

# AWS Design and Automation

## Module 1: Cloud Compute Basics

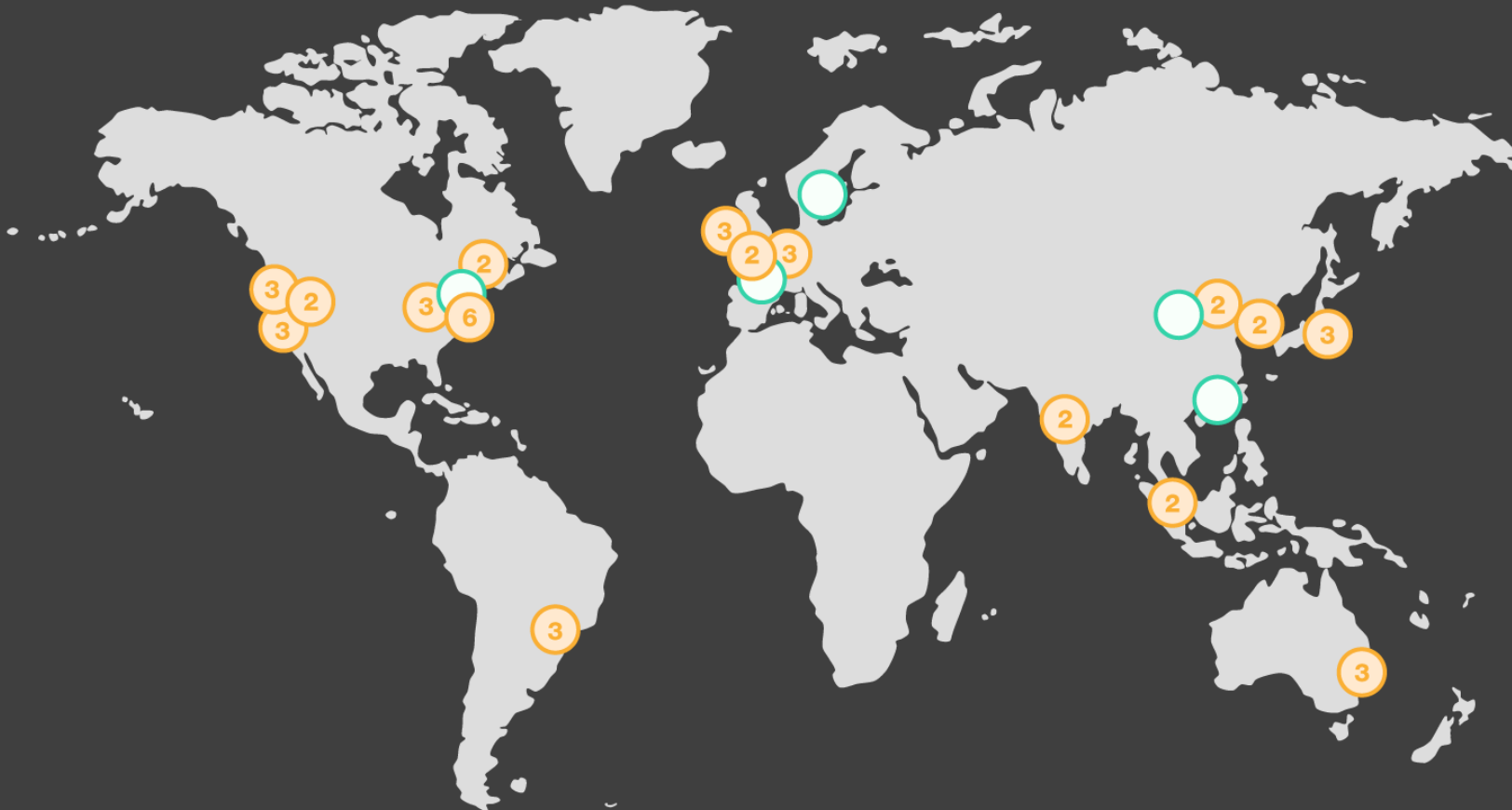
### Topic 4: AWS Services Overview

Mohanraj Shanmugam

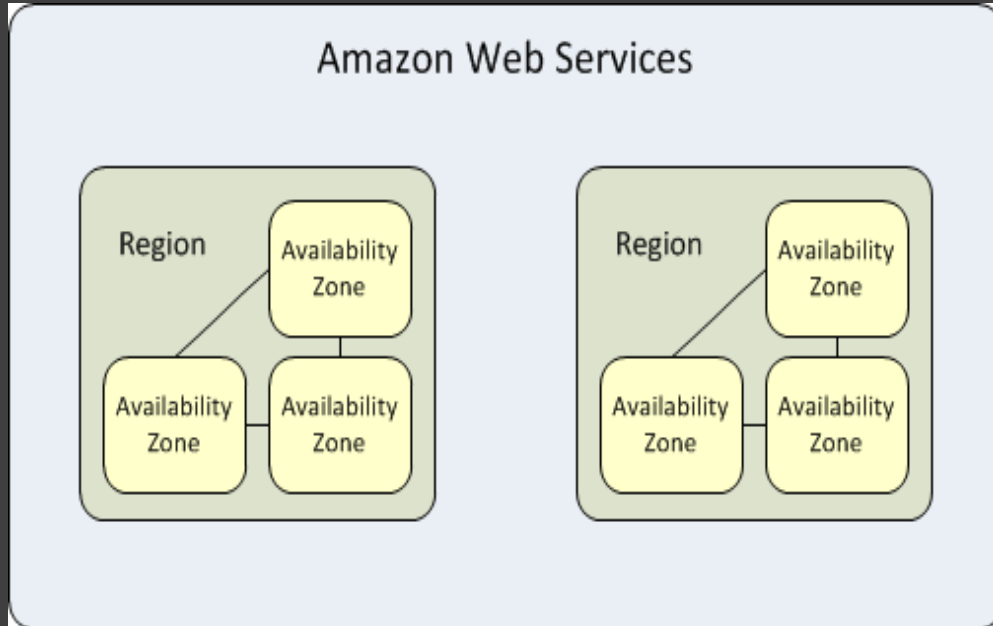
# AWS Regions and Availability Zones

# Amazon Web Services Regions

- Amazon Web Services (AWS) is a leading Cloud compute service provider to provide cloud services across 16 regions in the world
- A Region is a physical location in the world where we have multiple Availability Zones.
- <https://aws.amazon.com/about-aws/global-infrastructure/regional-product-services/>

