



Cloud Computing Tutorial

What's in it for you?

- 1 Why Cloud Computing?
- 2 What is Cloud Computing?
- 3 Types of Cloud Computing
- 4 Cloud Providers
- 5 Lifecycle of a Cloud Computing Solution
- 6 Cloud Computing with AWS
- 7 Demo – AWS EC2 and AWS S3



Why Cloud Computing?



Why Cloud Computing?

Hi Paul, I'm about to start a company.

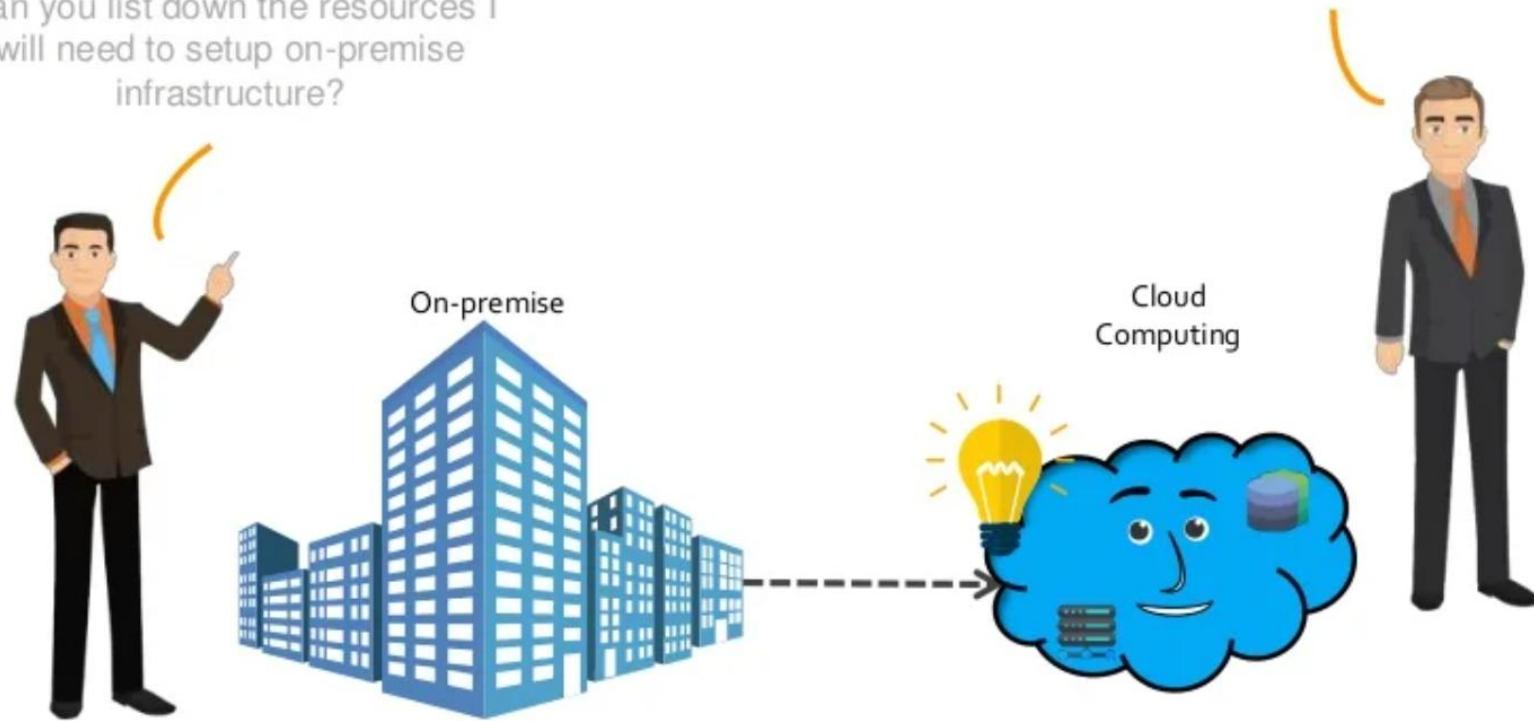
Can you list down the resources I will need to setup on-premise infrastructure?



