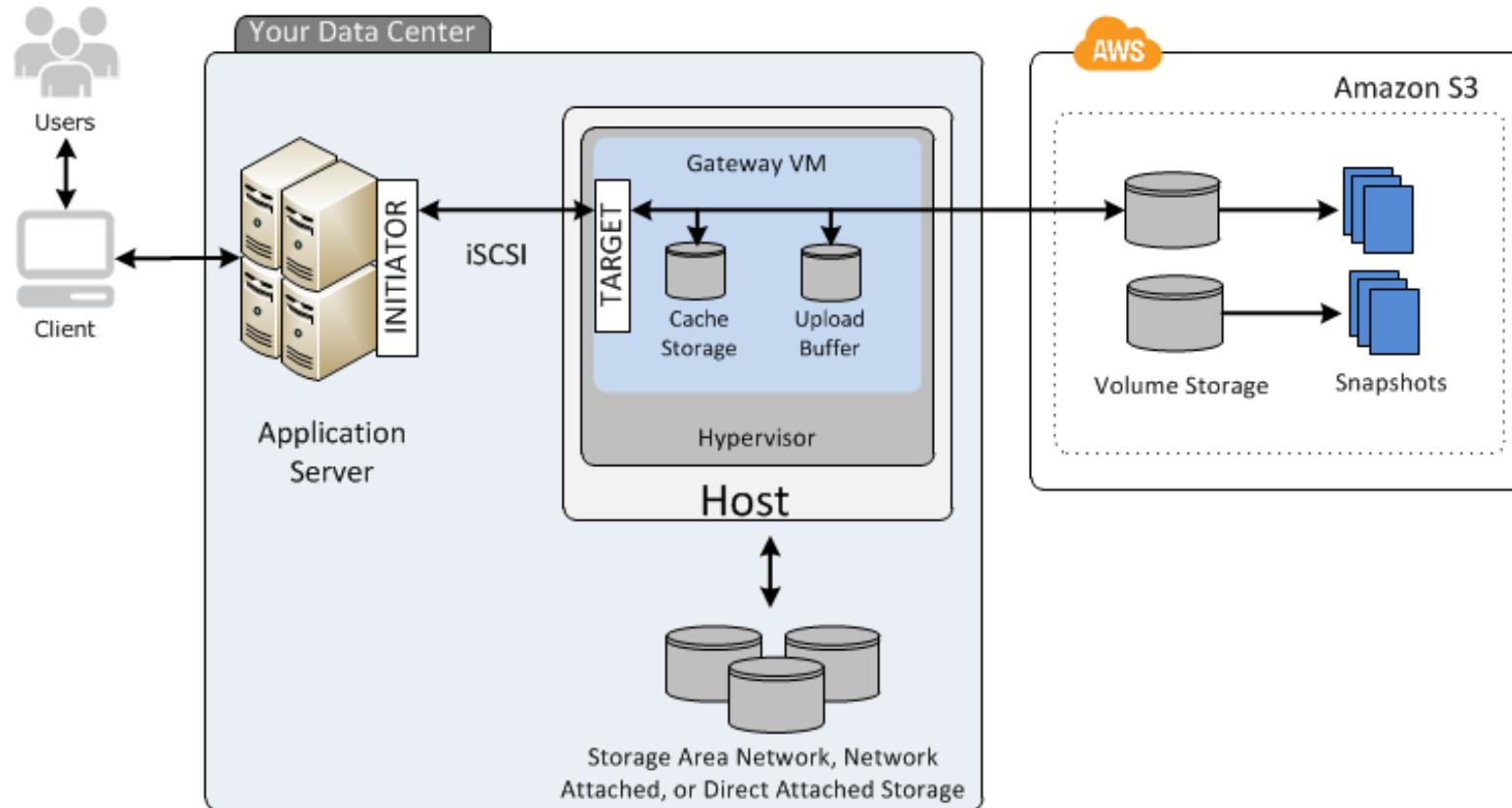
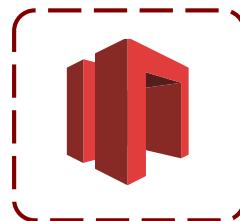
AWS Storage Gateway



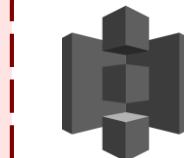
AWS
Storage
Gateway

- Connect an on-premises software appliance with **cloud-based storage**
- **Securely upload data** to the AWS cloud for cost effective backup and rapid disaster recovery
- Mirror your on-premises data to Amazon EC2 instances

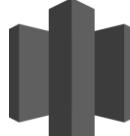
Gateway-Cached Volume Architecture



AWS Storage Products and Services



Amazon
Simple
Storage
Service



Amazon
Glacier



Amazon
Elastic
Block
Store



AWS
Storage
Gateway

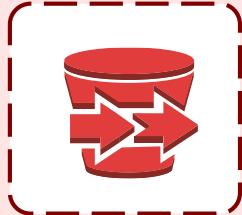


AWS
Import/Export



Amazon
CloudFront

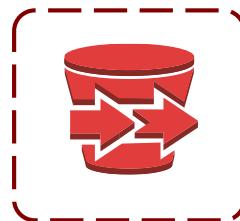
AWS Import/Export



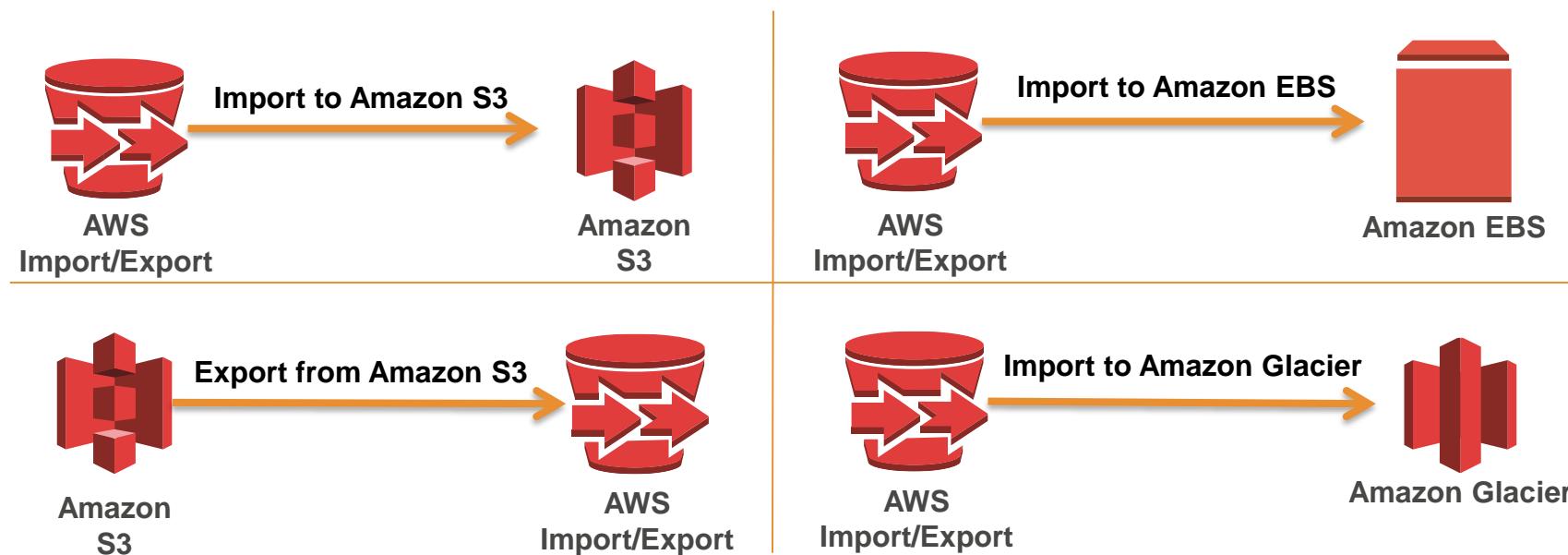
AWS
Import/Export

- **Accelerates moving large amounts of data** into and out of Amazon S3 or Amazon EBS
- **Transfers your data** directly onto and off of storage devices
- **Uses Amazon high-speed internal network**

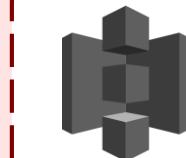
AWS Import/Export Support



AWS Import/Export supports:



AWS Storage Products and Services



Amazon
Simple
Storage
Service



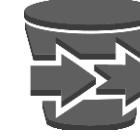
Amazon
Glacier



Amazon
Elastic
Block
Store



AWS
Storage
Gateway

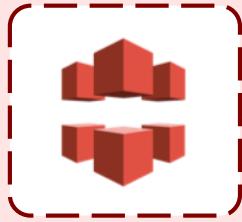


AWS
Import/Export



Amazon
CloudFront

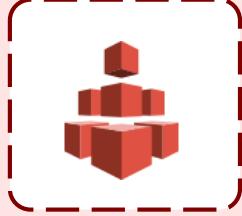
Amazon CloudFront



Amazon
CloudFront

- Easy and cost effective way to **distribute content** to end users
- **Low latency, high data transfer speeds**
- Deliver your entire website, including dynamic, static, streaming, and interactive content using a global network of edge locations

More AWS Storage Products and Services



Amazon
Elastic File
System

- Is a fully managed file storage service
- Is ideal for on-demand scaling of file system capacity and performance
- Supports Network File System version 4 (NFSv4) protocol

Knowledge Check

Q: What AWS service would help support your web application to offload serving static assets and store user uploaded images and video off-instance?