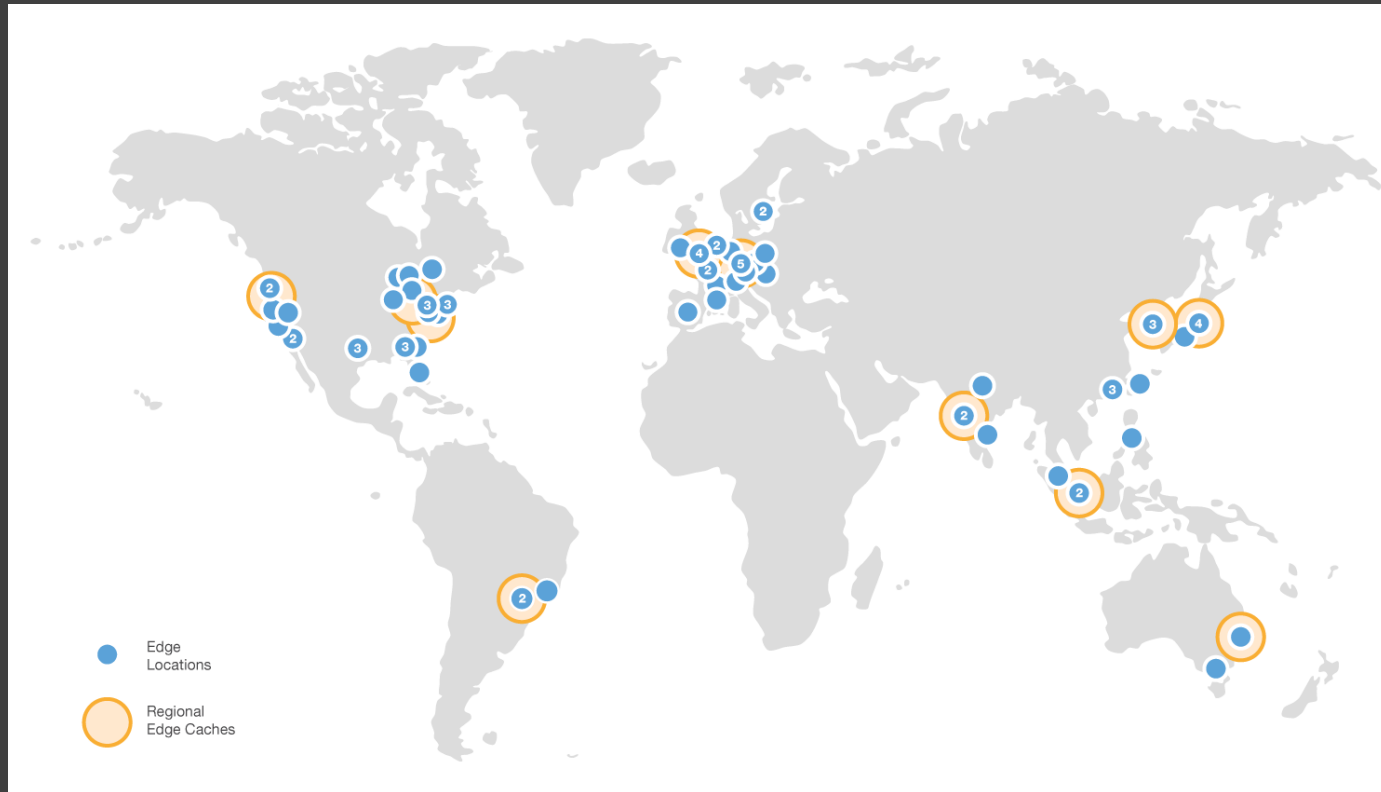


# Availability Zones



- **Availability Zone** is a AWS Datacenter location with redundant power, networking and connectivity, housed in separate facilities.
- The AWS Cloud operates 30 Availability Zones within 11 geographic Regions around the world.
- Each region have from 2 availability zone to 6 availability Zone
- Availability Zones are connected to each other with fast, private fiber-optic networking, enabling you to easily architect applications that automatically fail-over between Availability Zones without interruption.
- Refer the AWS individual services to understand the what are data gets replicated across AZs

# AWS Pops



- AWS Pops are Network edge locations where they provide connectivity or content delivery near to the user as possible
- Amazon CloudFront, Amazon Route 53, and AWS WAF services are offered at AWS Edge Locations
- There are now a total of 79 edge locations and 11 regional edge caches across 22 countries and 49 cities

# AWS Region Replication

- you can also choose to increase redundancy and fault tolerance further by replicating data between geographic Regions.
- You can do so using both private, high speed networking and public internet connections to provide an additional layer of business continuity, or to provide low latency access across the globe.
- Refer Individual services for what is replicated across region.

# AWS Facts

- Availability zone is a Highly available Datacenter
- Amazon operates at least 50+ data centers in its global network, with another 10 to 15 on the drawing board.
- It also operates an edge content delivery network to support its CloudFront CDN, which stores data in about 70 edge nodes around the world.
- AWS is the overwhelming (cloud computing) market share leader, with more than five times the compute capacity in use than the aggregate total of the other 14 providers
- AWS keep the size of data centers to less than 100,000 servers per data center

# AWS Facts

- Amazon leases buildings from a number of wholesale data center providers, including Digital Realty Trust and Corporate Office Properties Trust.
- In recent years Amazon has begun focusing on new construction, which provides a “greenfield” that can be customized to support all elements of its designs, from the grid to the server. In Oregon, Amazon has used pre-fabricated “modular” data center components to accelerate its expansion.



# AWS Facts

- Amazon offers several EC2 instance types featuring these custom chips, a souped-up version of the Xeon E5 processor based on Intel's Haswell architecture and 22-nanometer process technology. Different configurations offer optimizations for compute intensive, memory intensive or IOPS intensive applications.
- AWS designs its own software and hardware for its networking
- Availability Zone is isolated from one another, but close enough for low-latency network connections. Amazon says its zones are typically 1 to 2 milliseconds apart .
- AZs are in a different flood zone and a different geographical area, connected to different power grids

# AWS Services Overview

# AWS Storage & Content Delivery Service

S3



Bucket



Bucket with  
Objects



Object



Glacier



Glacier Archive



Glacier Vault



Cloud Front



Download  
Distribution



Streaming  
Distribution



Edge Location



Storage Gateway



Virtual Tape Library



Non-Cached  
Volume



Cached Volume



EFS



Snowball



Amazon Elastic Block Store



Volume



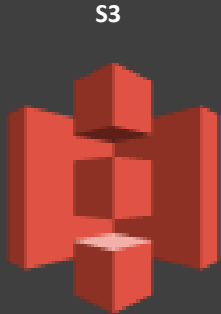
Snapshot



AWS Import/Export



# Simple Storage Service (S3)

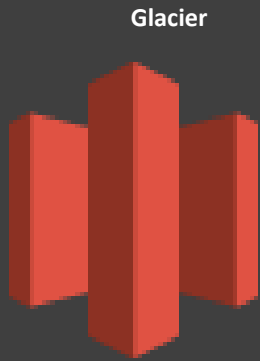


- Amazon Simple Storage Service (Amazon S3), provides developers and IT teams with secure, durable, highly-scalable object storage.
- Amazon S3 is easy to use, with a simple web service interface to store and retrieve any amount of data from anywhere on the web.
- With Amazon S3, you pay only for the storage you actually use. There is no minimum fee and no setup cost.
- Introduction Videos
  - <https://www.youtube.com/watch?v=rKpKHulqYQQ>

# Simple Storage Service (S3)

- Use Cases of Amazon S3
  - **Backup and Storage** – Provide data backup and storage services for others.
  - **Application Hosting** – Provide services that deploy, install, and manage web applications.
  - **Media Hosting** – Build a redundant, scalable, and highly available infrastructure that hosts video, photo, or music uploads and downloads.
  - **Software Delivery** – Host your software applications that customers can download.

