Amazon Web Services

The Big Picture

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Agenda : AWS The Big Picture

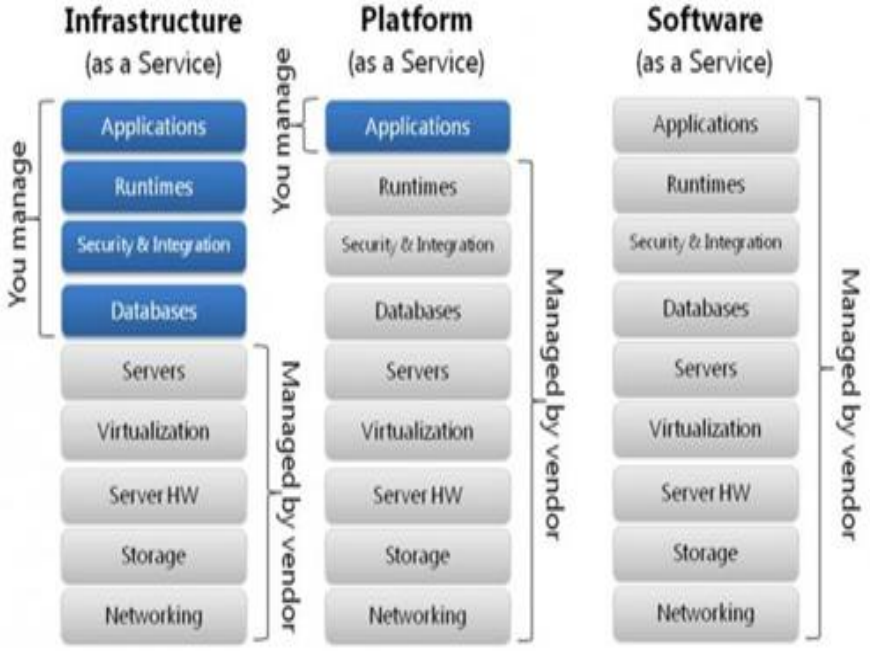
- **Introduction to AWS & terminology**
- **Features of AWS**
- **Amazon Web Services Offerings**
- **Core features of AWS**
  - Security & Identity
  - Compute & Networking Services
  - Storage and Content Delivery Services
  - Database Services

Amazon and Cloud Computing

- Amazon had spent over a decade building and managing the large-scale, reliable, and efficient IT infrastructure that powered one of the world's largest online retail platforms.
- Amazon has decentralized IT infrastructure.
- Using AWS, you can demand compute power, storage, and other services in minutes .
- Have the flexibility to choose the development platform or programming model .
- This arrangement enabled our development teams to access compute and storage resources on demand, and it has increased overall productivity and agility.
- You pay only for what you use, with no up-front expenses or long-term commitments, making AWS a cost-effective way to deliver applications.

Cloud Computing Service Models

- **Infrastructure as a Service (IaaS), which provides only a base infrastructure, leaving the end user responsible for platform and environment configuration necessary to deploy applications. Amazon's AWS and Microsoft Azure are prime examples of IaaS.**
- **Software as a Service (SaaS) like Gmail or Salesforce.com.**
- **Platform as a Service (PaaS), which helps to reduce the development overhead (environment configuration) by providing a ready-to-use platform. PaaS services can be hosted on top of infrastructure provided by an IaaS.**