Q: Important application and operations data (logs, user content, etc.) needs to be durably backed up and archived. What AWS service can help?

Q: What AWS service will help with your relational database on EC2 with log and data files that consume 40GB and grow at a rate of 5%/month?

Q: Your web application's static assets – and some of its dynamic content can be cached. What AWS service would support this?

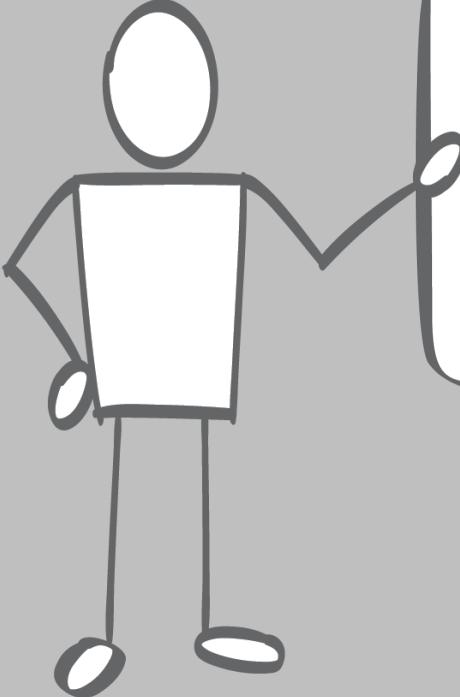
Knowledge Check Answers

Q: What AWS service would help support your web application to offload serving static assets and store user uploaded images and video off-instance? **Amazon S3**

Q: Important application and operations data (logs, user content, etc.) needs to be durably backed up and archived. What AWS service can help? **Amazon Glacier**

Q: What AWS service will help with your relational database on EC2 with log and data files that consume 40GB and grow at a rate of 5%/month? **Amazon EBS**

Q: Your web application's static assets – and some of its dynamic content can be cached. What AWS service would support this? **Amazon CloudFront**



AWS Networking Services & Security

Shared Responsibility—AWS

Customer

AWS

Customer Data

Platform, Applications, Identity & Access Management

Operating System, Network & Firewall Configuration

Client-side Data Encryption &
Data Integrity Authentication

Server-side Encryption
(File System and/or Data)

Network Traffic Protection
(Encryption/Integrity/Identity)

Foundation Services

Compute

Storage

Database

Network

**AWS Global
Infrastructure**

Availability Zones

Regions

**Edge
Locations**

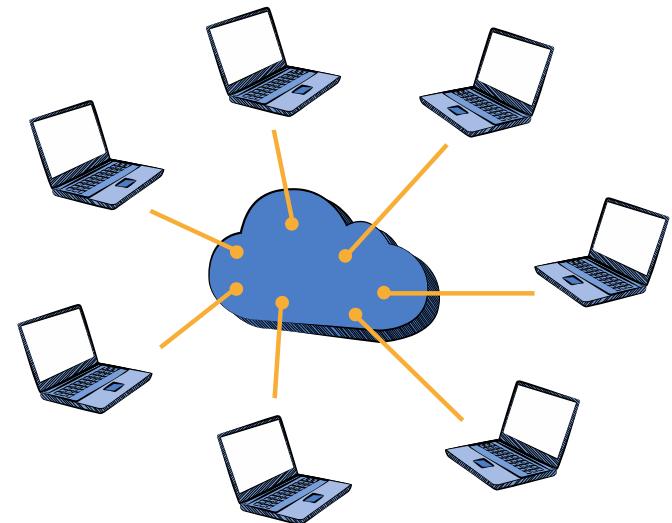
Physical Security

- 24/7 trained security guards
- Locations in nondescript, undisclosed facilities
- Two-factor authentication for ingress
- Authorization for datacenter access



Hardware, Software, and Network

- Automated change-control process
- Bastion servers that record all access attempts
- Firewall and other boundary devices
- AWS monitoring tools



SSL Endpoints

SSL Endpoints

Secure Transmission

Establish secure communication sessions (HTTPS) using SSL

Security Groups

Instance Firewalls

Configure firewall rules for instances using Security Groups

IAM

User Accounts

Create individual IAM accounts so that each of your users has their own AWS security credentials

VPC

Subnet Control

In your Virtual Private Cloud, create low-level networking constraints for resource access, such as public and private subnets, internet gateways, and NATs

Security Groups

SSL Endpoints

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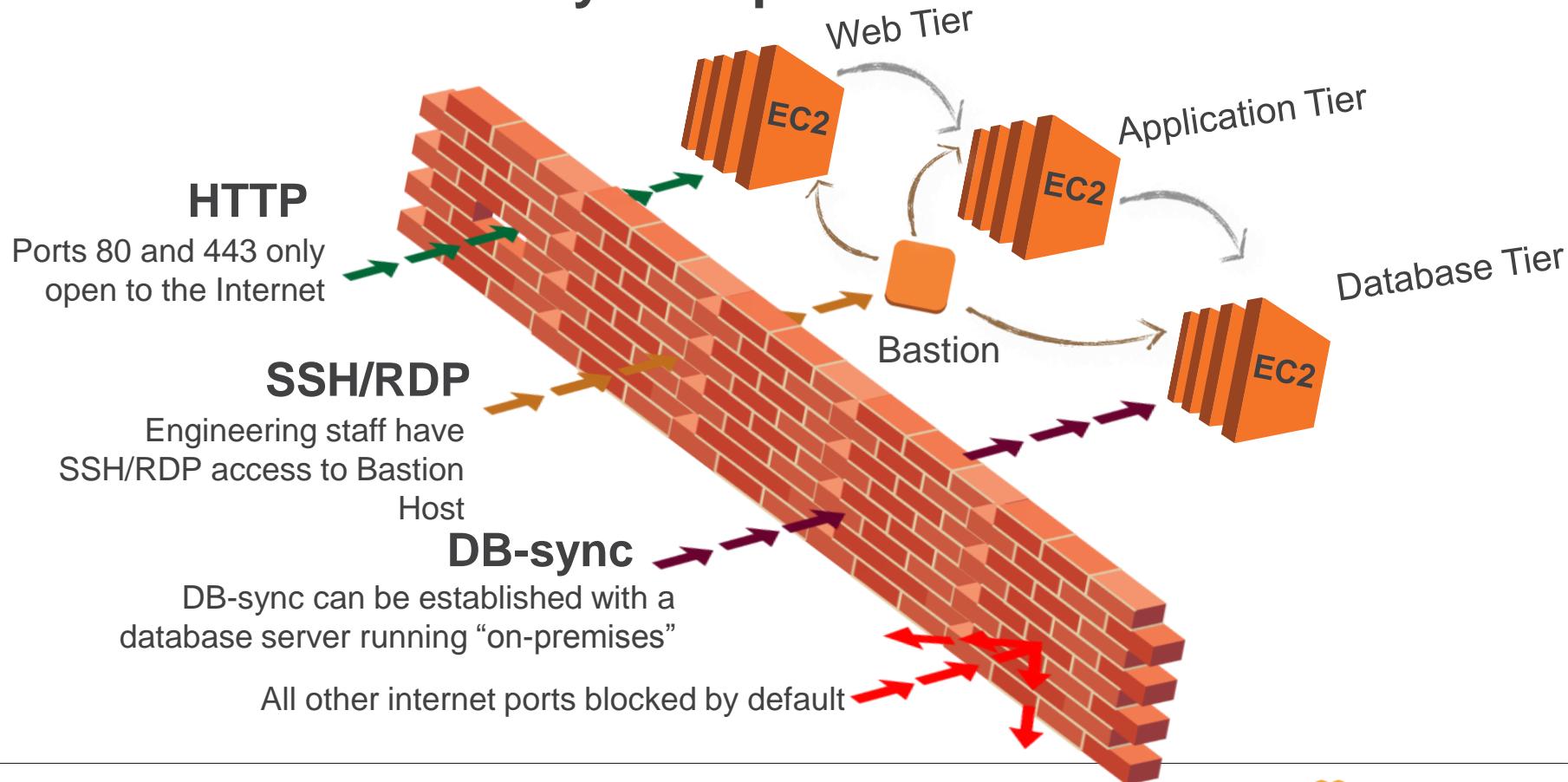
Create individual IAM accounts so that each of your users has their own AWS security credentials