# Amazon Glacier



- Amazon Glacier is a secure, durable, and extremely low-cost storage service for data archiving and long-term backup.
- Customers can reliably store large or small amounts of data for as little as \$0.007 per gigabyte per month, a significant savings compared to on-premises solutions.
- To keep costs low, Amazon Glacier is optimized for infrequently accessed data where a retrieval time of several hours is suitable.
- Introduction Video
  - <https://www.youtube.com/watch?v=PUVX84xbwCI>

# Elastic Block Storage

Amazon Elastic Block Store



- Amazon Elastic Block Store (Amazon EBS) provides persistent block level storage volumes for use with Amazon EC2 instances in the AWS Cloud.
- Each Amazon EBS volume is automatically replicated within its Availability Zone to protect you from component failure, offering high availability and durability.
- Amazon EBS volumes offer the consistent and low-latency performance needed to run your workloads.
- With Amazon EBS, you can scale your usage up or down within minutes – all while paying a low price for only what you provision.
- Introduction Videos
  - <https://www.youtube.com/watch?v=DKftR47Ljvw>

# EBS Snapshot

EBS Snapshot

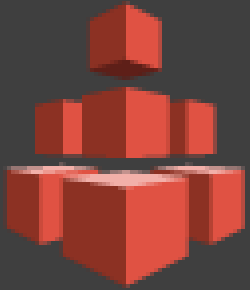


- Amazon EBS provides the ability to save point-in-time snapshots of your volumes to Amazon S3.
- Amazon EBS Snapshots are stored incrementally: only the blocks that have changed after your last snapshot are saved, and you are billed only for the changed blocks.
- If you have a device with 100 GB of data but only 5 GB has changed after your last snapshot, a subsequent snapshot consumes only 5 additional GB and you are billed only for the additional 5 GB of snapshot storage, even though both the earlier and later snapshots appear complete.
- When you delete a snapshot, you remove only the data not needed by any other snapshot. All active snapshots contain all the information needed to restore the volume to the instant at which that snapshot was taken. The time to restore changed data to the working volume is the same for all snapshots.



# Elastic File Storage

## EFS



- Amazon Elastic File System (Amazon EFS) is a file storage service for Amazon Elastic Compute Cloud (Amazon EC2) instances.
- Amazon EFS is easy to use and provides a simple interface that allows you to create and configure file systems quickly and easily.
- With Amazon EFS, storage capacity is elastic, growing and shrinking automatically as you add and remove files, so your applications have the storage they need, when they need it.
- Amazon EFS supports the Network File System version 4 (NFSv4) protocol, so the applications and tools that you use today work seamlessly with Amazon EFS.
- Multiple Amazon EC2 instances can access an Amazon EFS file system at the same time, providing a common data source for workloads and applications running on more than one instance.
- With Amazon EFS, you pay only for the storage used by your file system. You don't need to provision storage in advance and there is no minimum fee or setup cost.
- Amazon EFS is designed for a wide variety of use cases like content repositories, development environments, and home directories. With on-demand scaling and performance, Amazon EFS is an ideal solution for Big Data applications.
- It is replicated across the Availability zone within a region
- Introduction videos
  - [https://www.youtube.com/watch?v=bPpKV\\_6MFU](https://www.youtube.com/watch?v=bPpKV_6MFU)

# Storage Gateway

Storage Gateway



- The AWS Storage Gateway is a service connecting an on-premises software appliance with cloud-based storage to provide seamless and secure integration between an organization's on-premises IT environment and AWS's storage infrastructure.
- The service allows you to securely store data in the AWS cloud for scalable and cost-effective storage.
- The AWS Storage Gateway supports industry-standard storage protocols that work with your existing applications.
- It provides low-latency performance by maintaining frequently accessed data on-premises while securely storing all of your data encrypted in Amazon Simple Storage Service (Amazon S3) or Amazon Glacier.
- Introductory Videos
  - <https://www.youtube.com/watch?v=DPyc0q4MYsM>

# Amazon Snowball

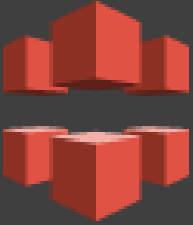
## Snowball



- Snowball is a petabyte-scale data transport solution that uses secure appliances to transfer large amounts of data into and out of AWS.
- Using Snowball addresses common challenges with large-scale data transfers including high network costs, long transfer times, and security concerns.
- Transferring data with Snowball is simple, fast, secure, and can be as little as one-fifth the cost of high-speed Internet.
- Simply create a job in the AWS Management Console and a Snowball appliance will be automatically shipped to you.
- Introduction video
  - <https://www.youtube.com/watch?v=-PqOwc3KURw>

# Amazon Cloud Front

Cloud Front



- Amazon Cloud Front is a content delivery web service
- It integrates with other Amazon Web Services products to give developers and businesses an easy way to distribute content to end users with low latency, high data transfer speeds, and no minimum usage commitments.
- Introduction Video:
  - <https://www.youtube.com/watch?v=dV5qOxwAJIU>

# Compute

EC2



Instance

DB on Instance

Optimized Instance



Instances



Instance With Cloud Watch



Spot Instance



AMI



Elastic IP



Spot Fleet



Lambda



EC2 Container Service



Elastic Beanstalk



Application



Deployment



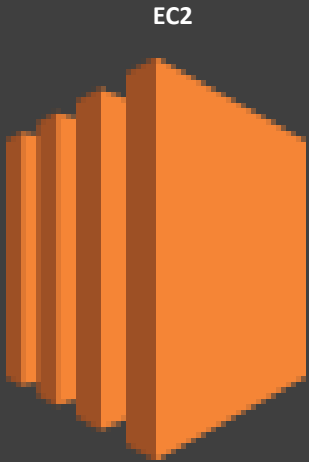
EC2 Container Registry



Elastic Load Balancing



# Elastic Cloud Compute (EC2)



- Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. A VM as a Service on Cloud
- Amazon EC2's simple web service interface allows you to obtain and configure capacity with minimal friction.
- It provides you with complete control of your computing resources and lets you run on Amazon's proven computing environment.
- Amazon EC2 reduces the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change.
- Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use.
- Amazon EC2 provides developers the tools to build failure resilient applications and isolate themselves from common failure scenarios.
- Introduction Videos
  - <https://www.youtube.com/watch?v=Px7ZPLq4AOU>
  - <https://aws.amazon.com/ec2/>

# EC2 Features

- Elastic Web-Scale Computing -Amazon EC2 enables you to increase or decrease capacity within minutes, not hours or days. You can commission one, hundreds or even thousands of server instances simultaneously
- Completely Controlled - You have complete control of your instances. You have root access to each one, and you can interact with them as you would any machine.
- Flexible Cloud Hosting Services - You have the choice of multiple instance types, operating systems, and software packages. Amazon EC2 allows you to select a configuration of memory, CPU, instance storage, and the boot partition size that is optimal for your choice of operating system and application. For example, your choice of operating systems includes numerous Linux distributions, and Microsoft Windows Server.
- Designed for use with other Amazon Web Services- Amazon EC2 works in conjunction with Amazon Simple Storage Service (Amazon S3), Amazon Relational Database Service (Amazon RDS), Amazon SimpleDB and Amazon Simple Queue Service (Amazon SQS) to provide a complete solution for computing, query processing and storage across a wide range of applications.
- Reliable - Amazon EC2 offers a highly reliable environment where replacement instances can be rapidly and predictably commissioned. The service runs within Amazon's proven network infrastructure and data centers. The Amazon EC2 Service Level Agreement commitment is 99.95% availability for each Amazon EC2 Region.

# EC2 Features

- Secure –

- Amazon EC2 works in conjunction with Amazon VPC to provide security and robust networking functionality for your compute resources.
- Your compute instances are located in a Virtual Private Cloud (VPC) with an IP range that you specify. You decide which instances are exposed to the Internet and which remain private.
- Security Groups and networks ACLs allow you to control inbound and outbound network access to and from your instances.
- You can connect your existing IT infrastructure to resources in your VPC using industry-standard encrypted IPsec VPN connections.
- For additional isolation, you can provision your EC2 resources on Dedicated Hosts or as Dedicated Instances. Both allow you to use EC2 instances in a VPC on hardware dedicated to a single customer.
- If you do not have a default VPC you must create a VPC and launch instances into that VPC to leverage advanced networking features such as private subnets, outbound security group filtering, network ACLs, Dedicated Instances, and VPN connections

- Inexpensive

- Amazon EC2 passes on to you the financial benefits of Amazon's scale. You pay a very low rate for the compute capacity you actually consume. See Amazon EC2 Instance Purchasing Options for a more detailed description.