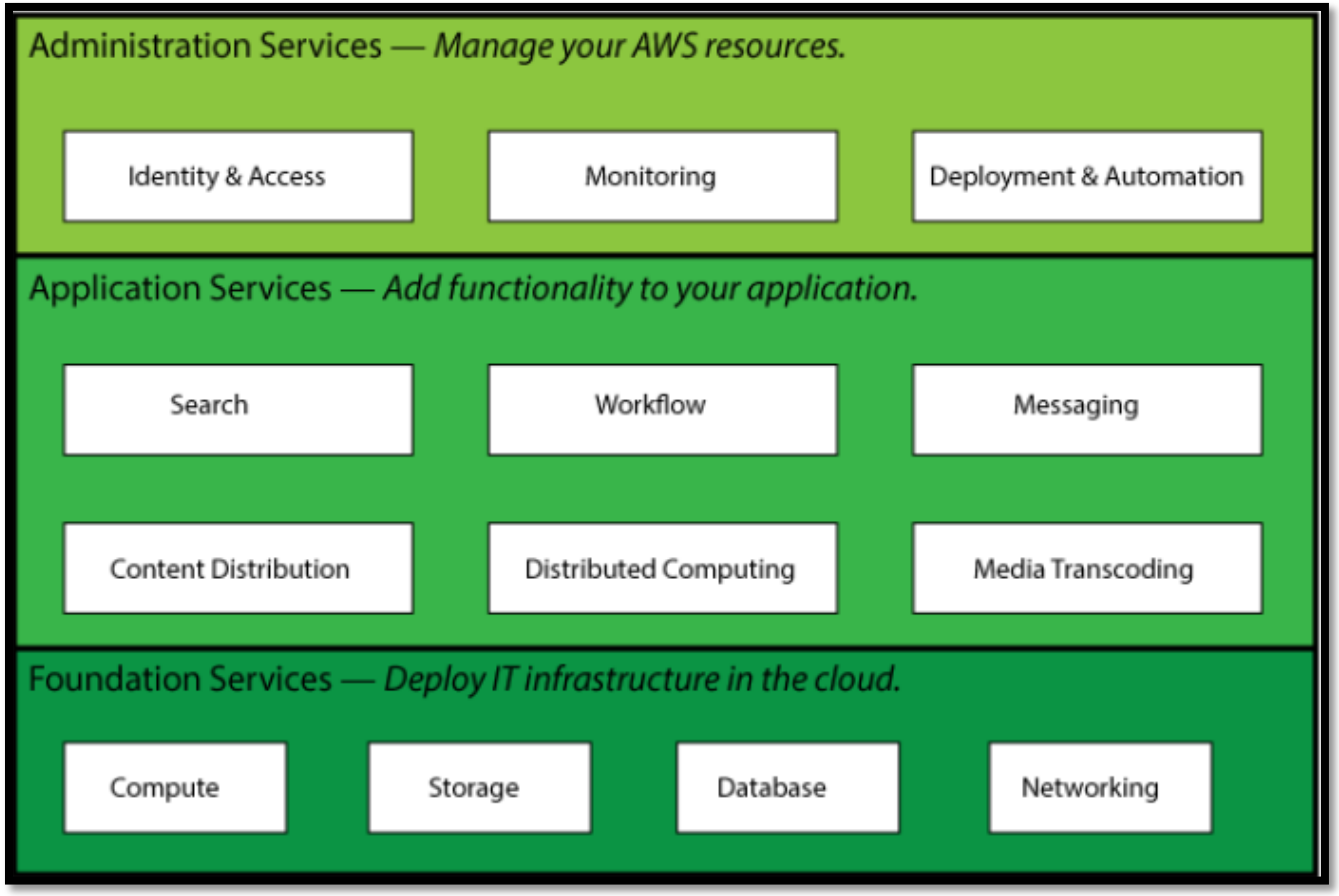


AWS Terminology

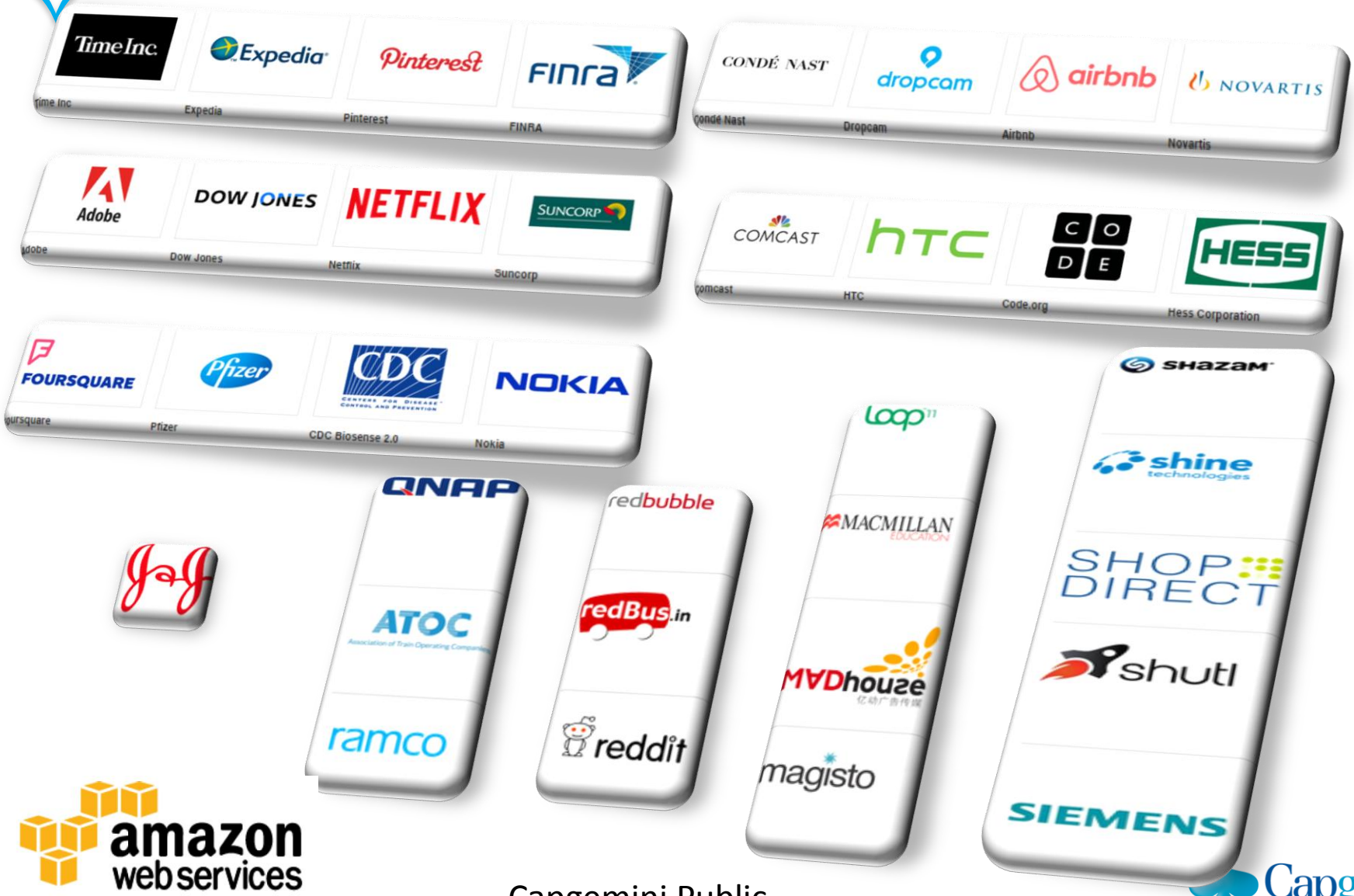
- **Scalability : Ability of a system to expand and contract as per the workload demands**
- **Fault Tolerance : Ability of a system to operate without interruption in the even of failure of a service**
- **Elasticity : Ability of infrastructure to adapt up and down optimally as per current workload**

Functionality offered by AWS

Categories of functionality offered by AWS



AWS Customers



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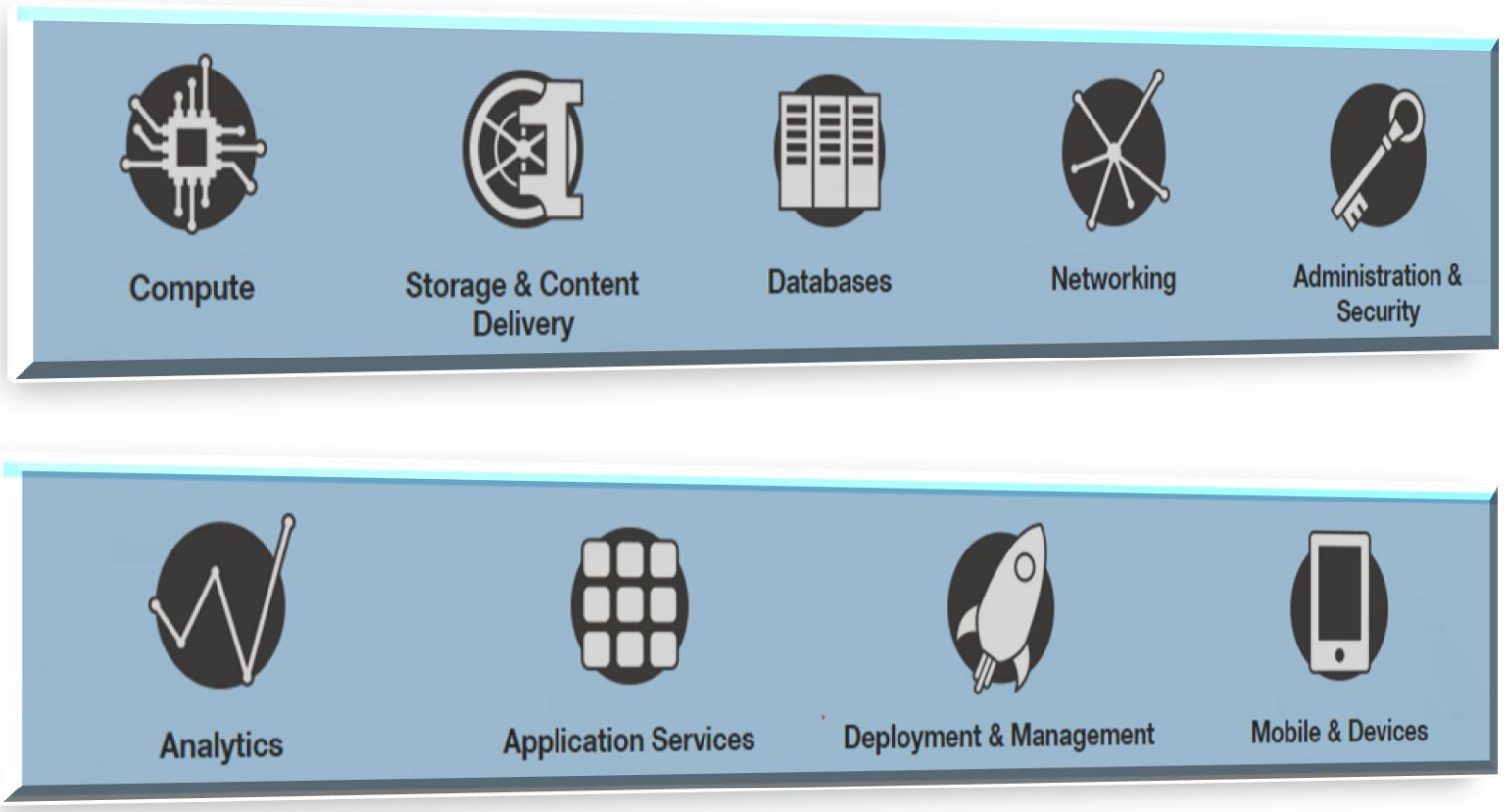
AWS Services