VPC

Subnet Control

In your Virtual Private Cloud, create low-level networking constraints for resource access, such as public and private subnets, internet gateways, and NATs

AWS Multi-tier Security Groups



AWS Identity and Access Management (IAM)

SSL Endpoints

Secure Transmission

Establish secure communication sessions (HTTPS) using SSL

Security Groups

Instance Firewalls

Configure firewall rules for instances using Security Groups

IAM

User Accounts

Create individual IAM accounts so that each of your users has their own AWS security credentials

VPC

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In your Virtual Private Cloud, create low-level networking constraints for resource access, such as public and private subnets, internet gateways, and NATs

Amazon Virtual Private Cloud (VPC)

SSL Endpoints

Secure Transmission

Establish secure communication sessions (HTTPS) using SSL

Security Groups

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Create individual IAM accounts so that each of your users has their own AWS security credentials

VPC

Subnet Control

In your Virtual Private Cloud, create low-level networking constraints for resource access, such as public and private subnets, internet gateways, and NATs

Certifications and Accreditations

- AWS publishes SOC 1 Type II, SOC 2 Type II and SOC 3 reports
- AWS is PCI DSS Level 1 compliant and ISO 27001 certified
- AWS has achieved FedRAMP compliance, received authorization from the U.S. Government
- FISMA Moderate level
- Authorities to Operate (ATOs) under the Defense Information Assurance Certification and Accreditation Program (DIACAP)

AWS CloudTrail

- Records API calls for accounts
- Delivers log files with information about API calls made using the AWS Management Console, AWS SDKs, command line tools, and higher-level AWS services

AWS Management CloudTrail Demo



AWS Networking Products and Services



Amazon
Virtual
Private
Cloud



AWS Direct
Connect



Amazon
Route 53



Elastic
Load
Balancing

Amazon Virtual Private Cloud (VPC)



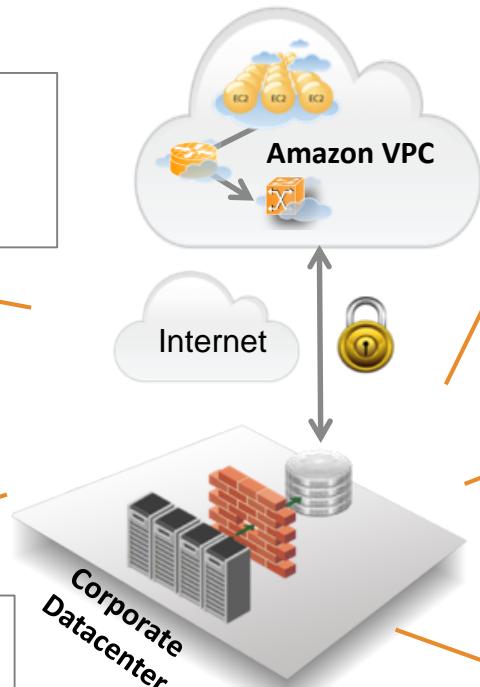
Amazon
VPC

- Provision a **private, isolated section** of the AWS Cloud where you can launch AWS resources in a **virtual network** that you define.
- Have complete control over your virtual networking environment.

Amazon VPC



Create an Amazon VPC and specify its **private IP address range** from any range you choose.



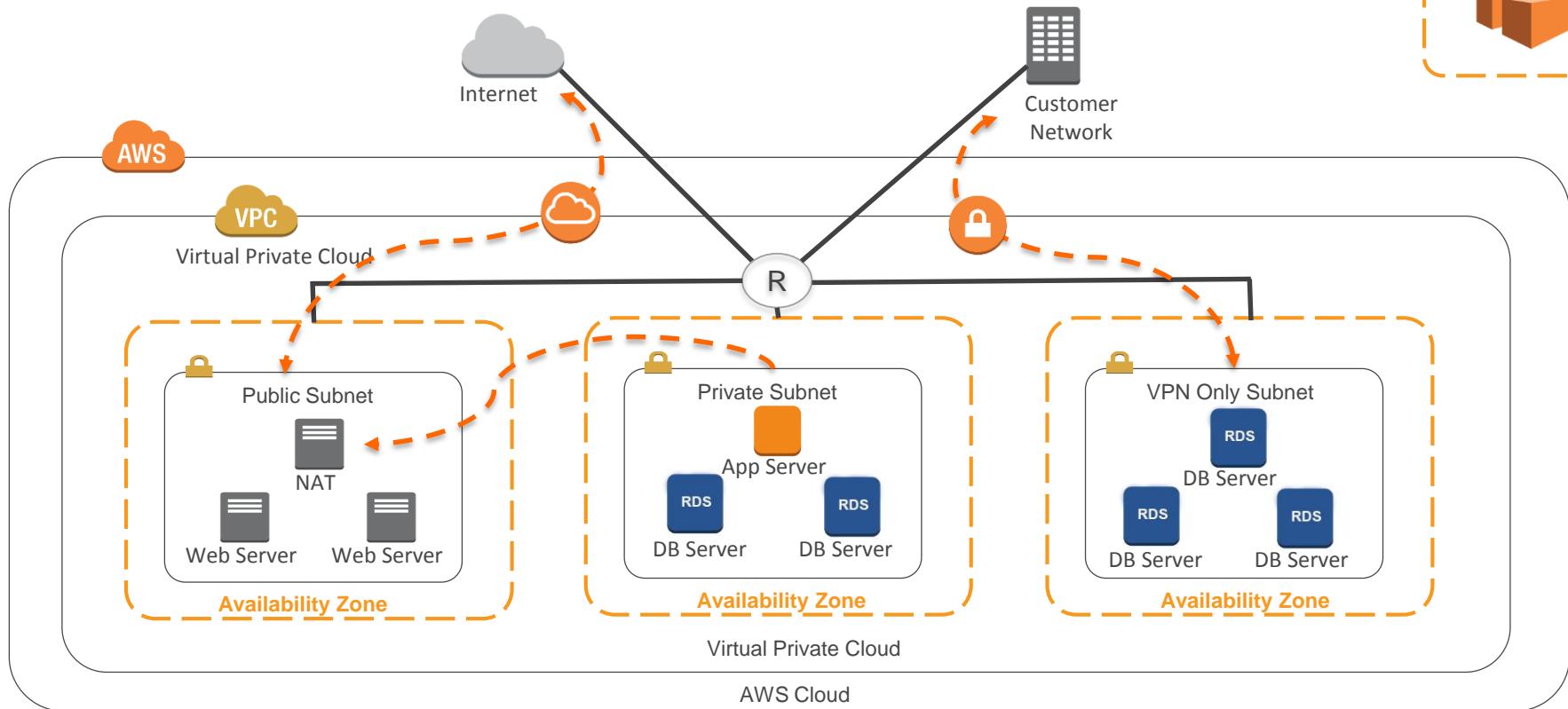
Bridge your Amazon VPC to your own IT infrastructure via an encrypted **VPN connection**.

Divide your VPC's private IP address range into multiple **subnets**.

Control inbound and outbound access to subnets by using **Network Access Control Lists**.

Attach an Amazon **Elastic IP address** to any instance in your VPC so it can be reached directly from the Internet.