- Easy to Start

- Quickly get started with Amazon EC2 by visiting AWS Marketplace to choose preconfigured software on Amazon Machine Images (AMIs). You can quickly deploy this software to EC2 via 1-Click launch or with the EC2 console.



# Amazon EC2 Container Registry (ECR)

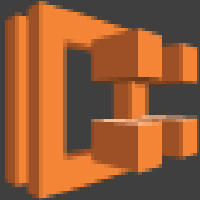
EC2 Container  
Registry



- Amazon EC2 Container Registry (ECR) is a fully-managed Docker container registry that makes it easy for developers to store, manage, and deploy Docker container images.
- Amazon ECR is integrated with Amazon EC2 Container Service (ECS), simplifying your development to production workflow.
- Amazon ECR eliminates the need to operate your own container repositories or worry about scaling the underlying infrastructure.
- Amazon ECR hosts your images in a highly available and scalable architecture, allowing you to reliably deploy containers for your applications.
- Integration with AWS Identity and Access Management (IAM) provides resource-level control of each repository.
- With Amazon ECR, there are no upfront fees or commitments. You pay only for the amount of data you store in your repositories and data transferred to the Internet.
- Introduction Videos
  - <https://www.youtube.com/watch?v=4t7Hbb3SS4Y>

# EC2 Container Service

## EC2 Container Service



- Amazon EC2 Container Service (ECS) is a highly scalable, high performance container management service that supports Docker containers and allows you to easily run applications on a managed cluster of Amazon EC2 instances.
- Amazon ECS eliminates the need for you to install, operate, and scale your own cluster management infrastructure.
- With simple API calls, you can launch and stop Docker-enabled applications, query the complete state of your cluster, and access many familiar features like security groups, Elastic Load Balancing, EBS volumes, and IAM roles.
- You can use Amazon ECS to schedule the placement of containers across your cluster based on your resource needs and availability requirements.
- You can also integrate your own scheduler or third-party schedulers to meet business or application specific requirements.
- Introduction Video:
  - <https://aws.amazon.com/ecs/>
  - <https://www.youtube.com/watch?v=1wLMLwjCqN4>

Elastic Beanstalk



- AWS Elastic Beanstalk is an easy-to-use service for deploying and scaling web applications and services developed with Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker on familiar servers such as Apache, Nginx, Passenger, and IIS.
- You can simply upload your code and Elastic Beanstalk automatically handles the deployment, from capacity provisioning, load balancing, auto-scaling to application health monitoring.
- At the same time, you retain full control over the AWS resources powering your application and can access the underlying resources at any time.
- Introduction Videos
  - [https://aws.amazon.com/elasticbeanstalk/?nc2=h\\_l3\\_dm](https://aws.amazon.com/elasticbeanstalk/?nc2=h_l3_dm)
  - <https://www.youtube.com/watch?v=dvmssHHBnII>



- AWS Lambda lets you run code without provisioning or managing servers
- You pay only for the compute time you consume - there is no charge when your code is not running.
- With Lambda, you can run code for virtually any type of application or backend service - all with zero administration. Just upload your code and Lambda takes care of everything required to run and scale your code with high availability.
- You can set up your code to automatically trigger from other AWS services or call it directly from any web or mobile app.
- Introduction Videos
  - [https://www.youtube.com/watch?v=eOBq\\_h4OJ4](https://www.youtube.com/watch?v=eOBq_h4OJ4)
  - <https://www.youtube.com/watch?v=pBLdMCksM3A>

# Elastic Load Balancing

Elastic Load Balancing



- Elastic Load Balancing automatically distributes incoming application traffic across multiple Amazon EC2 instances in the cloud.
- It enables you to achieve greater levels of fault tolerance in your applications, seamlessly providing the required amount of load balancing capacity needed to distribute application traffic.
- Introduction videos
  - <https://www.youtube.com/watch?v=oEcEqN8Peel>

# AWS Network Services

## VPC



Router

VPN Gateway



Internet Gateway



VPN Gateway



Customer Gateway



VPN Peering



## Direct Connect



## Route 53



Hosted Zone



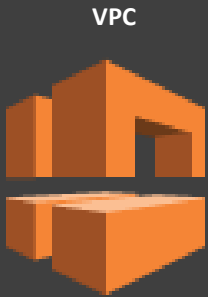
Route Table

172.16.0.0

172.16.1.0

172.16.2.0

# Virtual Private Cloud (VPC)



- Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the Amazon Web Services (AWS) Cloud where you can launch AWS resources in a virtual network that you define.
- You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets, and configuration of route tables and network gateways.
- You can easily customize the network configuration for your Amazon Virtual Private Cloud.
- Introduction Video
  - <https://www.youtube.com/watch?v=jcyZmj6Ywh4>

# Amazon Direct Connect

Direct Connect



- AWS Direct Connect makes it easy to establish a dedicated network connection from your premises to AWS.
- Using AWS Direct Connect, you can establish private connectivity between AWS and your datacenter, office, or colocation environment, which in many cases can reduce your network costs, increase bandwidth throughput, and provide a more consistent network experience than Internet-based connections.
- AWS Direct Connect lets you establish a dedicated network connection between your network and one of the AWS Direct Connect locations.



# Amazon Route53



- Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service.
- It is designed to give developers and businesses an extremely reliable and cost effective way to route end users to Internet applications by translating names like `www.example.com` into the numeric IP addresses like `192.0.2.1` that computers use to connect to each other.
- Amazon Route 53 effectively connects user requests to infrastructure running in AWS – such as Amazon EC2 instances, Elastic Load Balancing load balancers, or Amazon S3 buckets – and can also be used to route users to infrastructure outside of AWS.
- Introduction Video
  - <https://www.youtube.com/watch?v=xfCKXuofY60>

# Amazon Database Services

## RDS



RDS DB Instance

MySQL DB Instance

SQL Slave

PostgreSQL Instance

Oracle DB Instance Alternate



RDS DB Instance Standby (Multi-AZ)



Oracle DB Instance



PIOP



MySQL Instance Alternate



RDS DB Instance Read Replica



MS SQL Instance



SQL Master



MS SQL Instance Alternate



## DynamoDB



Email Notification

Attribute



Item



Attributes



Items



Global Secondary Index



## ElastiCache



CacheNode



Redis



MemCached



## RedShift



Solid State Disks



DW1 Dense Compute



DW2 Dense Compute



# Database (Continued)

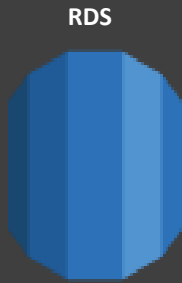
Simple DB



Database Migration  
Service



# Amazon Database Services



- Amazon Relational Database Service (Amazon RDS) makes it easy to set up, operate, and scale a relational database in the cloud.
- It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, freeing you up to focus on your applications and business.
- Amazon RDS provides you six familiar database engines to choose from, including Amazon Aurora, Oracle, Microsoft SQL Server, PostgreSQL, MySQL and MariaDB.
- Introduction Videos
  - <https://www.youtube.com/watch?v=Kz1zmyHw9G0>

# Amazon DynamoDB

DynamoDB



- Amazon DynamoDB is a fast and flexible NoSQL database service for all applications that need consistent, single-digit millisecond latency at any scale. It is a fully managed cloud database and supports both document and key-value store models.
- Its flexible data model and reliable performance make it a great fit for mobile, web, gaming, ad tech, IoT, and many other applications.
- Introduction Videos
  - <https://www.youtube.com/watch?v=oz-7wJJ9HZ0>
  - <https://www.youtube.com/watch?v=Eay2Ylhuf0k>