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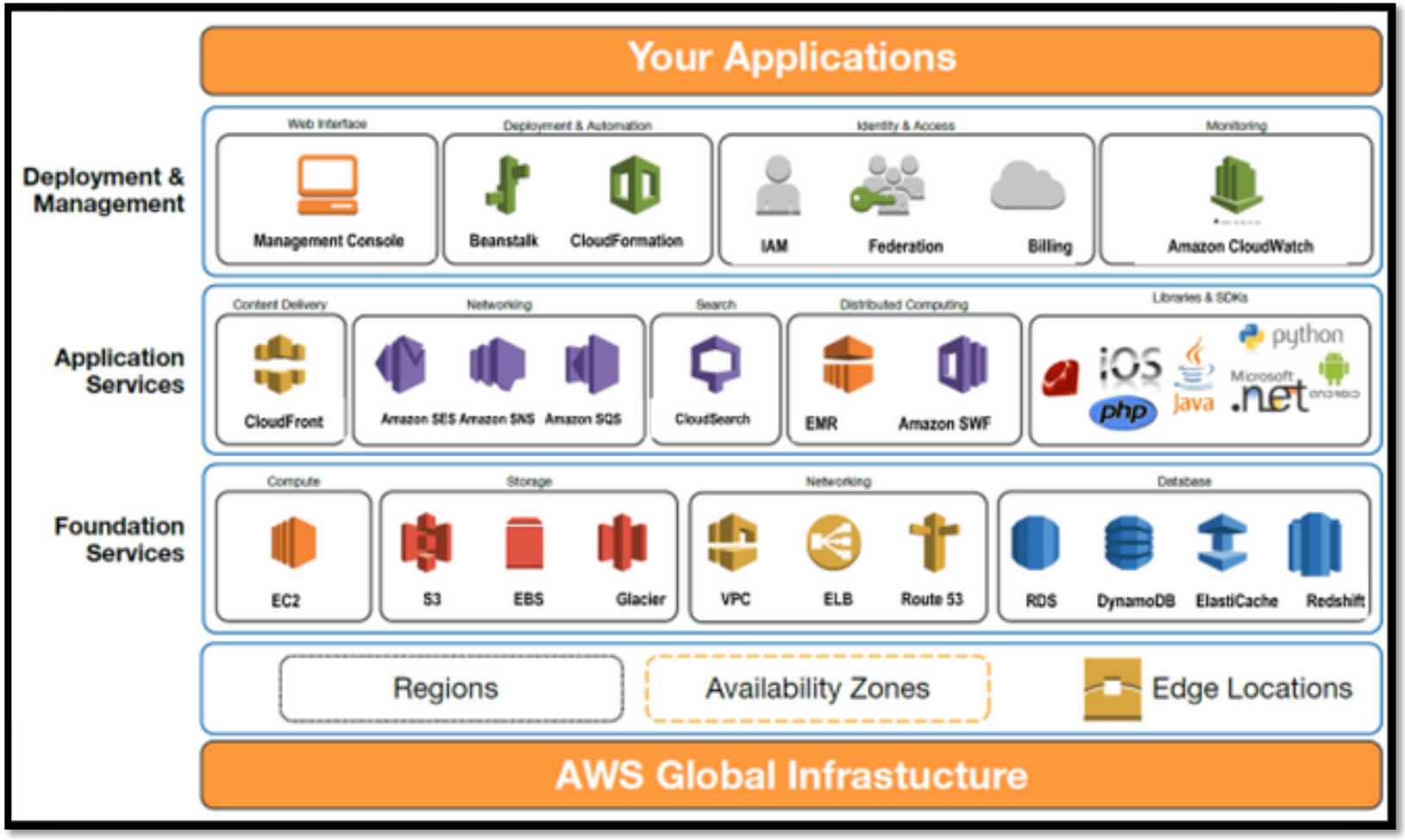
AWS 360° View



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Features of AWS

- **Flexible**
  - AWS enables organizations to use the programming models, operating systems, databases, and architectures with which they are already familiar.
  - In addition, this flexibility helps organizations mix and match architectures in order to serve their diverse business needs.
- **Cost-effective**
  - With AWS, organizations pay only for what they use, without up-front or long-term commitments.
- **Scalable and elastic**
  - Organizations can quickly add and subtract AWS resources to their applications in order to meet customer demand and manage costs.

Features of Amazon – contd.

- **Secure**
  - In order to provide end-to-end security and end-to-end privacy, AWS builds services in accordance with security best practices, provides the appropriate security features in those services, and documents how to use those features.
- **Experienced**
  - When using AWS, organizations can leverage Amazon's more than fifteen years of experience delivering large-scale, global infrastructure in a reliable, secure fashion.

Amazon Web Services Offerings

Services

Compute
Amazon EC2
Amazon EC2 Container Registry
Amazon EC2 Container Service
AWS Elastic Beanstalk
AWS Lambda
Auto Scaling
Elastic Load Balancing
Amazon VPC

Storage & Content Delivery
Amazon S3
Amazon CloudFront
Amazon EBS
Amazon EFS (preview)
Amazon Glacier
AWS Import/Export
AWS Storage Gateway

Database
Amazon RDS
AWS Schema Conversion Tool
Amazon DynamoDB
Amazon ElastiCache
Amazon Redshift
AWS Database Migration Service

Networking
Amazon VPC
AWS Direct Connect
Elastic Load Balancing
Amazon Route 53

Developer Tools
AWS CodeCommit
AWS CodeDeploy
AWS CodePipeline
AWS Tools & SDKs

Management Tools
AWS Application Discovery Service
Amazon CloudWatch
AWS CloudFormation
AWS CloudTrail
AWS Command Line Interface
AWS Config
AWS Management Console
AWS OpsWorks
AWS Service Catalog
Trusted Advisor
AWS Tools for Windows PowerShell

Security & Identity
Identity & Access Management
AWS Certificate Manager
AWS Directory Service
Amazon Inspector
AWS CloudHSM
AWS KMS
AWS WAF

Analytics
Amazon EMR
AWS Data Pipeline
Amazon Elasticsearch Service
Amazon Kinesis
Amazon Machine Learning
Amazon Redshift

Internet of Things
AWS IoT

Game Development
Amazon Lumberyard (beta)
Amazon GameLift

Mobile Services
AWS Mobile Hub
Amazon API Gateway
Amazon Cognito
AWS Device Farm
Amazon Mobile Analytics
AWS Mobile SDK for Android
AWS Mobile SDK for iOS
AWS Mobile SDK for Unity
AWS Mobile SDK for Xamarin
Amazon SNS

Application Services
Amazon API Gateway
Amazon AppStream
Amazon CloudSearch
Amazon Elastic Transcoder
Amazon FPS
Amazon SES
Amazon SNS
Amazon SQS
Amazon SWF