Amazon VPC Example



AWS Management VPC & Subnet Demo



AWS Networking Products and Services



Amazon
Virtual
Private
Cloud



AWS Direct
Connect



Amazon
Route 53



Elastic
Load
Balancing

AWS Direct Connect



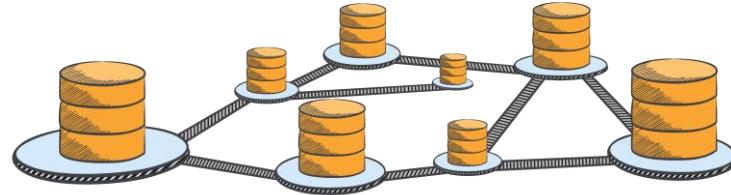
AWS Direct
Connect

- Establish a **dedicated network connection** from your premises to AWS
- Reduce network costs, increase bandwidth throughput and provide a more consistent network experience
- Compatible with all AWS Services

How to Use AWS Direct Connect



1. AWS Direct Connect location
2. Create connection request
3. Confirmation email
4. Provide the Letter of Authorization, Connecting Facility Assignment (LOA-CFA)
5. Configure virtual interfaces



AWS Networking Products and Services



Amazon
Virtual
Private
Cloud



AWS Direct
Connect



Amazon
Route 53



Elastic
Load
Balancing

Amazon Route 53



Amazon
Route 53

- **Route** end users to Internet applications
- Answers DNS queries with **low latency** by using a global network of DNS servers
- Provides **health-checks** to route traffic to healthy endpoints
- Offers **Domain Name Registration**

How to Use Amazon Route 53



- If you don't already have a domain name:
 - Register domain name
 - Automatically creates hosted zones
- If you already have a domain name:
 - Create a hosted zone
 - Transfer your domain name or update DNS servers

AWS Networking Products and Services



Amazon
Virtual
Private
Cloud



AWS Direct
Connect

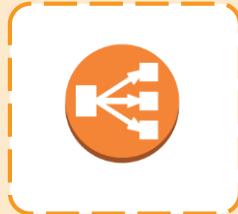


Amazon
Route 53



Elastic
Load
Balancing

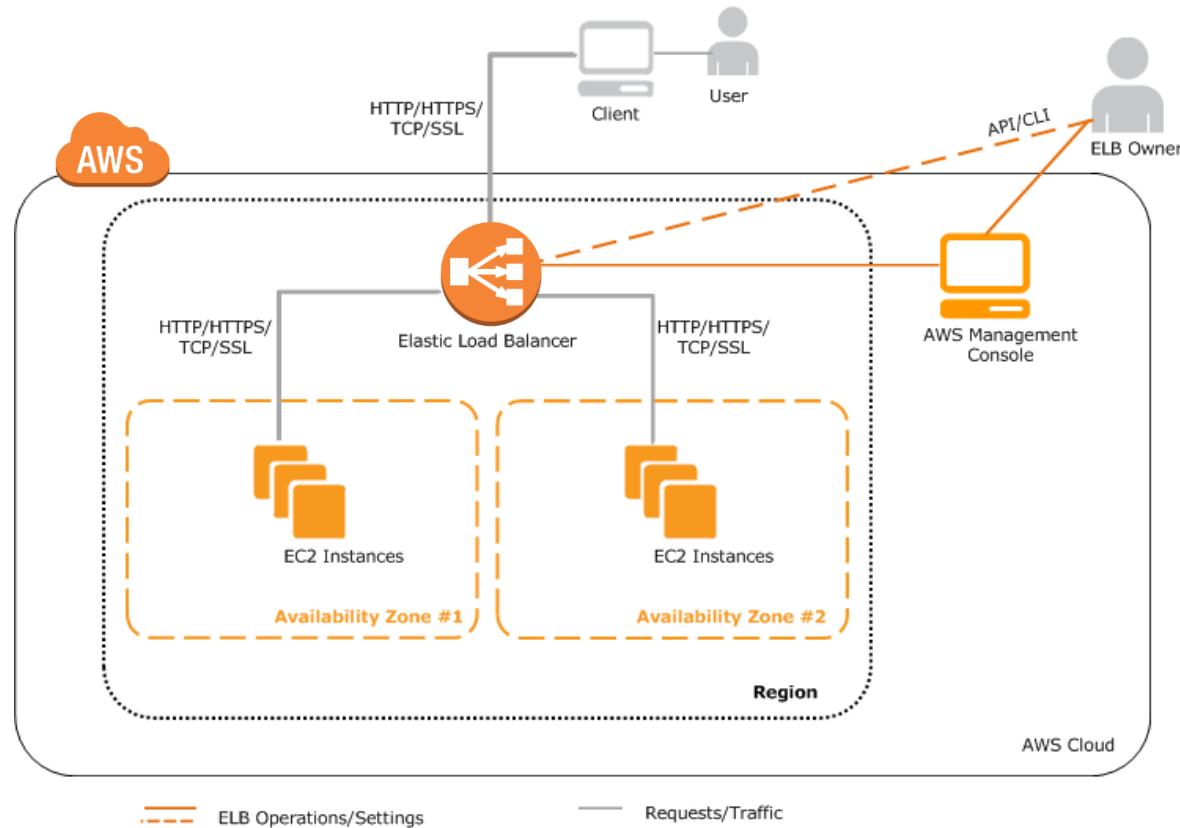
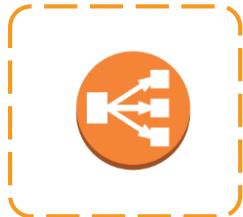
Elastic Load Balancing



Elastic Load
Balancing

- **Distributes** traffic across multiple instances
- Supports **health checks** to detect unhealthy Amazon EC2 instances
- Supports the **routing and load balancing** of HTTP, HTTPS, and TCP traffic to Amazon EC2 instances

Elastic Load Balancing Example



AWS Management ELB Demo



Knowledge Check

Q: You need to allow your web servers to access your application servers on port 8080. What would you use to make this happen?

Q: What do you use to extend your corporate network to Amazon EC2?

Q: What service provides scalable load balancing for your application's public-facing web servers or private application servers?

Q: What service allows you to automatically scale Amazon EC2 capacity out or in based on conditions you define.

Knowledge Check Answers

Q: You need to allow your web servers to access your application servers on port 8080. What would you use to make this happen? **Modify EC2 Security Group**

Q: What do you use to extend your corporate network to Amazon EC2? **VPN/Direct Connect**

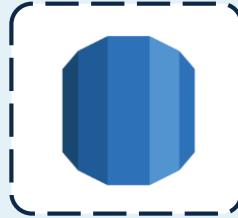
Q: What service provides scalable load balancing for your application's public-facing web servers or private application servers? **Elastic Load Balancing**

Q: What service allows you to automatically scale Amazon EC2 capacity out or in based on conditions you define. **Auto Scaling**

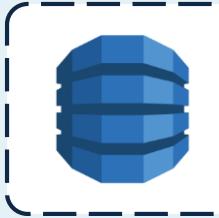


AWS Managed Services & Database

AWS Database Product and Services



Amazon
Relational
Database
Service



Amazon
DynamoDB



Amazon
ElastiCache



Amazon
Redshift

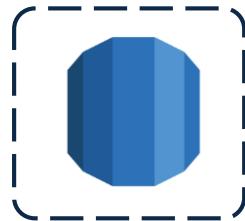
Amazon Relational Database Service (RDS)



Amazon
RDS

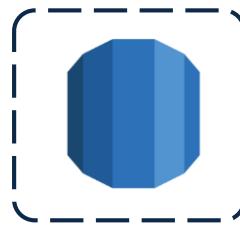
- Cost-efficient and **resizable capacity**
- Manages time-consuming **database administration** tasks
- Access to the full capabilities of **MySQL, PostgreSQL, Oracle, SQL Server, Amazon Aurora** databases

Amazon RDS



- Easy to set up, operate, and scale a **relational database**
- **Automatically patches** the database software and backs up your database
- Ability to **scale the compute resources** or storage capacity associated with your relational database instance via a single API call

Amazon RDS and VPC



- You can select your own IP address range.
- You can create subnets and configure routing and access control lists.
- The basic functionality of Amazon RDS is the same whether it is running in a VPC or not: Amazon RDS manages backups, software patching, automatic failure detection, and recovery.
- There is no additional cost to run your DB instance in a VPC.