# Amazon SimpleDB

Simple DB



- Amazon SimpleDB is a highly available and flexible non-relational data store that offloads the work of database administration. Developers simply store and query data items via web services requests and Amazon SimpleDB does the rest.
- Unbound by the strict requirements of a relational database, Amazon SimpleDB is optimized to provide high availability and flexibility, with little or no administrative burden. Behind the scenes, Amazon SimpleDB creates and manages multiple geographically distributed replicas of your data automatically to enable high availability and data durability.
- The service charges you only for the resources actually consumed in storing your data and serving your requests. You can change your data model on the fly, and data is automatically indexed for you.
- With Amazon SimpleDB, you can focus on application development without worrying about infrastructure provisioning, high availability, software maintenance, schema and index management, or performance tuning.
- Introduction Videos
  - <https://www.youtube.com/watch?v=4wMB5qQvA8c>

# Amazon Database Migration Services Course and Labs

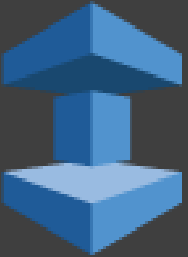
## Database Migration Service



- AWS Database Migration Service helps you migrate databases to AWS easily and securely.
- With AWS Database Migration Service, the source database remains fully operational during the migration, minimizing downtime to applications that rely on the database.
- The AWS Database Migration Service can migrate your data to and from all widely used commercial and open-source databases.
- The service supports homogenous migrations such as Oracle to Oracle, as well as heterogeneous migrations between different database platforms, such as Oracle to Amazon Aurora or Microsoft SQL Server to MySQL.
- To help make heterogeneous migrations easier, the AWS Database Migration Service includes a Schema Conversion Tool that converts the source database schema and code, including views, stored procedures and functions, to a format compatible with the target database
- Any code that cannot be automatically converted gets clearly marked to help you identify where manual re-coding is required.
- Introduction Videos
  - <https://www.youtube.com/watch?v=wsHg1XRss8U>

# Amazon ElastiCache

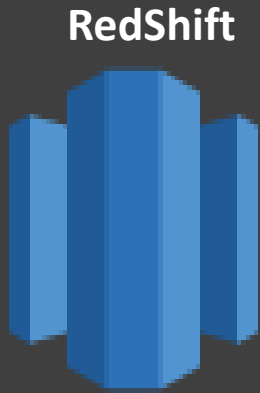
ElastiCache



- ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory cache in the cloud.
- The service improves the performance of web applications by allowing you to retrieve information from fast, managed, in-memory caches, instead of relying entirely on slower disk-based databases.
- Introduction Videos
  - <https://www.youtube.com/watch?v=8eD2eNljURE>



# Amazon Redshift



- Amazon Redshift is a fast, fully managed, petabyte-scale data warehouse that makes it simple and cost-effective to analyze all your data using your existing business intelligence tools.
- Start small for \$0.25 per hour with no commitments and scale to petabytes for \$1,000 per terabyte per year, less than a tenth the cost of traditional solutions. Customers typically see 3x compression, reducing their costs to \$333 per uncompressed terabyte per year.
- Introduction Videos
  - [https://www.youtube.com/watch?v=UhQjSzdIO\\_g](https://www.youtube.com/watch?v=UhQjSzdIO_g)

# Amazon Management Services

CloudWatch



Cluster



CloudFormation



Template



Stack



CloudTrail



OpsWorks



Config



Service Catalog



Stack



Deployments



Layers



Monitoring



Instances



Resources



Apps

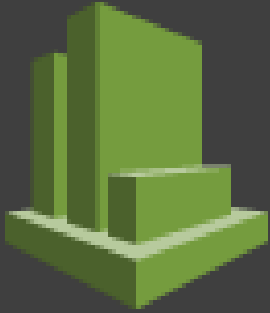


Permissions



# Amazon Cloudwatch

## CloudWatch



- Amazon CloudWatch is a monitoring service for AWS cloud resources and the applications you run on AWS.
- You can use Amazon CloudWatch to collect and track metrics, collect and monitor log files, set alarms, and automatically react to changes in your AWS resources.
- Amazon CloudWatch can monitor AWS resources such as Amazon EC2 instances, Amazon DynamoDB tables, and Amazon RDS DB instances, as well as custom metrics generated by your applications and services, and any log files your applications generate.
- You can use Amazon CloudWatch to gain system-wide visibility into resource utilization, application performance, and operational health.
- You can use these insights to react and keep your application running smoothly.

# Amazon CloudFormation

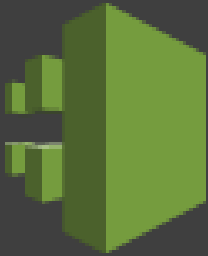
CloudFormation



- AWS CloudFormation gives developers and systems administrators an easy way to create and manage a collection of related AWS resources, provisioning and updating them in an orderly and predictable fashion.
- You can use AWS Cloud Formation's sample templates or create your own templates to describe the AWS resources, and any associated dependencies or runtime parameters, required to run your application.
- You don't need to figure out the order for provisioning AWS services or the subtleties of making those dependencies work. CloudFormation takes care of this for you.
- Introduction Videos
  - <https://www.youtube.com/watch?v=b-gwhQ6GPFQ>

# Amazon CloudTrail

## CloudTrail



- AWS CloudTrail is a web service that records AWS API calls for your account and delivers log files to you.
- The recorded information includes the identity of the API caller, the time of the API call, the source IP address of the API caller, the request parameters, and the response elements returned by the AWS service.
- With CloudTrail, you can get a history of AWS API calls for your account, including API calls made via the AWS Management Console, AWS SDKs, command line tools, and higher-level AWS services (such as AWS CloudFormation).
- The AWS API call history produced by CloudTrail enables security analysis, resource change tracking, and compliance auditing.

# Amazon Config



- AWS Config is a fully managed service that provides you with an AWS resource inventory, configuration history, and configuration change notifications to enable security and governance.
- Config Rules enables you to create rules that automatically check the configuration of AWS resources recorded by AWS Config.
- With AWS Config, you can discover existing and deleted AWS resources, determine your overall compliance against rules, and dive into configuration details of a resource at any point in time.
- These capabilities enable compliance auditing, security analysis, resource change tracking, and troubleshooting.

# Amazon Service Catalog

## Service Catalog



- AWS Service Catalog allows organizations to create and manage catalogs of IT services that are approved for use on AWS.
- These IT services can include everything from virtual machine images, servers, software, and databases to complete multi-tier application architectures.
- AWS Service Catalog allows you to centrally manage commonly deployed IT services, and helps you achieve consistent governance and meet your compliance requirements, while enabling users to quickly deploy only the approved IT services they need.
- Introduction Video:
  - [https://www.youtube.com/watch?v=rve\\_WACMeg4](https://www.youtube.com/watch?v=rve_WACMeg4)

# Amazon OpsWorks

OpsWorks



- AWS OpsWorks is a configuration management service that helps you configure and operate applications of all shapes and sizes using Chef.
- You can define the application's architecture and the specification of each component including package installation, software configuration and resources such as storage.
- Start from templates for common technologies like application servers and databases or build your own to perform any task that can be scripted.
- AWS OpsWorks includes automation to scale your application based on time or load and dynamic configuration to orchestrate changes as your environment scales.
- Introduction Video:
  - <https://www.youtube.com/watch?v=BhNfhHXvhhc>



# Amazon Security and Identity Services

Course and Labs

## Identity & Access Management



Add-On

Encrypted Data

Long-Term Security  
Credential

AWS Security Token Service  
(Alternate)