Why Cloud Computing?

Hi Sam, I'm about to start a company.
Can you list down the resources I will need to setup on-premise infrastructure?

Why not setup things on a cloud?



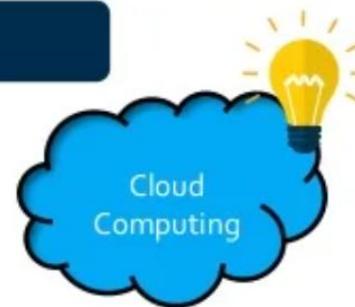
Why Cloud Computing?

On-premise **vs** Cloud Computing

On-Premise



- Higher pay, less scalability
- Allot huge space for servers
- Appoint a team for hardware and software maintenance
- Poor data security
- Less chance of data recovery



- Pay for what you use
 - Scale up= pay more
 - Scale down= pay less
- No server space required
- No experts required for hardware and software maintenance
- Better data security
- Disaster recovery

Why Cloud Computing?

On-premise **vs** Cloud Computing

On-Premise



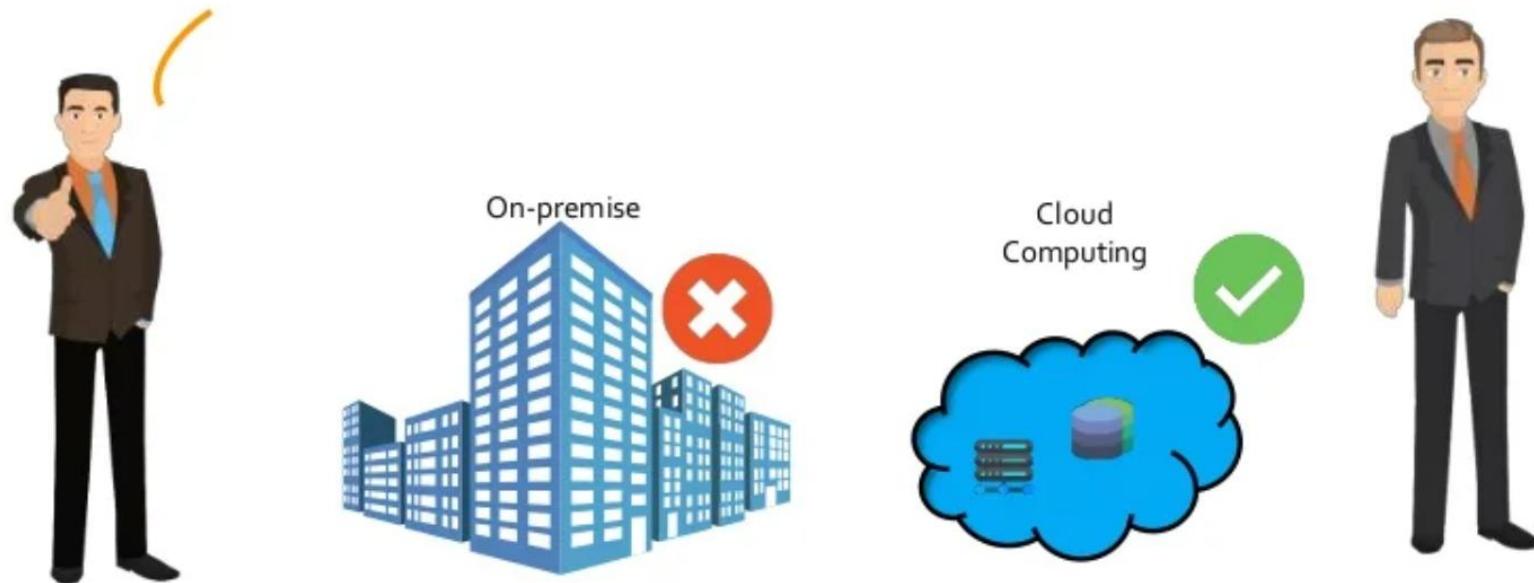
- Lack of flexibility
- No automatic updates
- Less collaboration
- Data cannot be accessed remotely
- Takes longer implementation time



- High Flexibility
- Automatic software updates
- Teams can collaborate from widespread locations
- Data can be accessed and shared anywhere over the internet
- Rapid implementation

Why Cloud Computing?