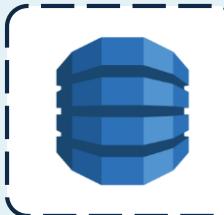
AWS Management RDS Database



AWS Database Product and Services



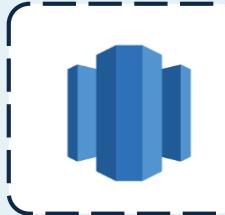
Amazon
Relational
Database
Service



Amazon
DynamoDB



Amazon
ElastiCache



Amazon
Redshift

Amazon DynamoDB



Amazon
DynamoDB

- Store any amount of data with **no limits**
- Fast, predictable performance using **SSDs**
- Easily provision and change the **request capacity** needed for each table

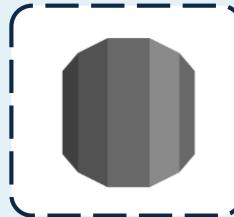
Amazon RDS and Amazon DynamoDB

Factors	Relational (Amazon RDS)	NoSQL (Amazon DynamoDB)
Application Type	<ul style="list-style-type: none">Existing database appsBusiness process–centric apps	<ul style="list-style-type: none">New web-scale applicationsLarge number of small writes and reads
Application Characteristics	<ul style="list-style-type: none">Relational data models, transactionsComplex queries, joins, and updates	<ul style="list-style-type: none">Simple data models, transactionsRange queries, simple updates
Scaling	Application or DBA–architected (clustering, partitions, sharding)	Seamless, on-demand scaling per application needs
QoS	<ul style="list-style-type: none">Performance—depends on data model, indexing, query, and storage optimizationReliability and availability—Managed Durability—Managed	<ul style="list-style-type: none">Performance—Automatically optimized by the systemReliability and availability—ManagedDurability—Managed

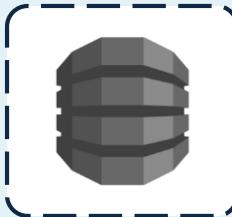
Database Considerations

If You Need	Consider Using
A relational database service with minimal administration	Amazon RDS , a fully managed service that offers a choice of MySQL, PostgreSQL, Oracle, SQL Server, or Amazon Aurora database engines, scale compute and storage, Multi-AZ availability, and more. 
A fast, highly scalable NoSQL database service	Amazon DynamoDB , a fully managed service that offers extremely fast performance, seamless scalability and reliability, low cost, and more. 
A relational database or NoSQL database you can manage on your own	Your choice of AMIs on Amazon EC2 and Amazon EBS that provide scale compute and storage, complete control over instances, and more. 

AWS Database Product and Services



Amazon
Relational
Database
Service



Amazon
DynamoDB



Amazon
ElastiCache



Amazon
Redshift

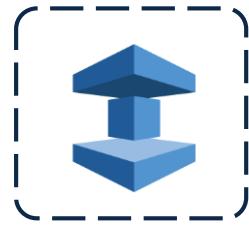
Amazon ElastiCache



Amazon
ElastiCache

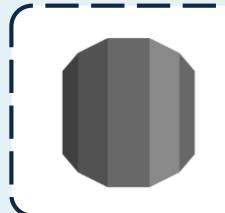
- Memcached compliant and Redis compliant cache cluster on demand
- Manages patching, cache node failure detection and recovery
- Caches in front of Database Tier instances
- A cache to be used with other AWS Services

Amazon ElastiCache Facts

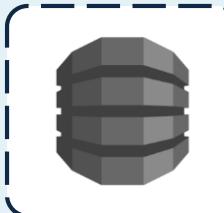


- Improves latency and throughput for many read-heavy application workloads.
- Existing applications that use Memcached or Redis can use ElastiCache with almost no modification.
- ElastiCache Auto Discovery feature lets your applications identify all of the nodes in a cache cluster.

AWS Database Product and Services



Amazon
Relational
Database
Service



Amazon
DynamoDB



Amazon
ElastiCache



Amazon
Redshift

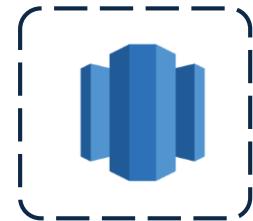
Amazon Redshift



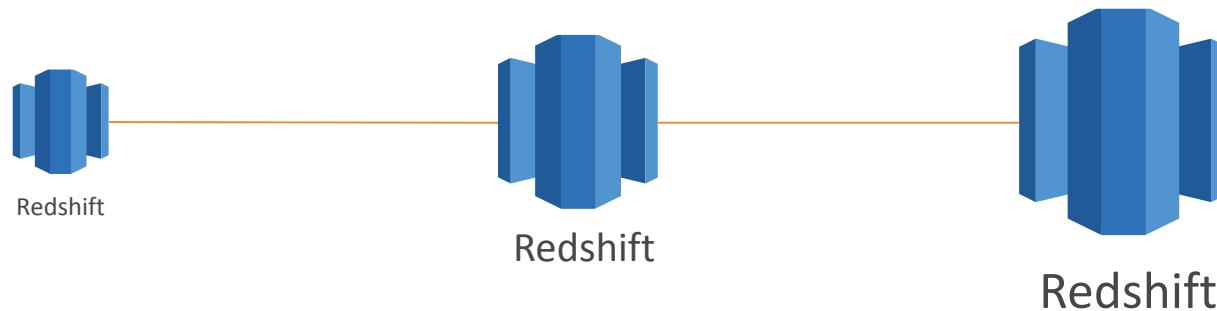
Amazon
Redshift

- **Petabyte-scale** service that manages all the work needed to set up, operate, and scale a data warehouse cluster
- Continuously monitors the health of the cluster and replaces any component
- Dramatically reduces I/O

Amazon Redshift Facts



- Amazon Redshift manages all the work needed
- Simple way to scale a cluster to improve performance
- Continuously monitors the health of the cluster



Knowledge Check

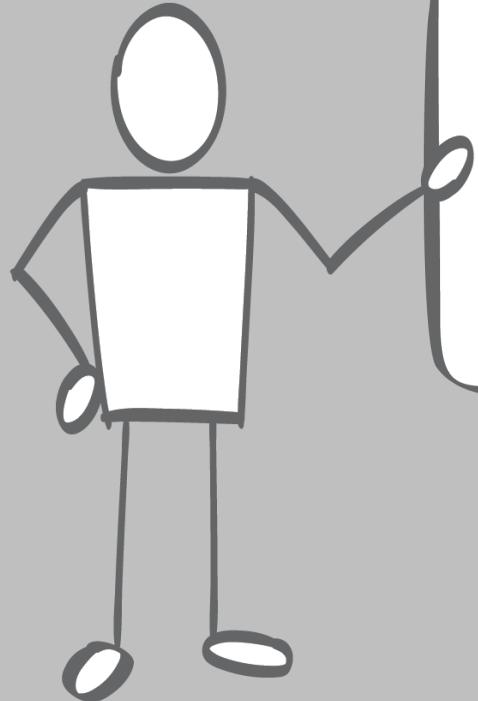
Q: What service is designed to eliminate the undifferentiated heavy lifting often involved with administering a relational database?

Q: What service is designed to eliminate the undifferentiated heavy lifting often involved with administering a Memcached or Redis cluster?

Knowledge Check Answers

Q: What service is designed to eliminate the undifferentiated heavy lifting often involved with administering a relational database? **Amazon RDS**

Q: What service is designed to eliminate the undifferentiated heavy lifting often involved with administering a Memcached or Redis cluster? **Amazon ElastiCache**



AWS Deployment & Management

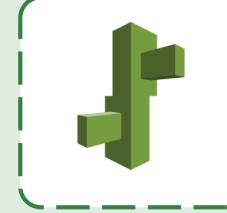
Deployment & Management Product and Services



AWS Identity
and Access
Management



Amazon
CloudWatch



AWS Elastic
Beanstalk



AWS
Cloud-
Formation



AWS
OpsWorks

AWS Identity and Access Management (IAM)



AWS IAM

- Create and manage AWS **users and groups**
- Enables **identity federation** between your corporate directory and AWS services
- Provides **fine-grained access control** to AWS resources

Using AWS IAM

1

Manage AWS IAM users and their access

Create users in AWS IAM, assign them individual security credentials or request temporary security credentials to provide users access to AWS.