AWS Security Token  
Service



Permissions



Temporary Security  
Credential



Data Encryption Key Key



Role



MFA Team



## Directory Service



## Trusted Advisor



## Cloud HSM



## Key Management Service



## Web App Firewall



# Amazon Identity and Access Management (IAM)

Identity & Access Management



- AWS Identity and Access Management (IAM) enables you to securely control access to AWS services and resources for your users.
- Using IAM, you can create and manage AWS users and groups, and use permissions to allow and deny their access to AWS resources.
- Introduction Video:
  - <https://www.youtube.com/watch?v=UI6FW4UANGc>

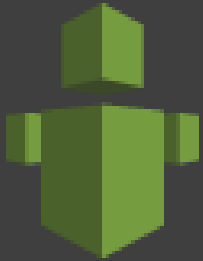
# Amazon Directory Service

Directory Service



- AWS Directory Service makes it easy to setup and run Microsoft Active Directory (AD) in the AWS cloud, or connect your AWS resources with an existing on-premises Microsoft Active Directory.
- Once your directory is created, you can use it to manage users and groups, provide single sign-on to applications and services, create and apply group policy, domain join Amazon EC2 instances, as well as simplify the deployment and management of cloud-based Linux and Microsoft Windows workloads.
- AWS Directory Service provides you with three directory types to choose from including AWS Directory Service for Microsoft Active Directory (Enterprise Edition), also referred to as Microsoft AD, as well as Simple AD, and AD Connector.
- Introduction Video:
  - <https://www.youtube.com/watch?v=XNTsmRe8k7Q>

Trusted Advisor



- AWS Trusted Advisor provides four of the most popular performance and security recommendations to all AWS customers. The complete set of checks and guidance is available with Business and Enterprise Support plans.
- AWS Trusted Advisor provides best practices in four categories:
  - Cost Optimization
  - Security
  - Fault Tolerance
  - Performance Improvement
- You can use over 40 [Trusted Advisor checks](#) to monitor and improve the deployment of Amazon EC2, Elastic Load Balancing, Amazon EBS, Amazon S3, Auto Scaling, AWS Identity and Access Management, Amazon RDS, Amazon Route 53, and other services. You can view the overall status of your AWS resources and savings estimations on the Trusted Advisor dashboard.
- Introduction Video:
  - [https://www.youtube.com/watch?v=KBLslgdE\\_Ts](https://www.youtube.com/watch?v=KBLslgdE_Ts)

### Cloud HSM



- The AWS CloudHSM service helps you meet corporate, contractual and regulatory compliance requirements for data security by using dedicated Hardware Security Module (HSM) appliances within the AWS cloud.
- With CloudHSM, you control the encryption keys and cryptographic operations performed by the HSM.
- The AWS CloudHSM service allows you to protect your encryption keys within HSMs designed and validated to government standards for secure key management.
- You can securely generate, store, and manage the cryptographic keys used for data encryption such that they are accessible only by you.
- AWS CloudHSM helps you comply with strict key management requirements without sacrificing application performance.
- Introduction Video:
  - <https://www.youtube.com/watch?v=-v7rsCWUC1I>

# Amazon Key Management Service

Key Management  
Service



- AWS Key Management Service (KMS) is a managed service that makes it easy for you to create and control the encryption keys used to encrypt your data, and uses Hardware Security Modules (HSMs) to protect the security of your keys.
- AWS Key Management Service is integrated with several other AWS services to help you protect your data you store with these services.
- AWS Key Management Service is also integrated with AWS CloudTrail to provide you with logs of all key usage to help meet your regulatory and compliance needs.
- Introduction Video:
  - [https://www.youtube.com/watch?v=OG-na9njy\\_k](https://www.youtube.com/watch?v=OG-na9njy_k)

# Amazon Web Application Firewall

## Web App Firewall



- AWS WAF is a web application firewall that helps protect your web applications from common web exploits that could affect application availability, compromise security, or consume excessive resources.
- AWS WAF gives you control over which traffic to allow or block to your web application by defining customizable web security rules. You can use AWS WAF to create custom rules that block common attack patterns, such as SQL injection or cross-site scripting, and rules that are designed for your specific application.
- New rules can be deployed within minutes, letting you respond quickly to changing traffic patterns. Also, AWS WAF includes a full-featured API that you can use to automate the creation, deployment, and maintenance of web security rules.
- Introduction Video:
  - <https://www.youtube.com/watch?v=yWSn5E6WQug>

# AWS Application Services

API Gateway



AppStream



CloudSearch



SDF Metadata



Elastic  
Transcoder



SES



Email



SQS



Queue



Message



SWF



Worker



Decider





# Amazon API Gateway

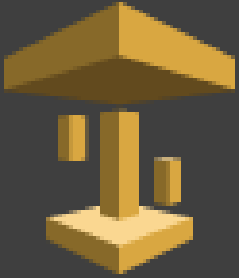
## API Gateway



- Amazon API Gateway is a fully managed service that makes it easy for developers to create, publish, maintain, monitor, and secure APIs at any scale.
- With a few clicks in the AWS Management Console, you can create an API that acts as a “front door” for applications to access data, business logic, or functionality from your back-end services, such as workloads running on Amazon Elastic Compute Cloud (Amazon EC2), code running on AWS Lambda, or any Web application.
- Amazon API Gateway handles all the tasks involved in accepting and processing up to hundreds of thousands of concurrent API calls, including traffic management, authorization and access control, monitoring, and API version management.
- Introduction Video:
  - <https://www.youtube.com/watch?v=ZFI3Qm-DBrg>

# Amazon AppStream

## AppStream



- Amazon AppStream lets you deliver your Windows applications to any device.
- Amazon AppStream enables you to stream your existing Windows applications from the cloud, reaching more users on more devices, without code modifications.
- With Amazon AppStream, your application will be deployed and rendered on AWS infrastructure and the output is streamed to mass-market devices, such as personal computers, tablets, and mobile phones.
- Because your application is running in the cloud, it can scale to handle vast computational and storage needs, regardless of the devices your customers are using.
- Amazon AppStream provides an SDK for streaming your application from the cloud.
- You can integrate your own custom clients, subscriptions, identity, and storage solution with AppStream to build a custom streaming solution that meets the needs of your business.
- Introduction Video:
  - [https://www.youtube.com/watch?v=Dx1d\\_9E2Zck](https://www.youtube.com/watch?v=Dx1d_9E2Zck)

CloudSearch



- Amazon CloudSearch is a managed service in the AWS Cloud that makes it simple and cost-effective to set up, manage, and scale a search solution for your website or application.
- Amazon CloudSearch supports 34 languages and popular search features such as highlighting, autocomplete, and geospatial search.
- Introduction Video:
  - <https://www.youtube.com/watch?v=eOVRt46RwT8>

# Amazon Elastic Transcoder

## Elastic Transcoder



- Amazon Elastic Transcoder is media transcoding in [the cloud](#).
- It is designed to be a highly scalable, easy to use and a cost effective way for developers and businesses to convert (or “transcode”) media files from their source format into versions that will playback on devices like smartphones, tablets and PCs.
- Amazon Elastic Transcoder manages all aspects of the media transcoding process for you transparently and automatically. There’s no need to administer software, scale hardware, tune performance, or otherwise manage transcoding infrastructure.
- . You simply create a transcoding “job” specifying the location of your source media file and how you want it transcoded. Amazon Elastic Transcoder also provides transcoding presets for popular output formats, which means that you don’t need to guess about which settings work best on particular devices.
- All these features are available via service API, AWS SDKs and the AWS Management Console.
- Introduction Video:
  - <https://www.youtube.com/watch?v=wSYHdt1TJVQ>