Enterprise Applications
Amazon WorkSpaces
Amazon WAM
Amazon WorkDocs
Amazon WorkMail

Additional Software & Services
AWS Billing and Cost Management
AWS Marketplace
AWS Support
Alexa Top Sites
Alexa Web Information Service
Amazon Silk
AWS GovCloud (US)

SDKs & Toolkits
AWS SDK for Go
AWS SDK for Java
AWS SDK for JavaScript (Node.js)
AWS SDK for JavaScript (Browser)
AWS SDK for .NET
AWS SDK for PHP
AWS SDK for Python (Boto 3)
AWS SDK for Ruby
AWS Toolkit for Eclipse
AWS Toolkit for Visual Studio

General Reference
Regions and Endpoints
Security Credentials
ARNs & Service Namespaces
Service Limits
AWS Glossary
AWS Whitepapers

AWS Management Console
Resource Groups
Tag Editor

Resources
AWS Quick Starts
AWS Whitepapers
AWS Training & Certification
AWS Case Studies
AWS Documentation on Kindle
AWS Documentation Archive

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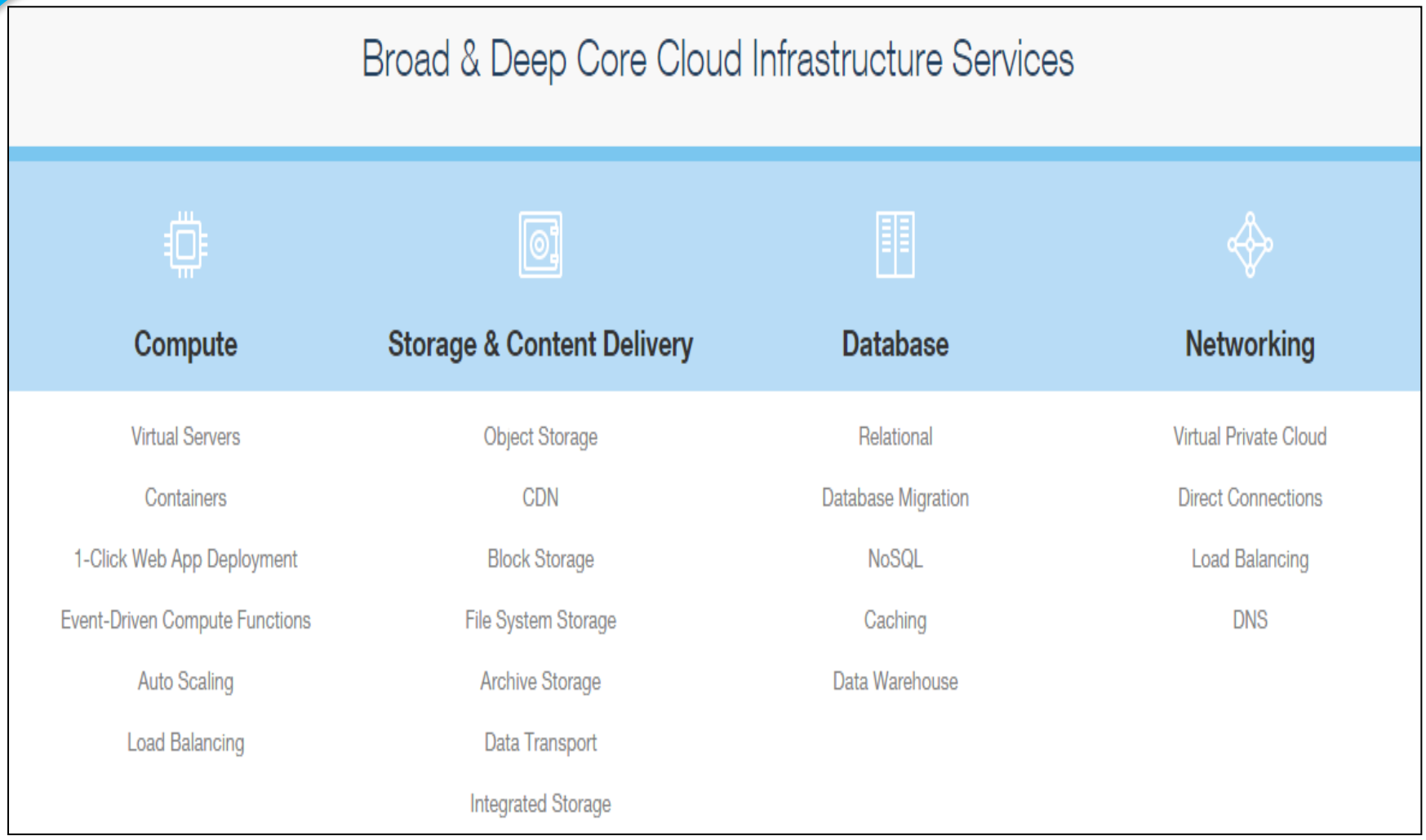
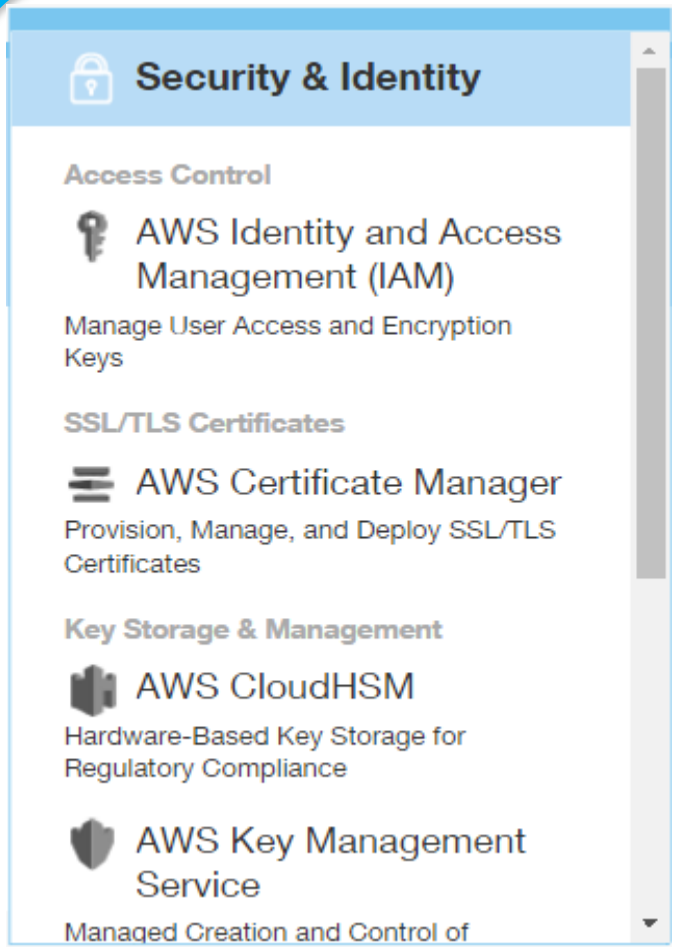
Amazon Web Services Offerings



Amazon Security & Identity Services



Identity & Access Management (IAM)

Access Control

AWS Identity and Access Management (IAM)