Manage permissions to control which operations a user can perform.

2

Manage federated users and their permissions

Enable identity federation to allow existing identities (e.g., users) in your enterprise to access the AWS Management Console, to call AWS APIs, and to access resources, without the need to create an IAM user for each identity.

3

Manage AWS IAM roles and their permissions

Create roles in AWS IAM, and manage permissions to control which operations can be performed by the entity, or AWS service, that assumes the role.

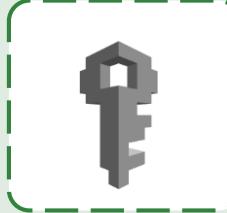
Define which entity is allowed to **assume the role**.



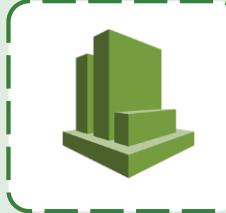
AWS Management IAM Demo



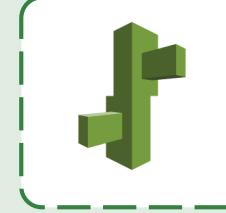
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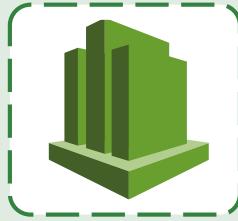


AWS
Cloud-
Formation



AWS
OpsWorks

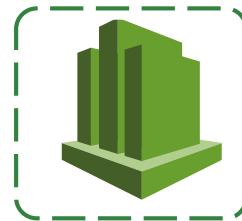
Amazon CloudWatch



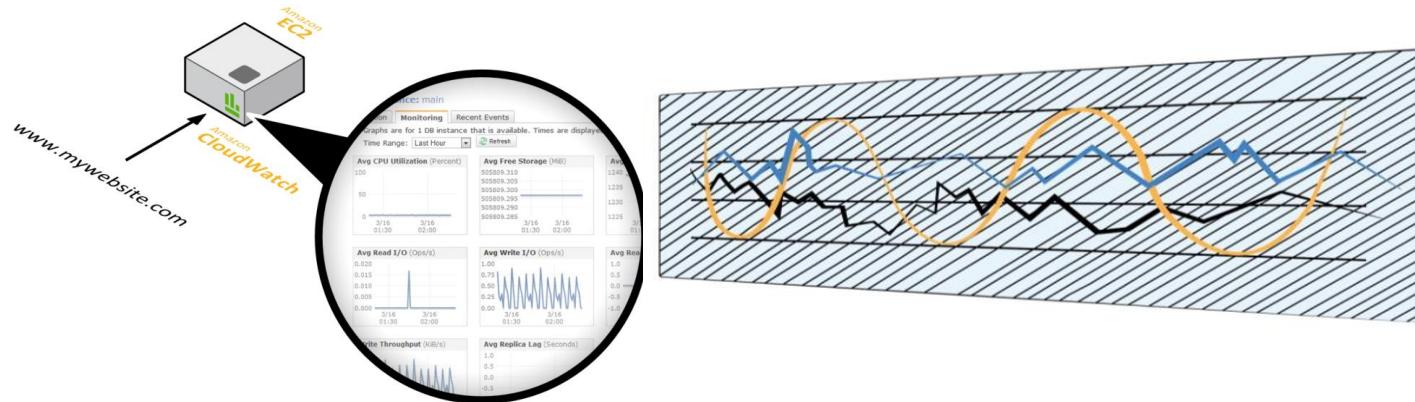
Amazon
CloudWatch

- **Visibility** into resource utilization, operational performance, and overall demand patterns
- **Custom application-specific** metrics of your own
- **Accessible** via AWS Management Console, APIs, SDK, or CLI

Amazon CloudWatch Facts



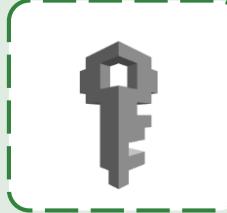
- Monitor other AWS resources
 - View graphics and statistics
- Set Alarms



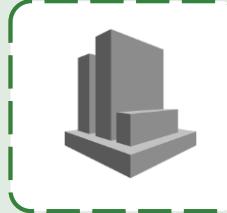
AWS Management CloudWatch Demo



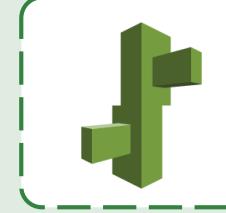
Deployment & Management Product and Services



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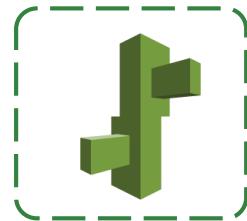
AWS Elastic Beanstalk



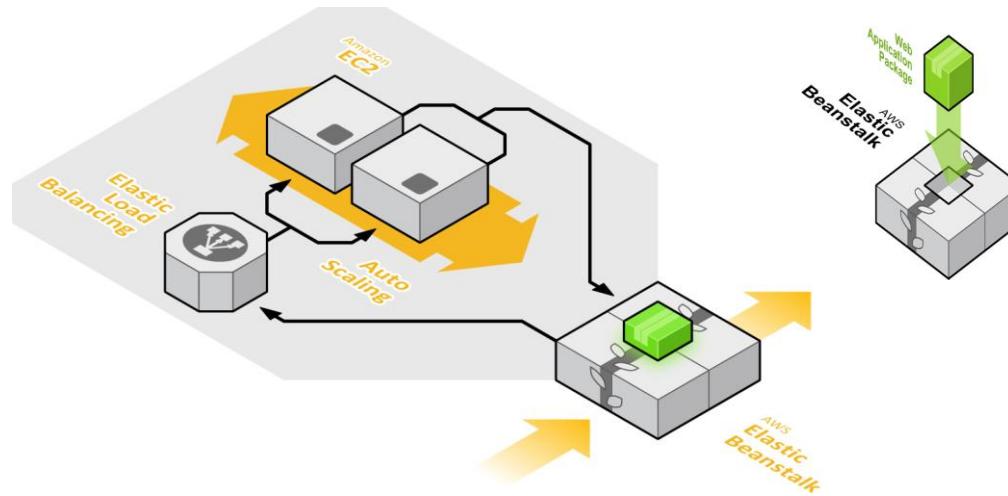
AWS Elastic
Beanstalk

- Easy-to-use service for **deploying and scaling** web applications and services
- **Automatically handles** the deployment details
- Retain **full control** over the AWS resources powering your application

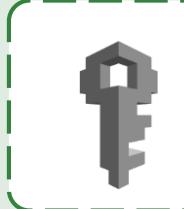
AWS Elastic Beanstalk Facts



- Quickly deploy and manage applications in the AWS cloud without worrying about the infrastructure that runs those applications.
- Reduce management complexity without restricting choice or control.



Deployment & Management Product and Services



AWS Identity
and Access
Management



Amazon
CloudWatch



AWS Elastic
Beanstalk

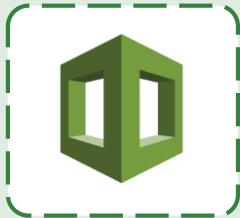


AWS
Cloud-
Formation



AWS
OpsWorks

AWS CloudFormation



AWS
CloudFormation

- **Create templates** of stack of resources
- Deploy stack from template with runtime parameters
- Use templates as a starting point or **create your own**

AWS CloudFormation Example



- Templates are simple JSON-formatted text files
- CloudFormer supports generating templates from running environments

```
"Resources" : {  
    "WebServer" : {  
        "Type" : "AWS::EC2::Instance",  
        "Properties" : {  
            "SecurityGroups" : [ { "Ref" : "WebSecurityGroup" } ],  
            "ImageId" : { "Fn::FindInMap" : [ "RegionMap", { "Ref" : "AWS::Region" }, "AMI" ] },  
            "Tags" : [{  
                "Key" : "MyTag",  
                "Value" : "TagValue"  
            }]  
        }  
    },  
},
```

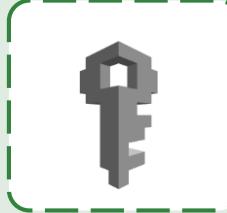
AWS CloudFormation Templates



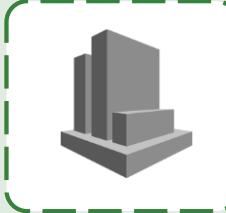
- Deploy and update a template and its associated collection of resources, “called a stack” via the AWS Management Console, AWS CloudFormation command line tools, or APIs.
- AWS CloudFormation is available at no additional charge, and you pay only for the AWS resources needed.