# Amazon Simple Email Service



- Amazon Simple Email Service (Amazon SES) is a cost-effective email service built on the reliable and scalable infrastructure that Amazon.com developed to serve its own customer base.
- With Amazon SES, you can send transactional email, marketing messages, or any other type of high-quality content to your customers.
- You can also use Amazon SES to receive messages and deliver them to an Amazon S3 bucket, call your custom code via an AWS Lambda function, or publish notifications to Amazon SNS.
- Introduction Video:
  - <https://www.youtube.com/watch?v=EKnK54TAKWg>

# Amazon Simple Email Service



- Amazon Simple Queue Service (SQS) is a fast, reliable, scalable, fully managed message queuing service. SQS makes it simple and cost-effective to decouple the components of a cloud application.
- You can use SQS to transmit any volume of data, at any level of throughput, without losing messages or requiring other services to be always available.
- With SQS, you can offload the administrative burden of operating and scaling a highly available messaging cluster, while paying a low price for only what you use.
- Introduction Video:
  - <https://www.youtube.com/watch?v=-XGm2VyNV4E>

# Amazon Simple Workflow Service



- Amazon SWF helps developers build, run, and scale background jobs that have parallel or sequential steps.
- You can think of Amazon SWF as a fully-managed state tracker and task coordinator in the Cloud.
- If your app's steps take more than 500 milliseconds to complete, you need to track the state of processing, and you need to recover or retry if a task fails, Amazon SWF can help you.
- Introduction Video:
  - <https://www.youtube.com/watch?v=IBUQiek8Jqk>

# Developer Tools

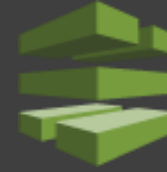
CodeCommit



CodeDeploy

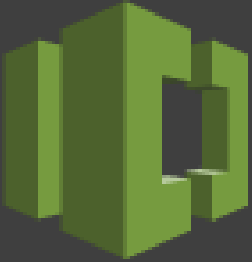


CodePipeline





CodeCommit



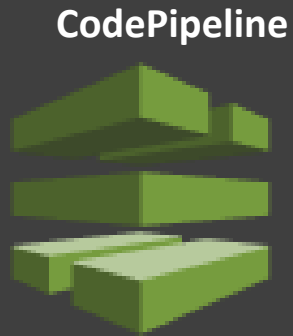
- AWS CodeCommit is a fully-managed source control service that makes it easy for companies to host secure and highly scalable private Git repositories.
- CodeCommit eliminates the need to operate your own source control system or worry about scaling its infrastructure.
- You can use CodeCommit to securely store anything from source code to binaries, and it works seamlessly with your existing Git tools.
- Introduction Video:
  - <https://www.youtube.com/watch?v=CxKbAxV0Hno>

CodeDeploy



- AWS CodeDeploy is a service that automates code deployments to any instance, including Amazon EC2 instances and instances running on-premises.
- AWS CodeDeploy makes it easier for you to rapidly release new features, helps you avoid downtime during application deployment, and handles the complexity of updating your applications.
- You can use AWS CodeDeploy to automate software deployments, eliminating the need for error-prone manual operations, and the service scales with your infrastructure so you can easily deploy to one instance or thousands.
- Introduction Video:
  - <https://www.youtube.com/watch?v=xt8QA2HccNI>

# Amazon CodePipeline



- AWS CodePipeline is a continuous delivery service for fast and reliable application updates. CodePipeline builds, tests, and deploys your code every time there is a code change, based on the release process models you define.
- This enables you to rapidly and reliably deliver features and updates.
- You can easily build out an end-to-end solution by using our pre-built plugins for popular third-party services like GitHub or integrating your own custom plugins into any stage of your release process.
- Introduction Video:
  - [https://www.youtube.com/watch?v=IxW\\_D79WPZI](https://www.youtube.com/watch?v=IxW_D79WPZI)

# Amazon Enterprise Application

WorkDocs



WorkMail



WorkSpaces



## WorkDocs



- Amazon WorkDocs is a fully managed, secure enterprise storage and sharing service with strong administrative controls and feedback capabilities that improve user productivity.
- Users can comment on files, send them to others for feedback, and upload new versions without having to resort to emailing multiple versions of their files as attachments.
- Users can take advantage of these capabilities wherever they are, using the device of their choice, including PCs, Macs, tablets and phones.
- Amazon WorkDocs offers IT administrators the option of integrating with existing corporate directories, flexible sharing policies, audit logs, and control of the location where data is stored
- Introduction Video:
  - <https://www.youtube.com/watch?v=8ETrqmbhnLw>

WorkMail



- Amazon WorkMail is a secure, managed business email and calendar service with support for existing desktop and mobile email clients.
- Amazon WorkMail gives users the ability to seamlessly access their email, contacts, and calendars using Microsoft Outlook, their web browser, or their native iOS and Android email applications.
- You can integrate Amazon WorkMail with your existing corporate directory and control both the keys that encrypt your data and the location in which your data is stored.
- Introduction Video:
  - <https://www.youtube.com/watch?v=A6iST0dAaqo>

## WorkSpaces



- Amazon WorkSpaces is a managed desktop computing service in the cloud.
- Using Amazon WorkSpaces allows you to easily provision cloud-based desktops and provide users access to the documents, applications, and resources they need from any supported device including Windows and Mac computers, Chromebooks, iPads, Kindle Fire tablets, and Android tablets.
- With just a few clicks in the AWS Management Console, you can deploy a high-quality cloud desktop experience for any number of users at a cost that is competitive with traditional desktops and half the cost of most Virtual Desktop Infrastructure (VDI) solutions.
- Introduction Video:
  - <https://www.youtube.com/watch?v=jsqI7KU3S8I>

# Amazon Application Services

Cognito



Device Farm



Mobile Analytics



SNS



Email Notification



HTTP Notification



Topic





# Amazon Cognito

Cognito



- Amazon Cognito is a service that makes it easy to save mobile user data, such as app preferences or game state, in the AWS Cloud without writing any backend code or managing any infrastructure.
- Cognito offers mobile identity management and data synchronization across devices. You can save data locally on users' devices allowing your applications to work even when the devices are offline.
- You can also synchronize data across a user's devices so that their app experience will be consistent regardless of the device they use.
- With Amazon Cognito, you can focus on creating great app experiences instead of having to worry about building and managing a backend solution to handle user authentication, network state, storage, and sync.
- Introduction Video:
  - <https://www.youtube.com/watch?v=abTy-Yyo6II>

# Amazon Device Farm

## Device Farm



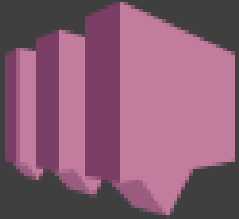
- Test your mobile app on real devices in the AWS Cloud
- Improve the quality of your iOS, Android, and web applications by testing them against real smartphones and tablets in the AWS Cloud
- Choose to test a native, hybrid, or web app with AWS Device Farm
- AWS Device Farm tests your mobile or web app against your choice of real phones and tablets
- Get results in minutes that pinpoint bugs and performance problems
- Introduction Video:
  - <https://www.youtube.com/watch?v=21olarLiAKU>

## Mobile Analytics



- With Amazon Mobile Analytics, you can measure app usage and app revenue. By tracking key trends such as new vs. returning users, app revenue, user retention, and custom in-app behavior events, you can make data-driven decisions to increase engagement and monetization for your app.
- You can view key charts in the Mobile Analytics console and automatically export your app event data to Amazon S3 and Amazon Redshift to run custom analysis.
- Introduction Video:
  - <https://www.youtube.com/watch?v=YU4yAYDFL2A>