You are right! Cloud computing is better than on-premise





What is Cloud Computing?

What is Cloud Computing?

Cloud computing is the delivery of on-demand computing services over the internet on a pay-as-you-go basis

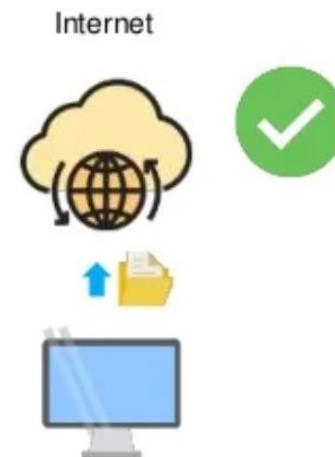


What is Cloud Computing?

Rather than managing files on a local storage device, cloud computing makes it possible to save them over internet



Storage device

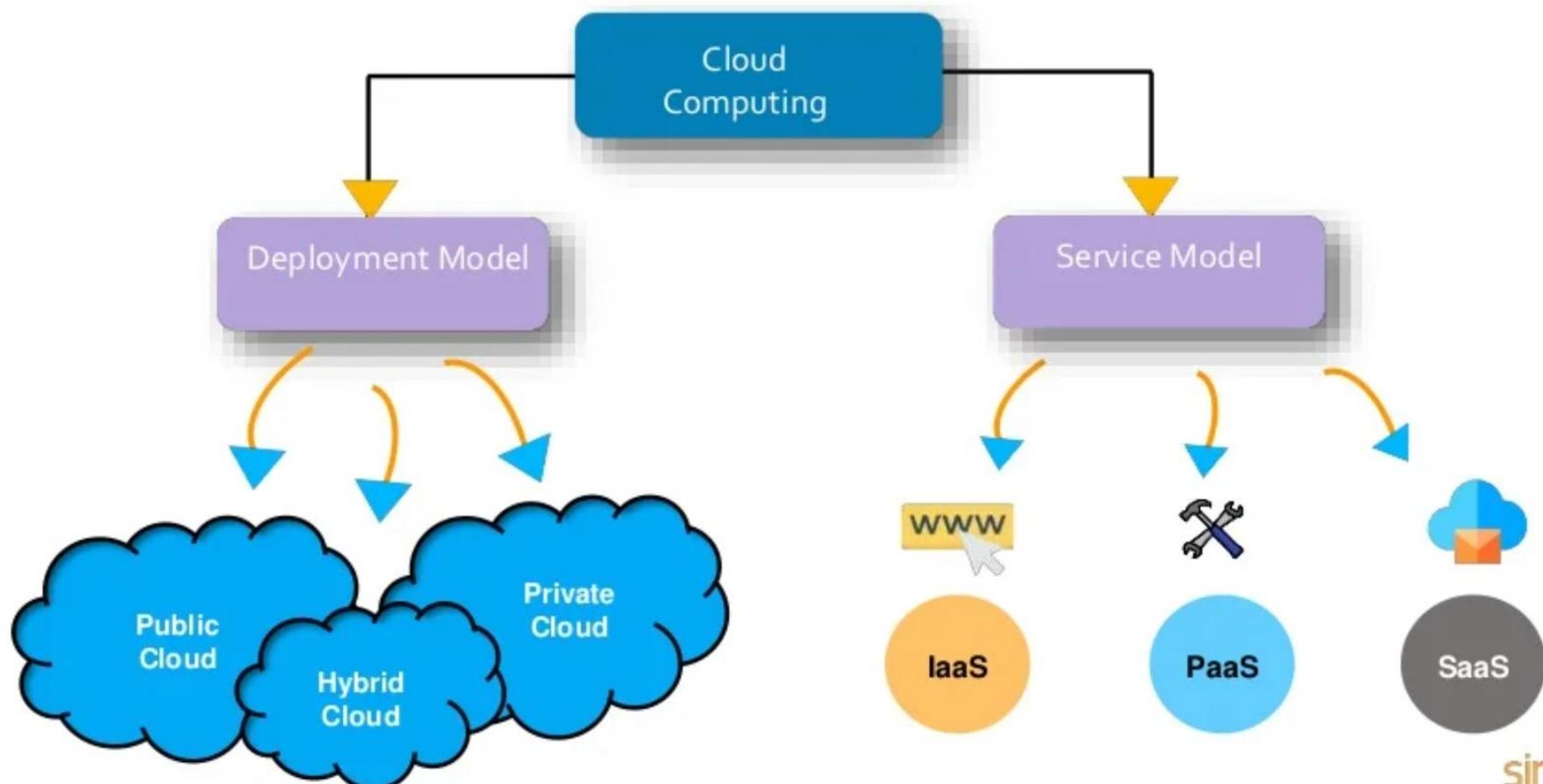


Save files

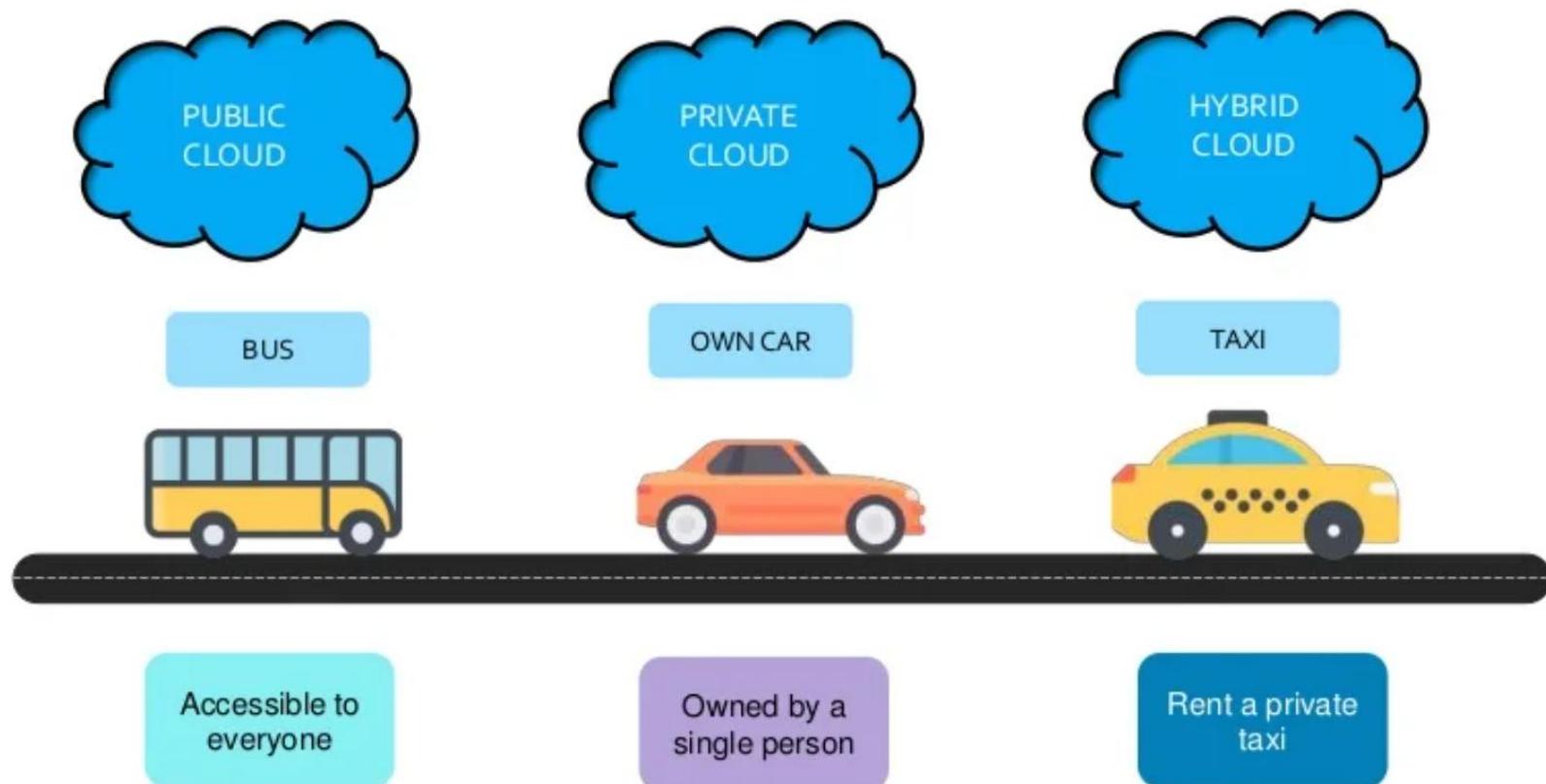
Types of Cloud Computing



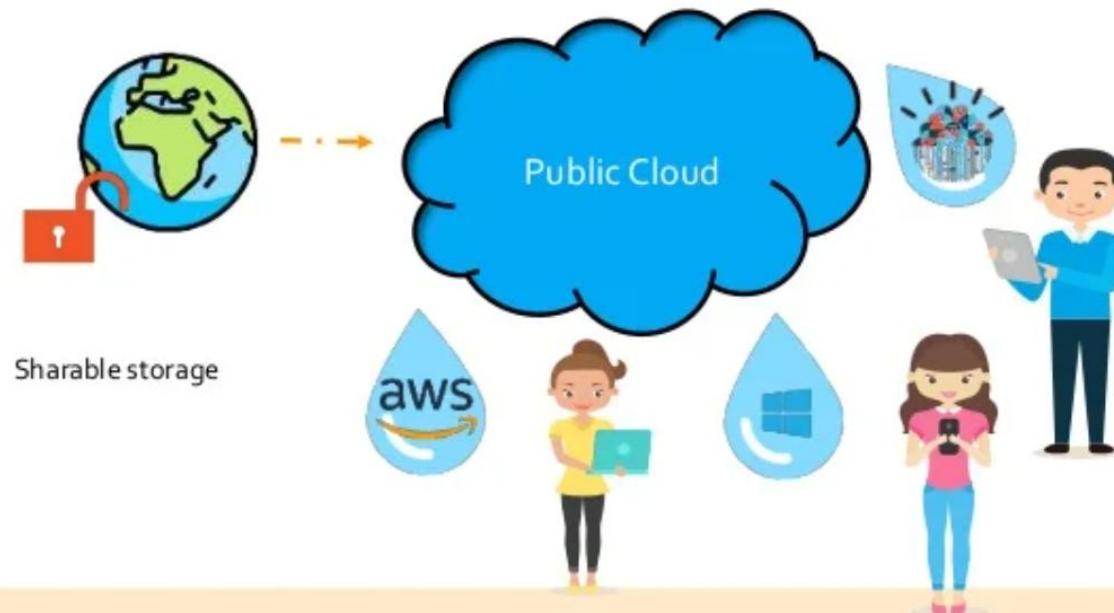
Types of Cloud Computing



Types of Deployment Models



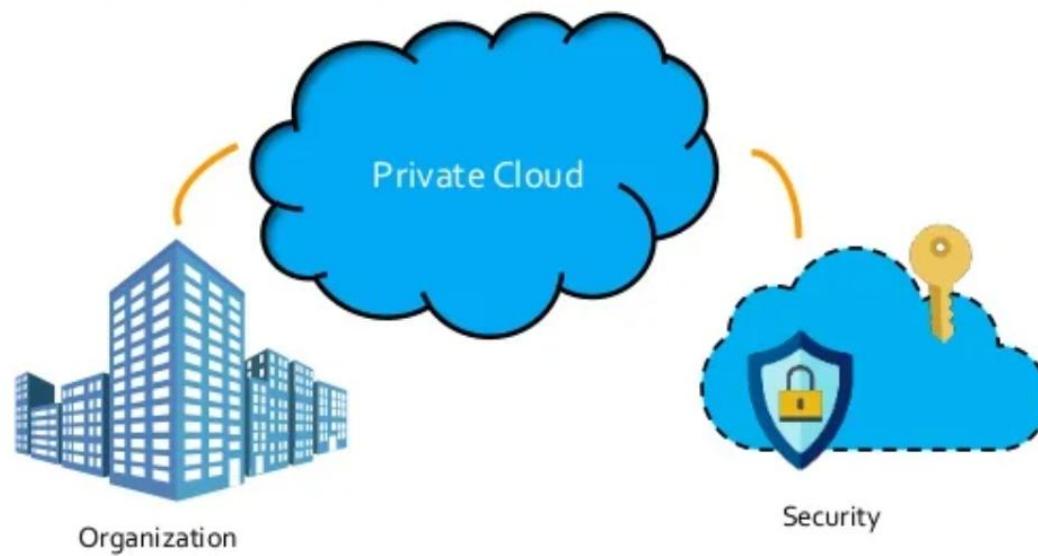
Public Cloud



The cloud infrastructure is made available to the general public over the internet and is owned by a cloud provider

Example: AWS, Microsoft Azure, IBM's Blue Cloud and Sun Cloud