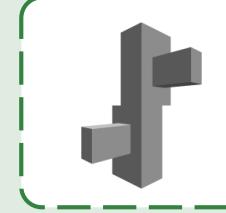
Deployment & Management Product and Services



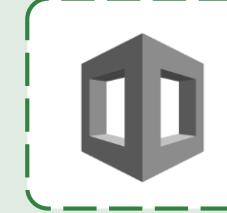
AWS Identity
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Amazon
CloudWatch



AWS Elastic
Beanstalk



AWS
Cloud-
Formation



AWS
OpsWorks

AWS OpsWorks



AWS
OpsWorks

- **Flexible application management solution**
- Leverage **sample templates** or build your own
- Includes automation to scale your application
- **Configuration as code** using Chef recipes and/or Bash scripts

AWS OpsWorks Elements

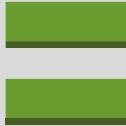


Stack



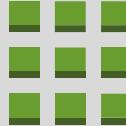
A **stack** represents the computer infrastructure and the applications that you want to manage together.

Layers



A **layer** defines how to set up and configure a set of instances and related resources.

Instances



Decide how to scale manually, with 24/7 **instances**, or automatically, with load-based or time-based instances.

Apps



Then deploy your **app** to specific instances and customize the deployment with Chef recipes.

Knowledge Check

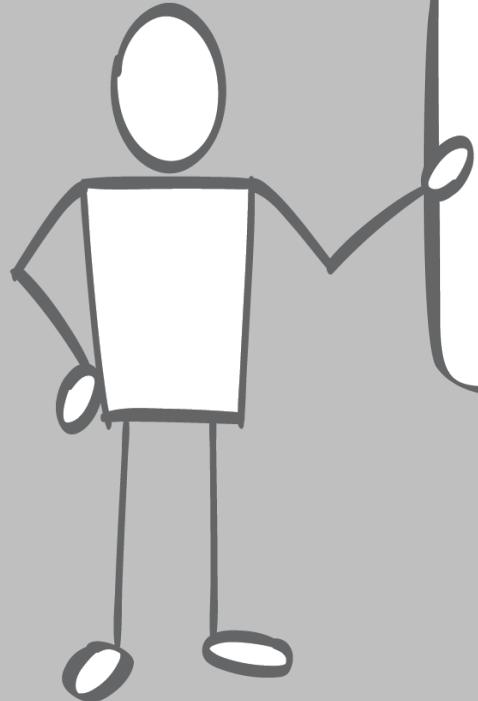
Q: Your web application needs credentials and authorization to read/write a Amazon DynamoDB table and an Amazon S3 bucket. What AWS service would you use?

Q: What service would you use if your developers need a simple, scalable location to easily deploy their Java, .NET, Python, PHP, or Ruby applications?

Knowledge Check Answers

Q: Your web application needs credentials and authorization to read/write a Amazon DynamoDB table and an Amazon S3 bucket. What AWS service would you use? **AWS IAM**

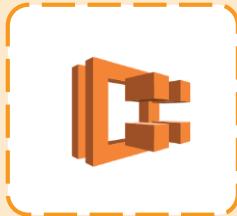
Q: What service would you use if your developers need a simple, scalable location to easily deploy their Java, .NET, Python, PHP, Ruby, and Docker applications? **Amazon Elastic Beanstalk**



Appendix

AWS Mobile & More

More AWS Compute Products



Amazon EC2
Container Service

- ❖ Supports Docker containers
- ❖ Enables you to run applications on managed cluster of EC2 instances



AWS Lambda

- ❖ Runs code in response to events
- ❖ Automatically manages compute resources

More Deployment & Management Product and Services



AWS
CodeDeploy

- Automates code deployment
- Enables you to rapidly release features

AWS Analytics Product & Services



Amazon Kinesis

- Collect and process hundreds of terabytes of data per hour from hundreds of thousands of sources
- Build real-time dashboards



AWS Data Pipeline

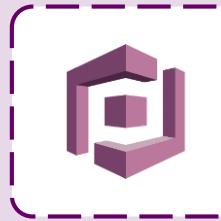
- Access data where it's stored, transform and process it at scale
- Create complex data processing workloads



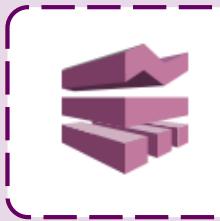
Amazon Elastic MapReduce

- Is highly scalable
- Utilizes a hosted Hadoop framework

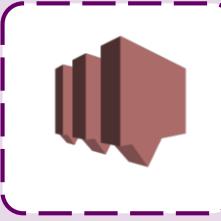
AWS Mobile Products & Services



Amazon
Cognito

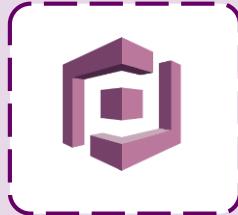


Amazon
Mobile
Analytics



Amazon
Simple
Notification
Service

Amazon Cognito

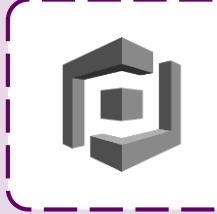


Amazon
Cognito

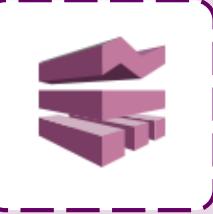
- User-data synchronization and identity service
- Securely store and sync user app data in the AWS Cloud
- Manage and synchronize app data for your users across mobile devices
- Allows to **save app data locally on the device** to work offline



AWS Mobile Products & Services



Amazon
Cognito



Amazon
Mobile
Analytics



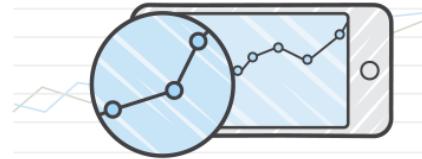
Amazon
Simple
Notification
Service

Amazon Mobile Analytics

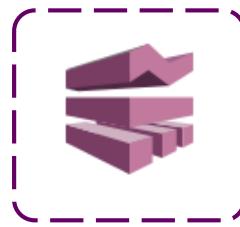


Amazon
Mobile Analytics

- **Usage reports** within 60 minutes
- Built to scale with your app
- Access data in the AWS Management Console



Using Amazon Mobile Analytics



- Free for up to 100 million events per month
- Integrated with Amazon Cognito
- Graphical Reports: Overview, Active Users, Sessions, Revenue, Retention, and Custom Events



AWS Mobile Products & Services



Amazon
Cognito

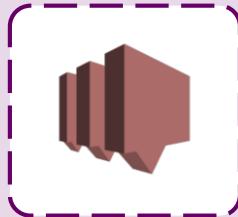


Amazon
Mobile
Analytics



Amazon
Simple
Notification
Service

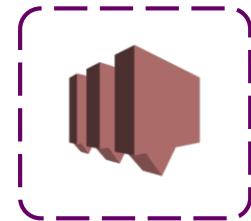
Amazon Simple Notification Service (SNS)



Amazon
Mobile SNS

- Push notifications to smart devices
- Notifications by SMS text or email
- Messages stored across Availability Zones

Amazon Mobile SNS Pricing



- No upfront costs and you can pay as you go
- Get started with a SNS free tier
- First 1 million Amazon SNS requests per a month are free



AWS Applications Products & Services



Amazon WorkDocs



Amazon
WorkDocs

- Fully managed, secure enterprise storage and **sharing service**
- **Strong administrative controls** and feedback capabilities
- Access and sync from any device
- **Free trial** for up to 50 users

Using Amazon WorkDocs



Low Cost



Secure



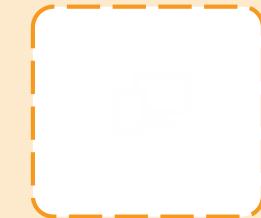
Integrate



AWS Applications Products & Services



Amazon WorkSpaces



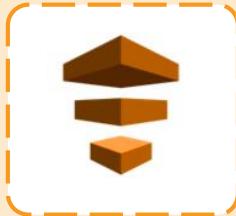
Amazon
WorkSpaces

- Easily provision **cloud-based desktop**
- Multiple **device options**
- **Infinite users**
- Access to **persistent storage**