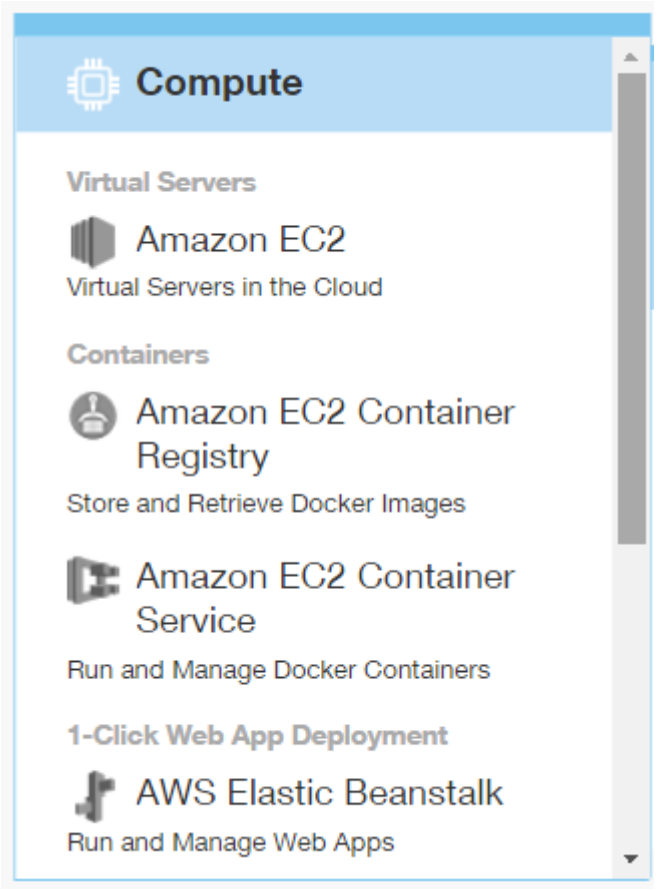
Manage User Access and Encryption Keys

AWS Identity and Access Management (IAM)

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.

https://aws.amazon.com/iam/?hp=tile

Amazon Compute Services

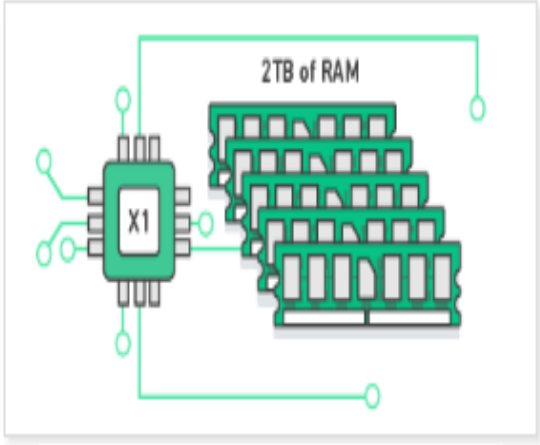


Elastic Compute Cloud (EC2)

Virtual Servers

Amazon EC2

Virtual Servers in the Cloud



AMAZON EC2

New X1 instances - Our largest EC2 memory optimized instances

Amazon EC2 - Virtual Server Hosting

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

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.

https://aws.amazon.com/ec2/?hp=tile

Setting Up Environment for Amazon EC2

- **Setting Up with Amazon EC2**
  - Sign Up for AWS
  - Create an IAM User
  - Create a Key Pair
  - Create a Virtual Private Cloud (VPC)
  - Create a Security Group

Creating , Connect and Terminate Amazon EC2 Instance

- Launching Amazon EC2 Instance
  - Step 1: Launch an Instance
  - Step 2: Connect to Your Instance
  - Step 3: Clean Up Your Instance

- **Note : Additional Step for Windows instances**
  - Decrypt Password and download RDP shortcut client

Elastic Compute Cloud (EC2)

What Is Amazon EC2? http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

Features of Amazon EC2

Amazon EC2 provides the following features:

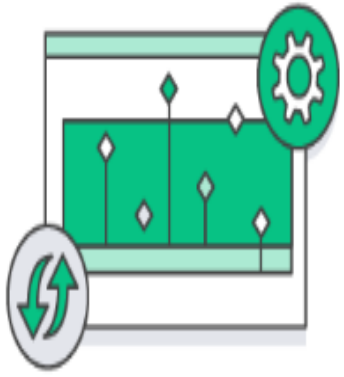
- Virtual computing environments, known as *instances*
- Preconfigured templates for your instances, known as *Amazon Machine Images (AMIs)*, that package the bits you need for your server (including the operating system and additional software)
- Various configurations of CPU, memory, storage, and networking capacity for your instances, known as *instance types*
- Secure login information for your instances using *key pairs* (AWS stores the public key, and you store the private key in a secure place)
- Storage volumes for temporary data that's deleted when you stop or terminate your instance, known as *instance store volumes*
- Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes*
- Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as *regions* and *Availability Zones*
- A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using *security groups*
- Static IP addresses for dynamic cloud computing, known as *Elastic IP addresses*
- Metadata, known as *tags*, that you can create and assign to your Amazon EC2 resources
- Virtual networks you can create that are logically isolated from the rest of the AWS cloud, and that you can optionally connect to your own network, known as *virtual private clouds* (VPCs)

Elastic Beanstalk

1-Click Web App Deployment

AWS Elastic Beanstalk

Run and Manage Web Apps



AWS ELASTIC BEANSTALK

Now enable managed platform updates for your application environments

AWS Elastic Beanstalk

Easy to begin, Impossible to outgrow

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.

There is no additional charge for Elastic Beanstalk - you pay only for the AWS resources needed to store and run your applications.

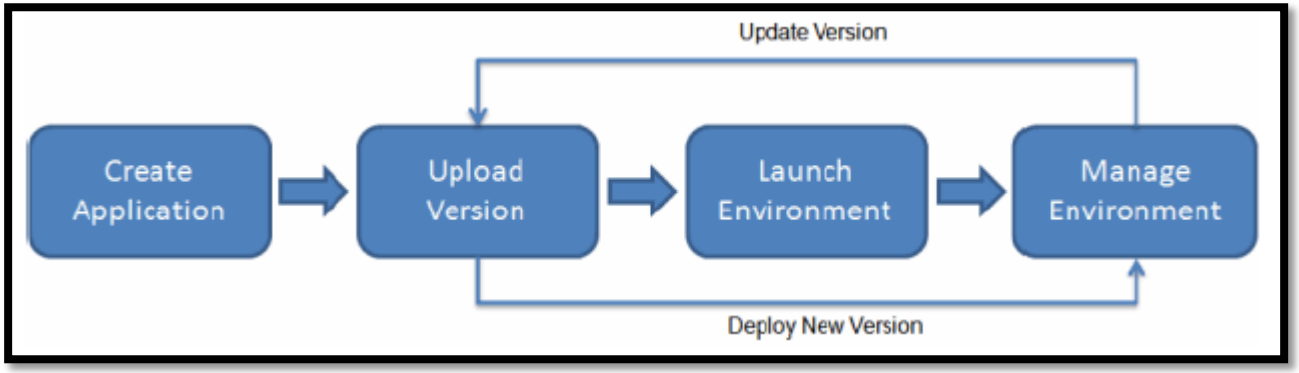
https://aws.amazon.com/elasticbeanstalk/?hp=tile

Elastic BeanStalk

- **Using Elastic Beanstalk, you can quickly deploy and manage applications in the AWS cloud.**
- **No need to worry about the infrastructure that runs those applications.**
- **AWS Elastic Beanstalk reduces management complexity without restricting choice or control.**
- **Simply upload your application, and Elastic Beanstalk automatically handles the details of-**
  - Capacity provisioning,
  - Load balancing,
  - Scaling, and
  - Application health monitoring
- **Elastic Beanstalk uses highly reliable and scalable services that are available in the AWS**

Elastic BeanStalk

- Create an application, upload an application version in the form of an application source bundle (for example, a Java .war file) to Elastic Beanstalk
- Elastic Beanstalk automatically launches an environment and creates and configures the AWS resources needed to run your code.
- After your environment is launched, you can then manage your environment and deploy new application versions.