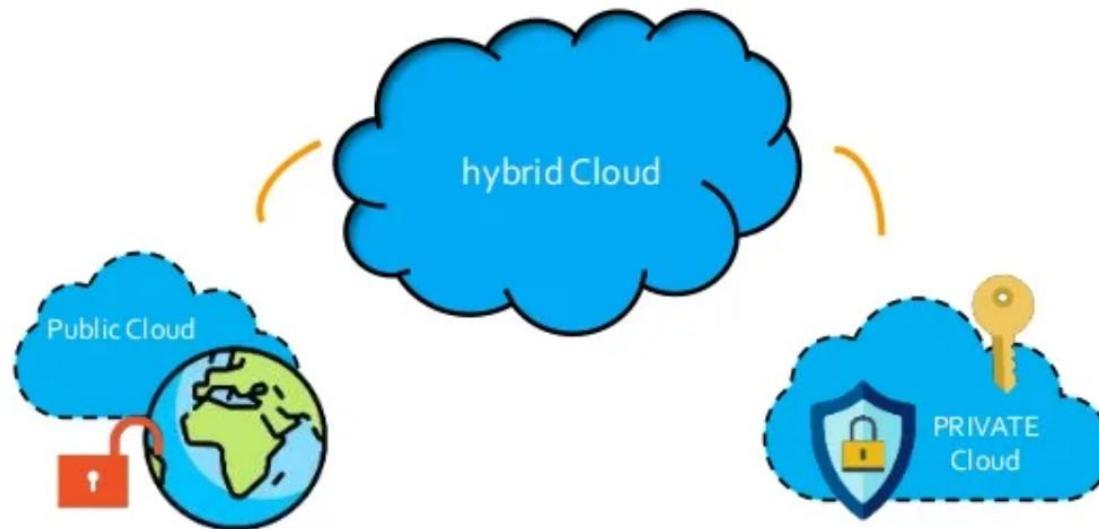
Private Cloud



The cloud infrastructure is exclusively operated by a single organization. It can be managed by the organization or a third party and may exist on-premise or off-premise

Example: AWS, VMware

Hybrid Cloud



It consists the functionalities of both public and private cloud

For example:

Federal agencies opt for private clouds when sensitive information is involved

Also, they use the public cloud to share datasets with general public or other government departments

Types of Service Models

Which cloud service is suitable for you?



IaaS

If your business needs a virtual machine, opt for Infrastructure as a Service



PaaS

If your company requires a platform for building software products, pick Platform as a Service



SaaS

If your business doesn't want to maintain any IT equipment, then choose Software as a Service