AWS Analytics Product & Services



AWS Data Pipeline



AWS Data
Pipeline

- Access data where it's stored, transform and process it at scale
- Create complex data processing workloads
- No need to create failure notification systems
- Move previously locked up on-premises data silos

AWS Analytics Product & Services



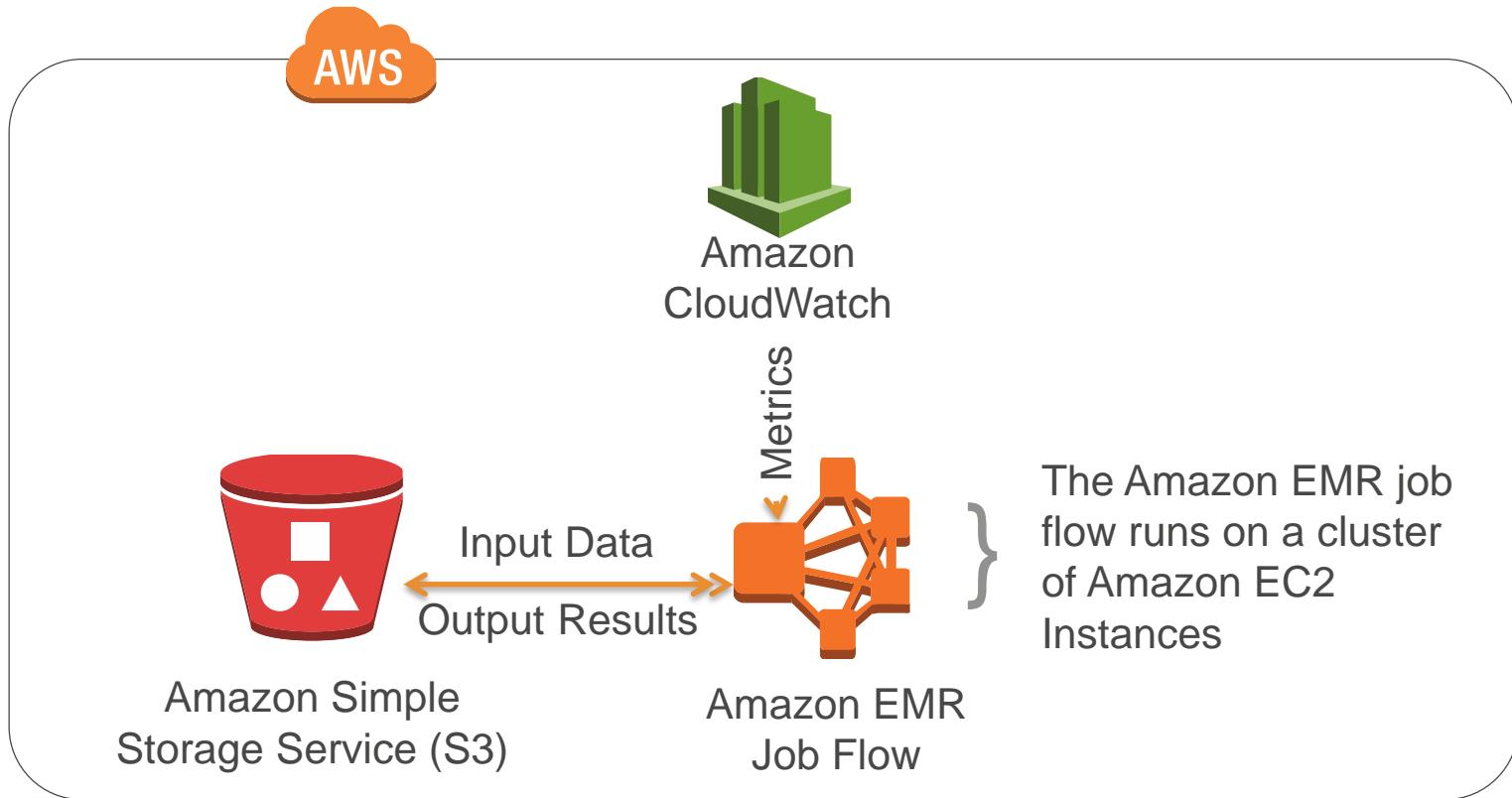
Amazon Elastic MapReduce (EMR)



Amazon
EMR

- **Highly scalable**
- Utilizes a hosted **Hadoop** framework
- Easily and cost-effectively **processes vast amounts of data**

Amazon EMR Example



AWS Analytics Product & Services



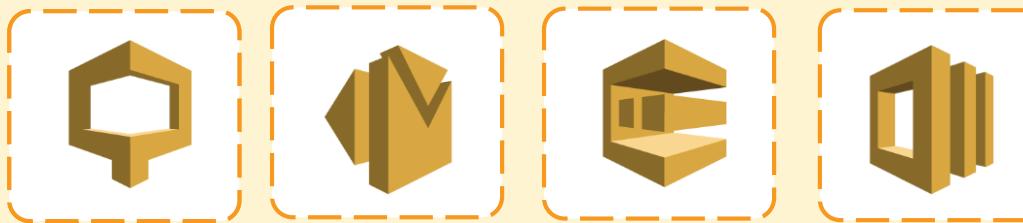
Amazon Kinesis



Amazon
Kinesis

- Collect and process hundreds of terabytes of data per hour from hundreds of thousands of sources
- **Build real-time dashboards**
- Capture exceptions and generate alerts
- Send data to a variety of other services

AWS App Services



Amazon
Cloud-
Search

Amazon
Simple Email
Service

Amazon
Simple
Queue
Service

Amazon
Simple
Workflow

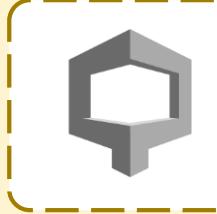
Amazon CloudSearch



Amazon
CloudSearch

- Supports 34 languages
- **Popular search features**
- Seamlessly scales to meet your needs
- Easily change your search parameters
- Apply new settings at any time without having to re-upload your data

AWS App Services



Amazon
Cloud-
Search



Amazon
Simple Email
Service



Amazon
Simple
Queue
Service



Amazon
Simple
Workflow

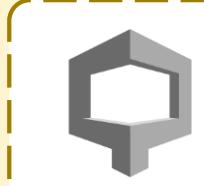
Amazon Simple Email Service (SES)



Amazon
SES

- **Transactional email**, marketing messages, or any other type of high-quality content
- **Real-time access** to your sending statistics
- SMTP interface or calling an API
- High availability and data durability

AWS App Services



Amazon
Cloud-
Search



Amazon
Simple Email
Service



Amazon
Simple
Queue
Service



Amazon
Simple
Workflow

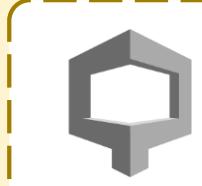
Amazon Simple Queue Service (SQS)



Amazon
SQS

- Decouple the components of cloud application
- **Transmit any volume of data**, at any level of throughput, without losing messages
- Offload the administrative burden
- Unlimited number of services to read and write

AWS App Services



Amazon
Cloud-
Search



Amazon
Simple Email
Service



Amazon
Simple
Queue
Service



Amazon
Simple
Workflow

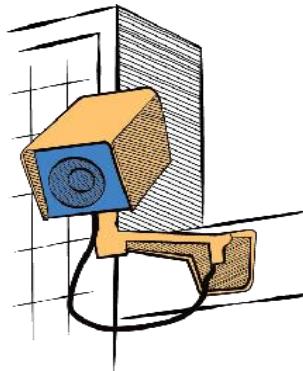
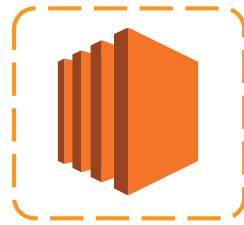
Amazon Simple Workflow (SWF)



Amazon
SWF

- ❖ State tracker and task coordinator in the cloud
- ❖ Separation between the control flow of your background job's **stepwise logic**
- ❖ Scales with your applications usage
- ❖ No manual administration of the workflow service is required

Amazon EC2 Security Groups



EC2-Classic	EC2-VPC
Inbound Only	Inbound and Outbound
TCP, UDP, ICMP only	Any Internet Protocol
Assigned at launch	Can be assigned or removed at any time, including when running
Modify the rules in the security group	Modify the rules in the security group