Working with Amazon EBS

- **Working with EBS**
  - Create Standard Volume
  - Create and delete snapshots
  - Create Provisioned I/o Volume
  - Assign volumes to servers
  - Disassociate and Delete volumes

Elastic Block Store (EBS)

Amazon Elastic Block Store (Amazon EBS)

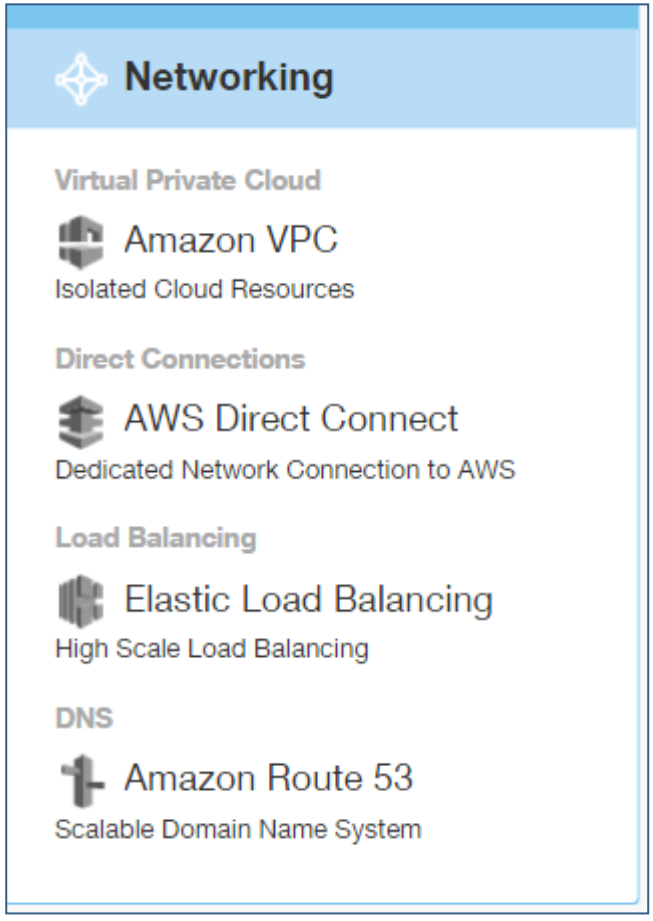
http://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/AmazonEBS.html

Amazon Elastic Block Store (Amazon EBS) provides block level storage volumes for use with EC2 instances. EBS volumes are highly available and reliable storage volumes that can be attached to any running instance that is in the same Availability Zone. EBS volumes that are attached to an EC2 instance are exposed as storage volumes that persist independently from the life of the instance. With Amazon EBS, you pay only for what you use. For more information about Amazon EBS pricing, see the Projecting Costs section of the Amazon Elastic Block Store page.

Amazon EBS is recommended when data changes frequently and requires long-term persistence. EBS volumes are particularly well-suited for use as the primary storage for file systems, databases, or for any applications that require fine granular updates and access to raw, unformatted, block-level storage. Amazon EBS is particularly helpful for database-style applications that frequently encounter many random reads and writes across the data set.

For simplified data encryption, you can launch your EBS volumes as encrypted volumes. Amazon EBS encryption offers you a simple encryption solution for your EBS volumes without the need for you to build, manage, and secure your own key management infrastructure. When you create an encrypted EBS volume and attach it to a supported instance type, data stored at rest on the volume, disk I/O, and snapshots created from the volume are all encrypted. The encryption occurs on the servers that hosts EC2 instances, providing encryption of data-in-transit from EC2 instances to EBS storage. For more information, see Amazon EBS Encryption.

Amazon Networking Services



Virtual Private cloud (VPC)

Amazon Virtual Private Cloud (VPC)

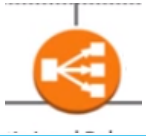
Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the Amazon Web Services (AWS) cloud where you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own 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. For example, you can create a public-facing subnet for your webservers that has access to the Internet, and place your backend systems such as databases or application servers in a private-facing subnet with no Internet access. You can leverage multiple layers of security, including security groups and network access control lists, to help control access to Amazon EC2 instances in each subnet.

Additionally, you can create a Hardware Virtual Private Network (VPN) connection between your corporate datacenter and your VPC and leverage the AWS cloud as an extension of your corporate datacenter.

https://aws.amazon.com/vpc/?hp=tile

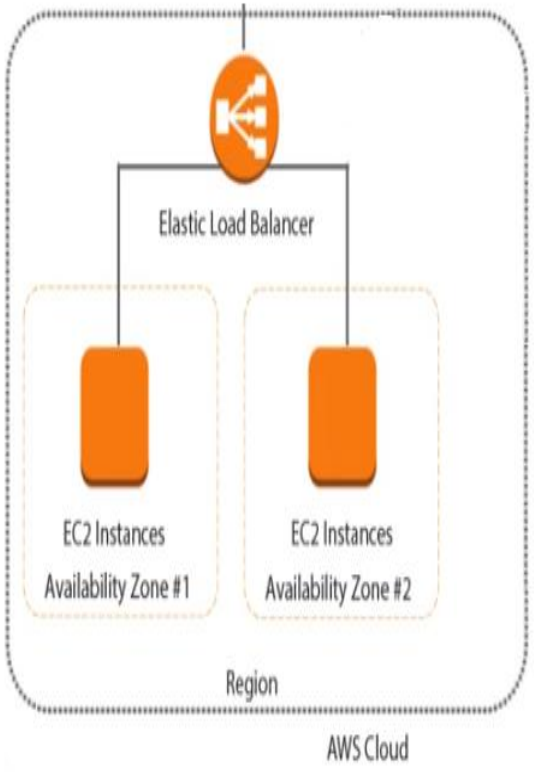
Elastic Load Balancing (ELB)



Load Balancing

Elastic Load Balancing

High Scale 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.

https://aws.amazon.com/elasticloadbalancing/?hp=tile

Elastic Load Balancing (ELB)

Elastic Load Balancing

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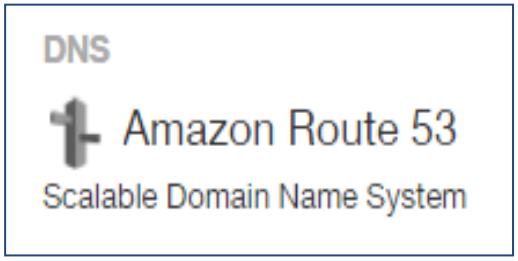
https://aws.amazon.com/elasticloadbalancing/?hp=tile

