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AWS Features, Usage and Deployment Applications

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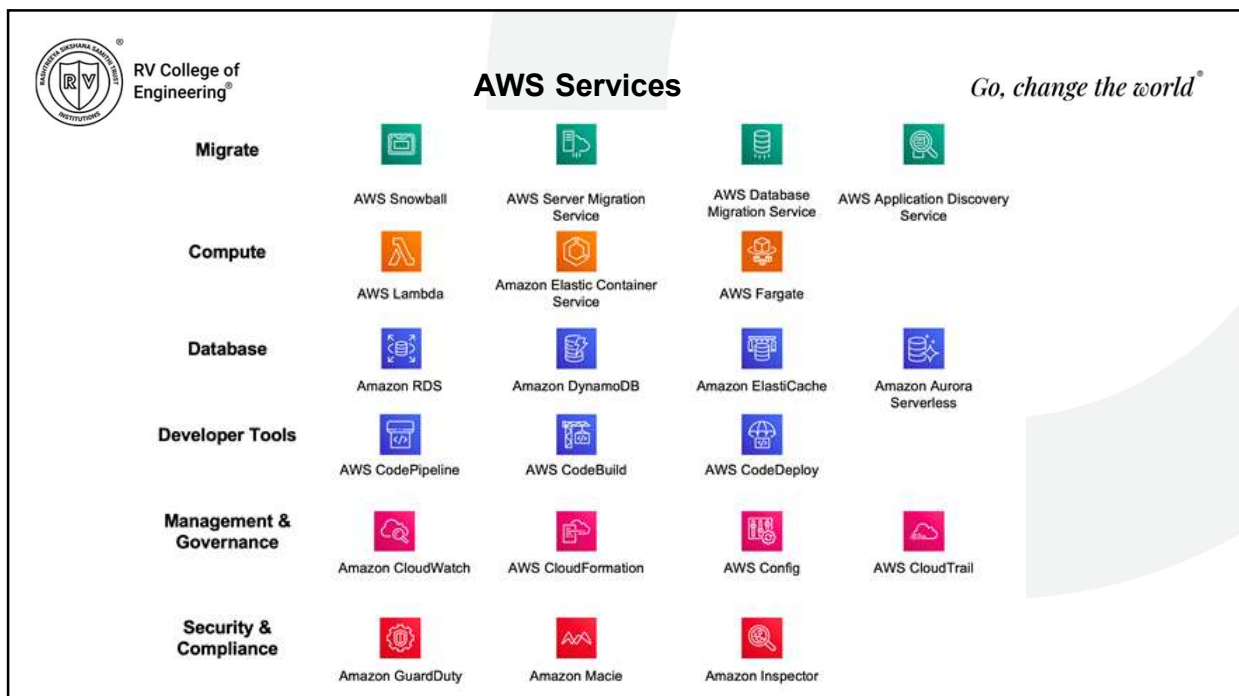
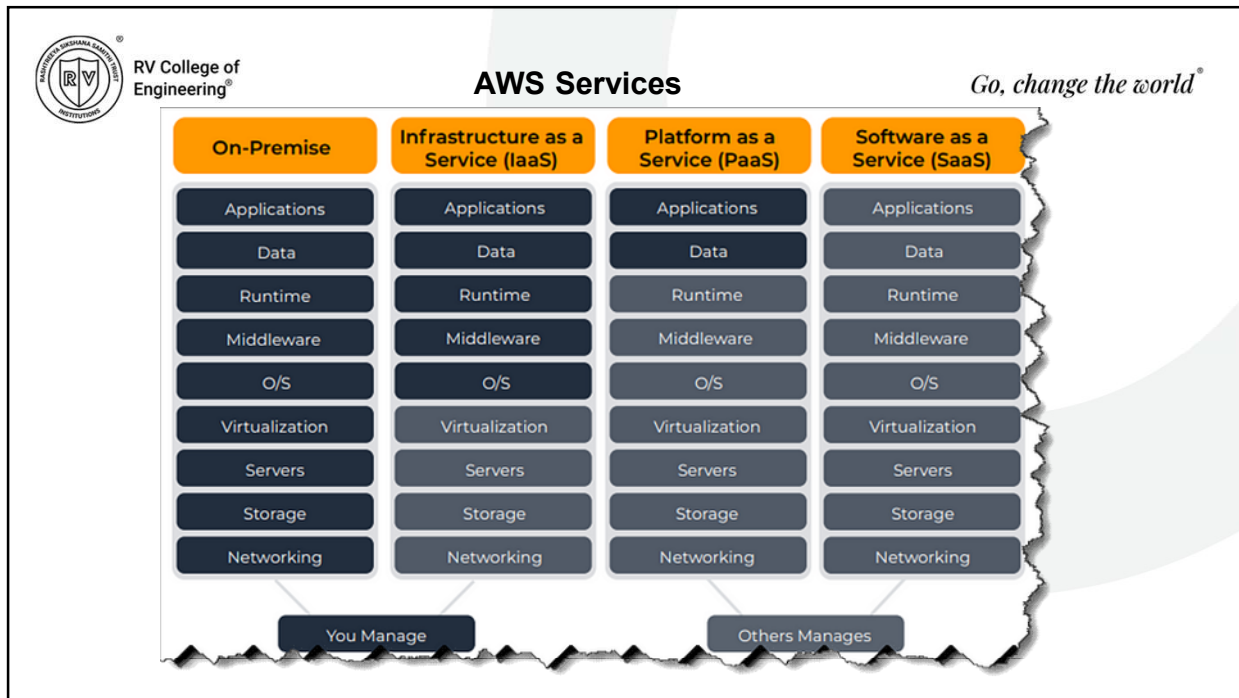