SNS



- Pub-sub Service for Mobile and Enterprise Messaging
  - Send push messages
  - Scale as your needs grow
  - Engage audiences directly or all-at-once
  - Use your choice of platforms
  - Deliver across multiple protocols
  - Easily connect with other AWS services
  - Get message delivery analytics
  - Usage-based pricing
- Introduction Video:
  - <https://www.youtube.com/watch?v=u5j1U3qFXDY>

# Amazon Analytics Platforms

## EMR



Cluster

EMR Engine  
MapR M3



HDFS Cluster



EMR Engine MapR  
M5



EMR Engine



EMR Engine  
MapR M5



MapR M7

## Data Pipeline



## Kinesis



Kinesis Enabled  
App



Kinesis Streams



Kinesis Firehose



Kinesis Analytics



## Machine Learning



## QuickSight



## Elasticsearch



# Amazon Elastic Map Reduce

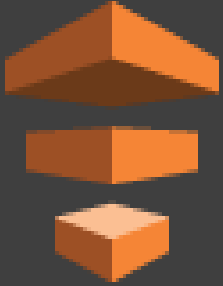
EMR



- Amazon Elastic MapReduce (Amazon EMR) is a web service that makes it easy to quickly and cost-effectively process vast amounts of data.
- Amazon EMR simplifies big data processing, providing a managed Hadoop framework that makes it easy, fast, and cost-effective for you to distribute and process vast amounts of your data across dynamically scalable Amazon EC2 instances.
- You can also run other popular distributed frameworks such as Apache Spark and Presto in Amazon EMR, and interact with data in other AWS data stores such as Amazon S3 and Amazon DynamoDB.
- Amazon EMR securely and reliably handles your big data use cases, including log analysis, web indexing, data warehousing, machine learning, financial analysis, scientific simulation, and bioinformatics.
- Introduction Video:
  - <https://www.youtube.com/watch?v=Hhj3fOdt7zo>

# Amazon Data Pipeline

## Data Pipeline



- AWS Data Pipeline is a web service that helps you reliably process and move data between different AWS compute and storage services, as well as on-premise data sources, at specified intervals.
- With AWS Data Pipeline, you can regularly access your data where it's stored, transform and process it at scale, and efficiently transfer the results to AWS services such as Amazon S3, Amazon RDS, Amazon DynamoDB, and Amazon Elastic MapReduce (EMR).
- AWS Data Pipeline helps you easily create complex data processing workloads that are fault tolerant, repeatable, and highly available. You don't have to worry about ensuring resource availability, managing inter-task dependencies, retrying transient failures or timeouts in individual tasks, or creating a failure notification system.
- AWS Data Pipeline also allows you to move and process data that was previously locked up in on-premise data silos.
- Introduction Video:
  - <https://www.youtube.com/watch?v=ziorTgT0Zac>

Kinesis



- Amazon Kinesis services make it easy to work with real-time streaming data in the AWS cloud.
- [Amazon Kinesis Firehose](#)
  - Easily load massive volumes of streaming data into AWS
- [Amazon Kinesis Analytics](#)
  - Easily analyze streaming data with standard SQL
- [Amazon Kinesis Streams](#)
  - Build your own custom applications that process or analyze streaming data
- Introduction Video:
  - <https://www.youtube.com/watch?v=ZROcwFis7wI>



# Amazon Machine learning

## Machine Learning



- Amazon Machine Learning is a service that makes it easy for developers of all skill levels to use machine learning technology.
- Amazon Machine Learning provides visualization tools and wizards that guide you through the process of creating machine learning (ML) models without having to learn complex ML algorithms and technology.
- Once your models are ready, Amazon Machine Learning makes it easy to obtain predictions for your application using simple APIs, without having to implement custom prediction generation code, or manage any infrastructure.
- Amazon Machine Learning is based on the same proven, highly scalable, ML technology used for years by Amazon's internal data scientist community.
- The service uses powerful algorithms to create ML models by finding patterns in your existing data. Then, Amazon Machine Learning uses these models to process new data and generate predictions for your application.
- Amazon Machine Learning is highly scalable and can generate billions of predictions daily, and serve those predictions in real-time and at high throughput.
- Introduction Video:
  - <https://www.youtube.com/watch?v=PAHU8tPA7xs>

# Amazon QuickSight

## QuickSight



- Amazon QuickSight is a very fast, cloud-powered business intelligence (BI) service that makes it easy for all employees to build visualizations, perform ad-hoc analysis, and quickly get business insights from their data.
- Amazon QuickSight uses a new, Super-fast, Parallel, In-memory Calculation Engine (“SPICE”) to perform advanced calculations and render visualizations rapidly.
- Amazon QuickSight integrates automatically with AWS data services, enables organizations to scale to hundreds of thousands of users, and delivers fast and responsive query performance to them via SPICE’s query engine.
- At one-tenth the cost of traditional solutions, Amazon QuickSight enables you to deliver rich BI functionality to everyone in your organization.
- Introduction Video:
  - <https://www.youtube.com/watch?v=Tj0gW4XI6vU>

## Elasticsearch



- Amazon Elasticsearch Service is a managed service that makes it easy to deploy, operate, and scale Elasticsearch in the AWS Cloud.
- Elasticsearch is a popular open-source search and analytics engine for use cases such as log analytics, real-time application monitoring, and click stream analytics.
- . You can set up and configure your Amazon Elasticsearch cluster in minutes from the AWS Management Console.
- Amazon Elasticsearch Service provisions all the resources for your cluster and launches it. The service automatically detects and replaces failed Elasticsearch nodes, reducing the overhead associated with self-managed infrastructure and Elasticsearch software.
- Amazon Elasticsearch Service allows you to easily scale your cluster via a single API call or a few clicks in the AWS Management Console.
- With Amazon Elasticsearch Service, you get direct access to the Elasticsearch open-source API so that code and applications you're already using with your existing Elasticsearch environments will work seamlessly.
- Introduction Video:
  - [https://www.youtube.com/watch?v=s7dJESec\\_dY](https://www.youtube.com/watch?v=s7dJESec_dY)

## Mobile Hub



# Amazon Mobile Hub

Mobile Hub



- AWS Mobile Hub lets you easily add and configure features for your mobile apps, including user authentication, data storage, backend logic, push notifications, content delivery, and analytics.
- After you build your app, AWS Mobile Hub gives you easy access to testing on real devices, as well as analytics dashboards to track usage of your app – all from a single, integrated console.
- Introduction Video:
  - <https://www.youtube.com/watch?v=MgpGROhgO8w>

# Amazon Internet of Things (IoT)

## AWS IoT



Generic IOT Thing



IOT Thing Windfarm



IOT Thing Utility



IOT Thing Camera



IOT Thing Medical Emergency



IOT Simulator



IOT Reported State



IOT Topic



IOT MQTT Protocol



IOT Thing Lightbulb



IOT Thing Bicycle



IOT Thing Police Emergency



IOT Thing Coffee Pot



IOT Sensor



IOT Desired State



IOT Action



IOT HTTP Protocol



IOT Thing House



IOT Thing Car



IOT Thing Door Lock



IOT Thing Travel



IOT Servo



IOT Shadow



IOT Rule



IOT HTTP/2 Protocol



IOT Thing Factory



IOT Thing Bank



IOT Thing Cart



IOT Thing Thermostat



IOT Actuator



IOT Certificate



IOT Policy



IOT Hardware Board



# Amazon IoT

Mobile Hub



- AWS IoT is a platform that enables you to connect devices to AWS Services and other devices, secure data and interactions, process and act upon device data, and enable applications to interact with devices even when they are offline.
- Introduction Video:
  - <https://www.youtube.com/watch?v=N3-Az0OH5WM>