Working with Amazon ELB

- **Working with ELB**
  - Create Elastic Load Balancer
  - Add instance servers to ELB
  - Test Elastic Load Balancer
  - Delete your Elastic Load Balancer

Route 53 (R53)



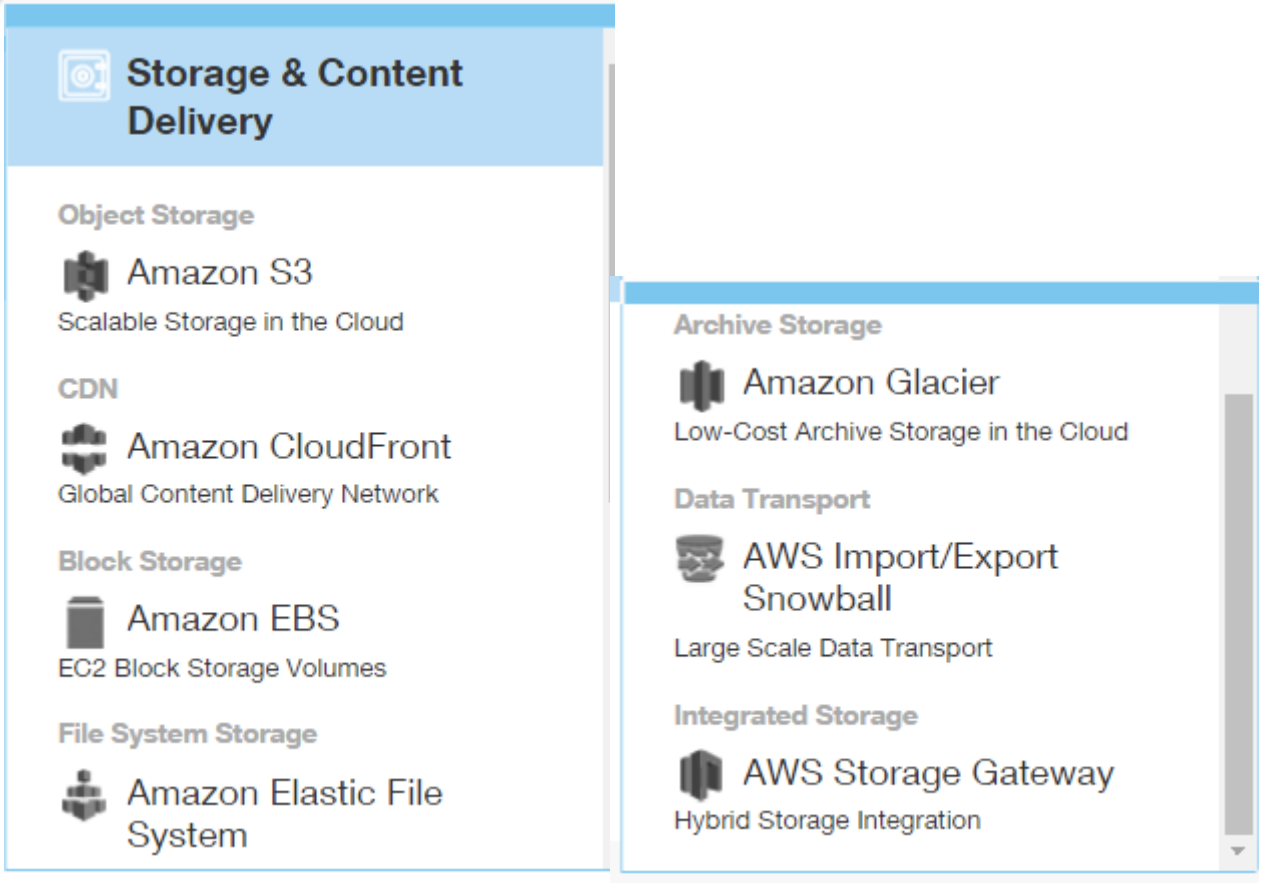
Amazon Route 53

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. You can use Amazon Route 53 to configure DNS health checks to route traffic to healthy endpoints or to independently monitor the health of your application and its endpoints. Amazon Route 53 Traffic Flow makes it easy for you to manage traffic globally through a variety of routing types, including Latency Based Routing, Geo DNS, and Weighted Round Robin—all of which can be combined with DNS Failover in order to enable a variety of low-latency, fault-tolerant architectures. Using Amazon Route 53 Traffic Flow's simple visual editor, you can easily manage how your end-users are routed to your application's endpoints—whether in a single AWS region or distributed around the globe. Amazon Route 53 also offers Domain Name Registration – you can purchase and manage domain names such as example.com and Amazon Route 53 will automatically configure DNS settings for your domains.

https://aws.amazon.com/route53/?hp=tile

Amazon Storage & Content Delivery Services



Simple Storage Service (S3)

Object Storage

Amazon S3

Scalable Storage in the Cloud

AMAZON S3

Load data up to 300% faster with Amazon S3 Transfer Acceleration

Amazon S3

Amazon Simple Storage Service (Amazon S3), provides developers and IT teams with secure, durable, highly-scalable cloud storage. Amazon S3 is easy to use object storage, 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.

Amazon S3 offers a range of storage classes designed for different use cases including Amazon S3 Standard for general-purpose storage of frequently accessed data, Amazon S3 Standard - Infrequent Access (Standard - IA) for long-lived, but less frequently accessed data, and Amazon Glacier for long-term archive. Amazon S3 also offers configurable lifecycle policies for managing your data throughout its lifecycle. Once a policy is set, your data will automatically migrate to the most appropriate storage class without any changes to your applications.

https://aws.amazon.com/s3/?hp=tile

CloudFront

Amazon CloudFront – Content Delivery Network (CDN)

Amazon CloudFront is a global content delivery network (CDN) service that accelerates delivery of your websites, APIs, video content or other web assets. It integrates with other Amazon Web Services products to give developers and businesses an easy way to accelerate content to end users with no minimum usage commitments.

https://aws.amazon.com/cloudfront/?hp=tile

Elastic Block Store (EBS)

Amazon Elastic Block Store (EBS)

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.