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Outline

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- Amazon EC2
- Amazon Autoscaling
- Amazon s3
- Amazon RDS
- Amazon Dynamo DB
- Amazon Kinesis
- Amazon SQS
- Amazon EMR
- AWS Cloud Features for IoT
- Usage of AWS for IoT Applications
- Deployment for IoT Applications





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Amazon EC2

Amazon EC2 (Elastic Compute Cloud) is one of the core services provided by Amazon Web Services (AWS), offering resizable compute capacity in the cloud.

Key Features

- Scalability
- Variety of Instances
- Elastic Load Balancing
- Auto scaling

Common Use Cases

- Web Hosting
- Big Data Processing: High-Performance Computing (HPC)
- Application Development and Testing:
- Backup and Disaster Recovery



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Auto Scaling

Amazon Auto Scaling is a feature within Amazon Web Services (AWS) that automatically adjusts the number of compute resources (like Amazon EC2 instances) in response to changing demand.

Key Features of Amazon Auto Scaling

- Dynamic Scaling
- Predictive Scaling
- Scaling Policies
- Multi-Service Support
- Health Checks and Replacement

How Amazon Auto Scaling Works

- Auto Scaling Groups
- Scaling Policies
- Launch Configurations/Launch Templates
- Monitoring and Metrics



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Amazon s3

Amazon S3 (Simple Storage Service) is a scalable object storage service provided by Amazon Web Services (AWS).

How Amazon S3 Works

- Buckets and Objects
- Storage Management
- Access Control
- Data Transfer and Retrieval

S3 Bucket Addressing (URL Structure)

Virtual Hosted-Style URLs: <https://my-bucket.s3.us-west-2.amazonaws.com/image.png>

Path-Style URLs: <https://s3.us-west-2.amazonaws.com/my-bucket/image.png>

Accessing via AWS Console

S3 Management Console: You can navigate to the S3 Management Console in the AWS Management Console, select the bucket, and view or manage its contents.

Direct Object Access: You can copy the object URL directly from the S3 console by selecting the object and clicking on "Copy URL".



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Amazon RDS

Amazon RDS (Relational Database Service) is a managed relational database service provided by AWS that makes it easy to set up, operate, and scale a relational database in the cloud.

Multiple Database

Amazon Aurora: A MySQL- and PostgreSQL-compatible relational database built for the cloud.

MySQL: The popular open-source relational database.

PostgreSQL: An advanced open-source relational database with support for complex queries and data types.

MariaDB: A fork of MySQL that is community-developed.

Oracle: A widely-used enterprise database with robust features.

Microsoft SQL Server: A relational database from Microsoft, widely used in enterprise environments.



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Amazon DynamoDB

Amazon DynamoDB is a fully managed NoSQL database service provided by AWS, designed for fast and predictable performance with seamless scalability.

Flexible Data Models:

Key-Value Model: Stores data as key-value pairs where each item is uniquely identified by a primary key.

Document Model: Supports complex data structures with nested attributes, allowing you to store JSON-like documents.

Common Use Cases

- Web and Mobile Backends.
- Gaming
- IoT Applications
- Real-Time Analytics



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Amazon Kinesis

Amazon Kinesis is a set of services offered by AWS that enables you to collect, process, and analyze real-time streaming data.

Key Components of Amazon Kinesis

•**Real-Time Processing:** Ingest and process data in real-time as it arrives.

•**Scalability:** You can scale the data stream by adding or removing shards, depending on your throughput requirements.

•**Durability:** Data is stored in shards and can be retained for up to 365 days.

•**Data Consumers:** You can build custom applications using AWS SDKs to process the data, or use Kinesis Data Firehose or Kinesis Data Analytics for further processing.

•**Use Cases:** Real-time log processing, event tracking, and real-time analytics



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Amazon Simple Queue Service (SQS)

Amazon Simple Queue Service (SQS) is a fully managed message queuing service offered by AWS that enables you to decouple and scale microservices, distributed systems, and serverless applications.

Common Use Cases

Decoupling Microservices: SQS enables microservices to communicate asynchronously by sending messages to a queue, where they are stored until the receiving service processes them.