https://aws.amazon.com/ebs/?hp=tile

Glacier

Archive Storage

Amazon Glacier

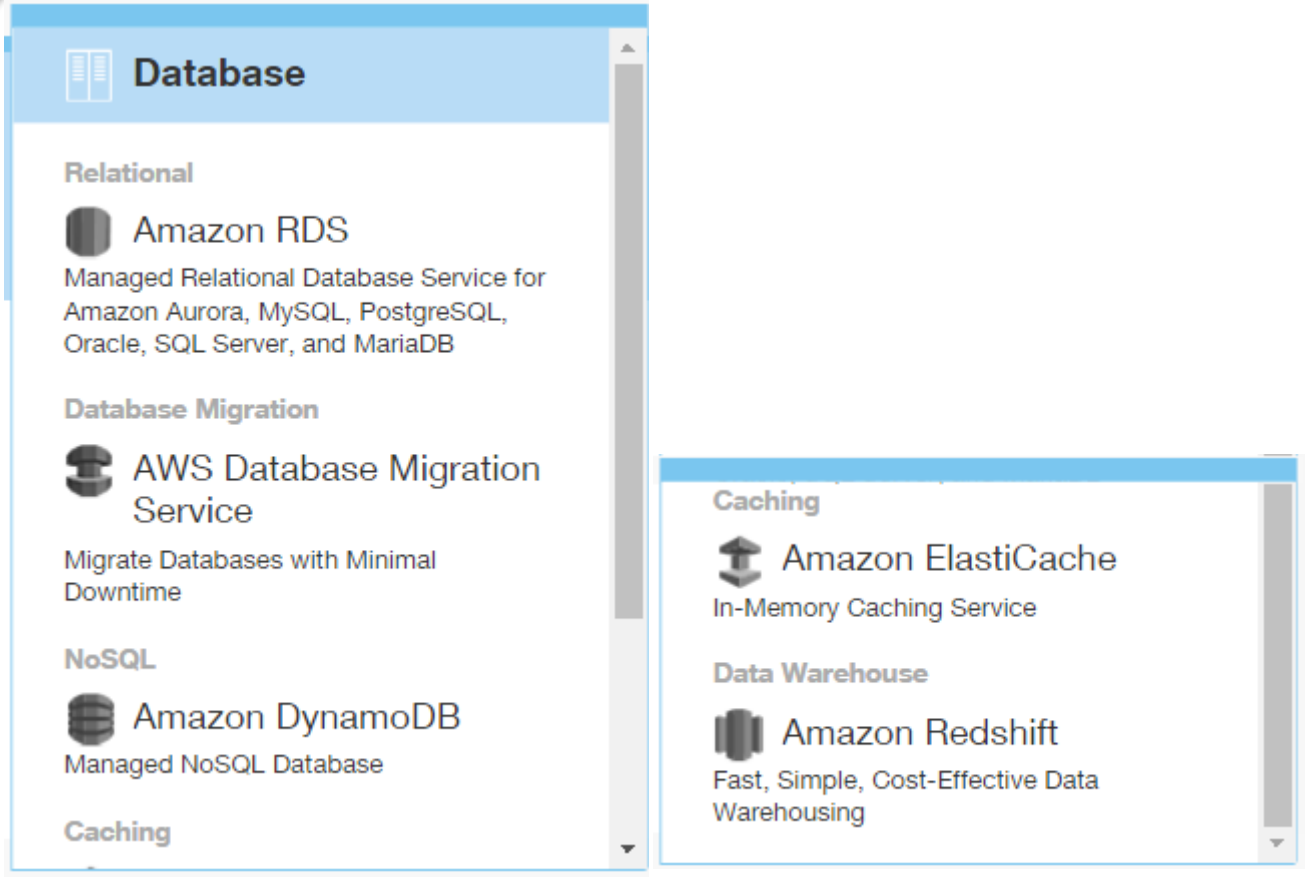
Low-Cost Archive Storage in the Cloud

Amazon Glacier

Amazon Glacier is a secure, durable, and extremely low-cost cloud 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.

https://aws.amazon.com/glacier/?hp=tile

Amazon Database Services



Relational Database Service (RDS)

Relational

Amazon RDS

Managed Relational Database Service for Amazon Aurora, MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB

Amazon RDS

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.

https://aws.amazon.com/rds/?hp=tile

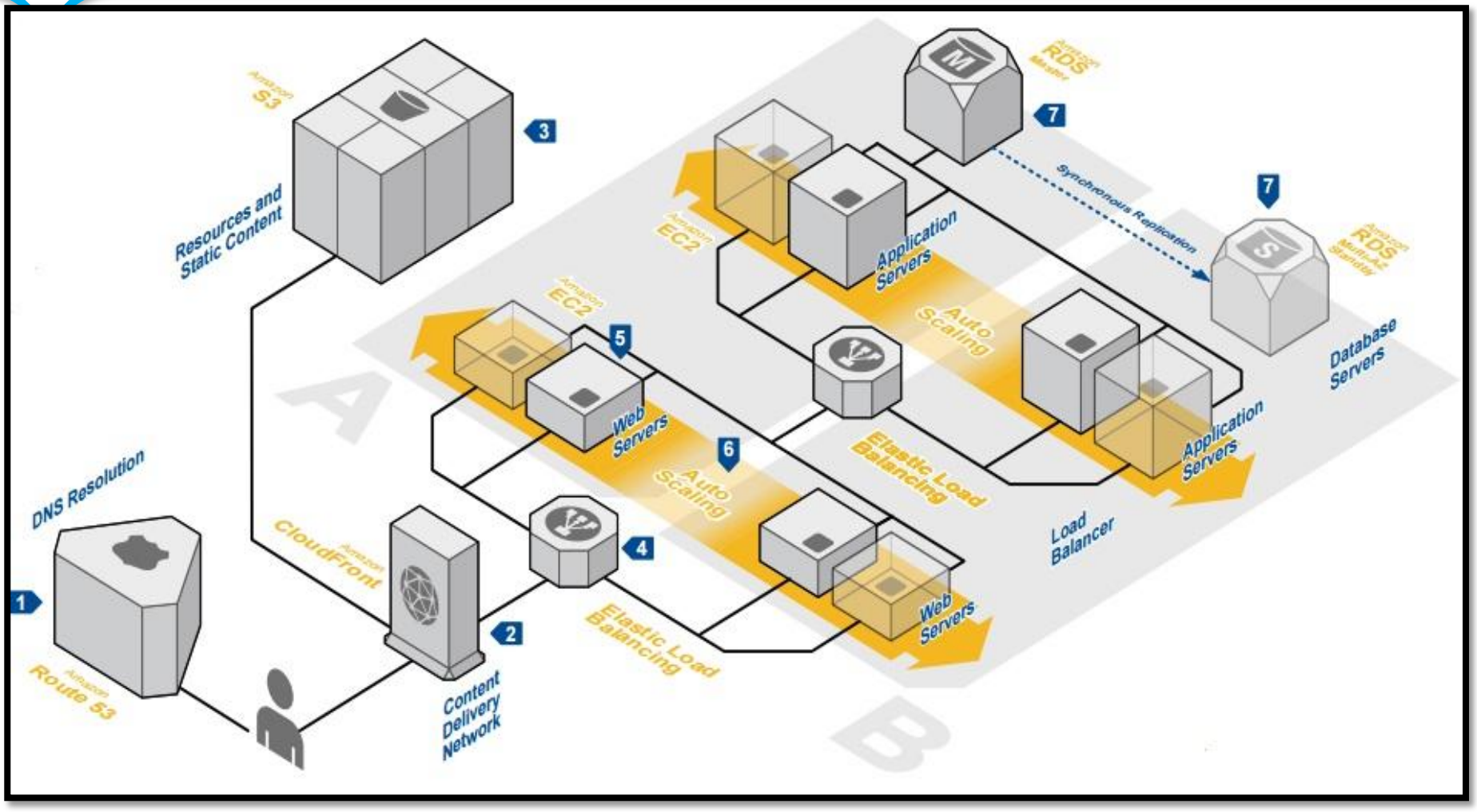
Amazon RDS Database Engines

Amazon Aurora | PostgreSQL | MySQL | MariaDB | ORACLE | Microsoft SQL Server

Summary: AWS The Big Picture

- **Features of AWS**
- **Amazon Web Services Offerings**
- **Core features of AWS**
  - Security & Identity
  - Compute & Networking Services
  - Storage and Content Delivery Services
  - Database Services

Web Hosting Architecture – An Example



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Reference

- https://console.aws.amazon.com Documentation