Task Queues: SQS can be used to manage tasks that need to be processed asynchronously, such as image processing, email sending, or data processing.

Buffering Requests: Acts as a buffer between incoming requests and the backend processing, ensuring that your application can handle varying loads.

Distributed Systems Communication: Facilitates communication between components of distributed systems, ensuring reliable message delivery.



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Amazon EMR

Amazon EMR (Elastic MapReduce) is a cloud-based big data platform provided by AWS that makes it easy to process and analyze large datasets using popular big data frameworks such as Apache Hadoop, Apache Spark, Apache HBase, Apache Flink, and Presto

Multiple Framework Support:

Apache Hadoop: For distributed data processing using the MapReduce programming model.

Apache Spark: For fast, in-memory data processing and machine learning.

Apache HBase: A NoSQL database for real-time, random access to large datasets.

Apache Flink: For stateful stream processing.

Presto: A distributed SQL query engine for interactive analytics on large datasets.



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1. AWS IoT Core

Device Connectivity and Management: Allows secure device connectivity and messaging between IoT devices and the cloud.

Device Shadows: Provides a persistent, virtual representation of each device, which includes the device's last reported state and desired future state.

Rules Engine: Helps process and route data from IoT devices to other AWS services based on predefined rules.

2. AWS IoT Device Management

Onboarding and Organizing Devices: Supports device registration, organization, and group management.

Over-the-Air Updates (OTA): Allows for remote software updates to IoT devices, ensuring they run the latest firmware and applications.

Fleet Indexing and Search: Facilitates searching for devices based on device attributes, status, or any other metadata.



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Creation of EC2 Instances

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Amazon EC2 Instance Creation

- EC2 stands for Amazon Elastic Compute Cloud.
- Amazon EC2 is a web service that provides resizable compute capacity in the cloud.

Amazon machine images

- Amazon Machine Images (AMIs) are templates from which it is possible to create a virtual machine.
- They are stored in Amazon S3 and identified by a unique identifier in the form of ami-xxxxxx and XML File

EC2 instances

- EC2 instances represent virtual machines. They are created using AMI as templates, which are specialized by selecting the number of cores, their computing power, and the installed memory.



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Creation of EC2 Instances

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```
#!/bin/bash
yum update -y
yum install httpd -y
echo "<html>
    <body><center><h1> Welcome to Cloud Computing Skill
Lab</h1></center>
    </body>
</html>">/var/www/html/index.html

systemctl start httpd
systemctl enable httpd
```



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Creation of EC2 Instances

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Go to downloads

Address bar type: cmd

```
C:\user\downloads\ssh ssh -i key-pair-name.pem ec2-user@ec2-198-51-100-1.us-east-2.compute.amazonaws.com
```

Right click and paste your copied ssh address and hit enter

Type yes and hit enter

```
ssh$ Curl http://localhost
```




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Creation of EC2 Instances

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Install Python in EC2 Instance

```
Sudo apt update
```

```
Ssh$ yum install python or yum  
install python 3
```

```
Or sudo apt install python3-pip
```

```
Sudo yum install python
```

```
Pip install jupyterlab
```

```
Pip install jupyter notebook
```



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Creation of EC2 Instances

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```
sudo apt update
```

```
sudo apt install python3-pip
```

```
pip install jupyterlab
```

```
pip install jupyter notebook
```

```
echo 'export PATH=$PATH:~/.local/bin' >> ~/.bashrc
```

```
source ~/.bashrc
```

```
# Set the password for jupyterlab
```

```
jupyter notebook password
```

```
# Initiate jupyterlab
```

```
jupyter-lab --ip 0.0.0.0 --no-browser --allow-root
```

Go to ec2 instance and copy public address



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Creation of EC2 Instances

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44.211:148.32:8888/lab

If security is not created then go to ec2 instance
Go to security
click on security group

Click on edit inbound rules

Click on add rule

edit tcp port no 8888 source select my if or public
public ip you type 0.0.0.0/0

Click on save rules



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Amazon s3

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Amazon s3

- S3 is a safe place to store the files.
- It is Object-based storage, i.e., you can store the images, word files, pdf files, etc.
- The files which are stored in S3 can be from 0 Bytes to 5 TB.
- Files are stored in Bucket. A bucket is like a folder available in S3 that stores the files.
- S3 is a universal namespace, i.e., the names must be unique globally. Bucket contains a DNS address. Therefore, the bucket must contain a unique name to generate a unique DNS address.
- If you create a bucket, URL look like:

<https://s3-eu-west-1.amazonaws.com/acloudguru>

↓
Region name

↓
Bucket name



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Amazon s3

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Storage services

Resource naming Buckets

- Canonical form: http://s3.amazonaws.com/bucket_name/
- Subdomain form: <http://bucketname.s3.amazonaws.com/>
- Virtual hosting form: <http://bucket-name.com/>

Buckets

- A bucket is a container of objects. It can be thought of as a virtual drive hosted on the S3 distributed storage, which provides users with a flat store to which they can add objects.