If the business wants a finished product hosted in cloud

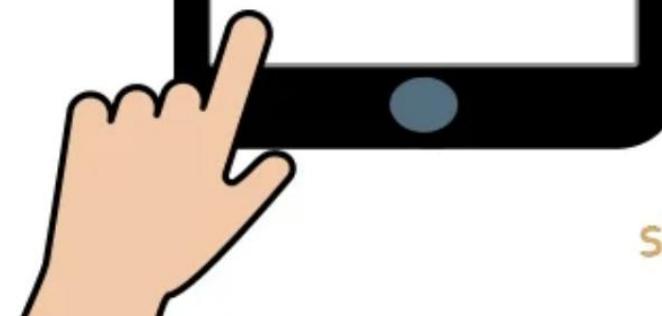
IaaS

eg: online data backup services



- ✓ IaaS is a cloud service that provides basic computing infrastructure
- ✓ Services are available on pay-for-what-you-use model
- ✓ IaaS providers include Amazon Web Services, Microsoft Azure and Google Compute Engine
- Users: IT Administrators**

IaaS ProductS and Services



PaaS



- ✓ PaaS provides cloud platforms and runtime environments for developing, testing, and managing applications
- ✓ It allows software developers to deploy applications without requiring all the related infrastructure
- ✓ **Users: Software Developers**

PaaS ProductS and Services



SaaS

eg: google docs



- ✓ In SaaS, cloud providers host and manage the software application on a pay-as-you-go pricing model
- ✓ All software and hardware are provided and managed by a vendor so you don't have to maintain anything

Users: End Customers

SaaS ProductS and Services



Differences between IaaS, PaaS and SaaS

On-Premises	IaaS	PaaS	SaaS
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking



Managed by you



Managed by Vendor

Differences between IaaS, PaaS and SaaS

Example:

Consider a task where you are planning to bake a cake



Differences between IaaS, PaaS and SaaS

On-Premises

Made at Home

Dinning table

Water

Electricity

Oven

Cake Pan

Flour

Sugar

Butter

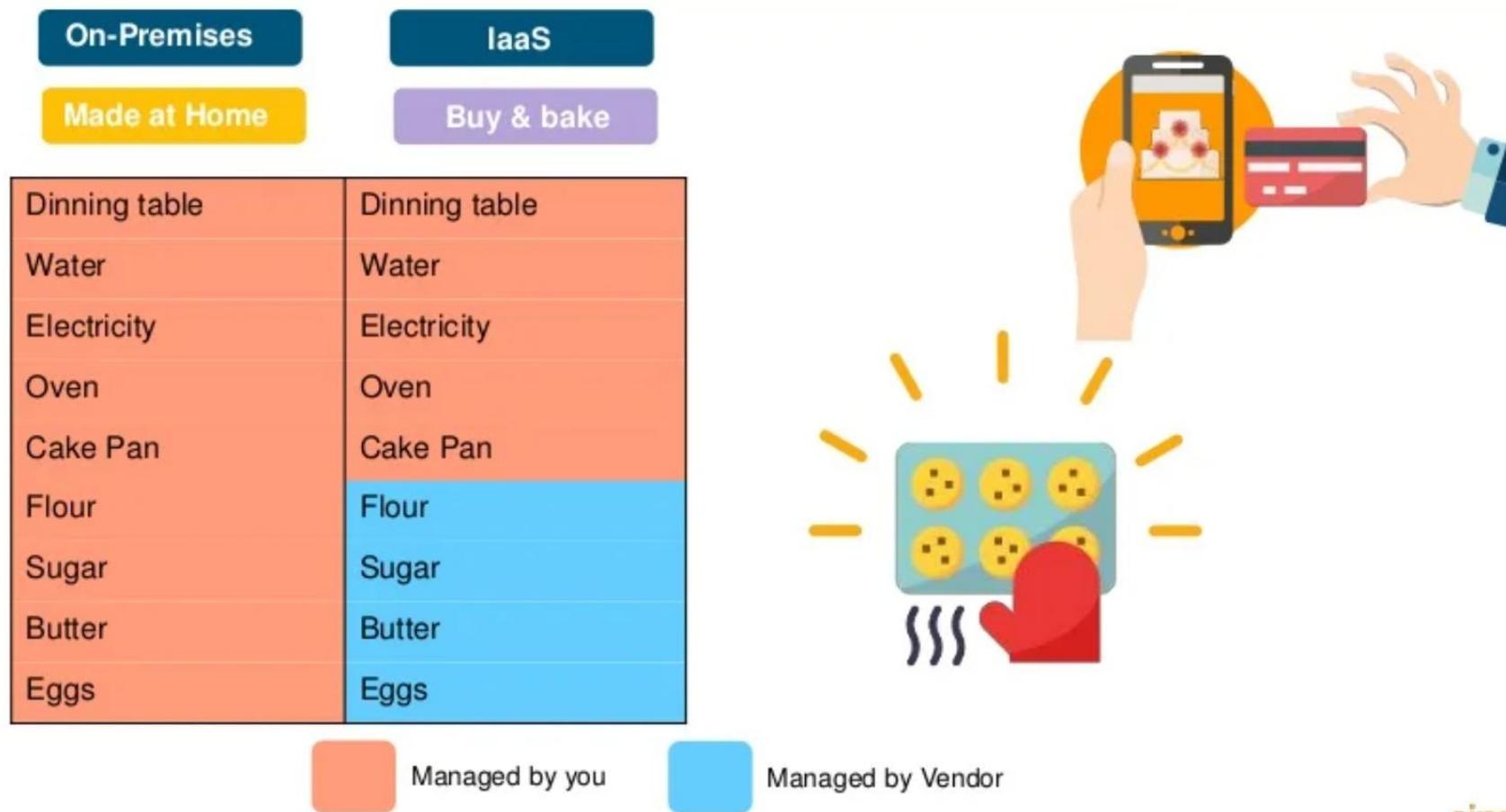
Eggs



Managed by you

Managed by Vendor

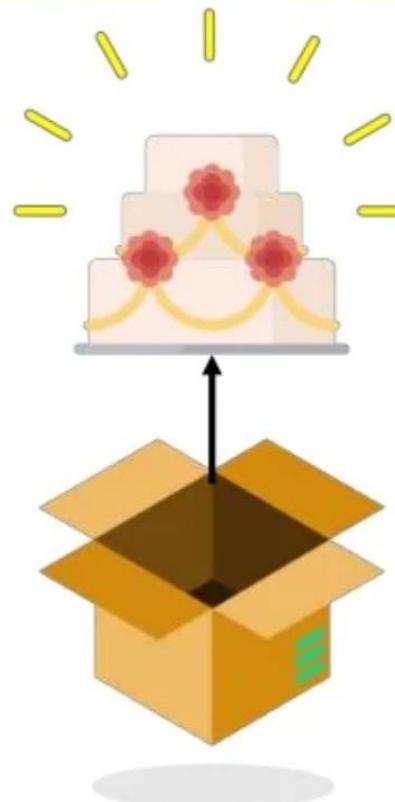
Differences between IaaS, PaaS and SaaS



Differences between IaaS, PaaS and SaaS

On-Premises	IaaS	PaaS
Made at Home	Buy & bake	Cake delivery
Dinning table	Dinning table	Dinning table
Water	Water	Water
Electricity	Electricity	Electricity
Oven	Oven	Oven
Cake Pan	Cake Pan	Cake Pan
Flour	Flour	Flour
Sugar	Sugar	Sugar
Butter	Butter	Butter
Eggs	Eggs	Eggs

Managed by you Managed by Vendor



Differences between IaaS, PaaS and SaaS

On-Premises	IaaS	PaaS	SaaS
Made at Home	Buy & bake	Cake delivery	Dine out
Dinning table	Dinning table	Dinning table	Dinning table
Water	Water	Water	Water
Electricity	Electricity	Electricity	Electricity
Oven	Oven	Oven	Oven
Cake Pan	Cake Pan	Cake Pan	Cake Pan
Flour	Flour	Flour	Flour
Sugar	Sugar	Sugar	Sugar
Butter	Butter	Butter	Butter
Eggs	Eggs	Eggs	Eggs

Managed by you Managed by Vendor



Cloud Providers



Cloud Providers



Cloud Computing with AWS



Cloud Computing with AWS



- Amazon Web Services (AWS) is a cloud service from Amazon 
- It provides services over the internet 
- AWS services can be used to create and deploy any type of application in the cloud 
- AWS uses the subscription pricing model (pay for what you use) 



Lifecycle of a Cloud Computing Solution



Lifecycle of a Cloud Computing Solution

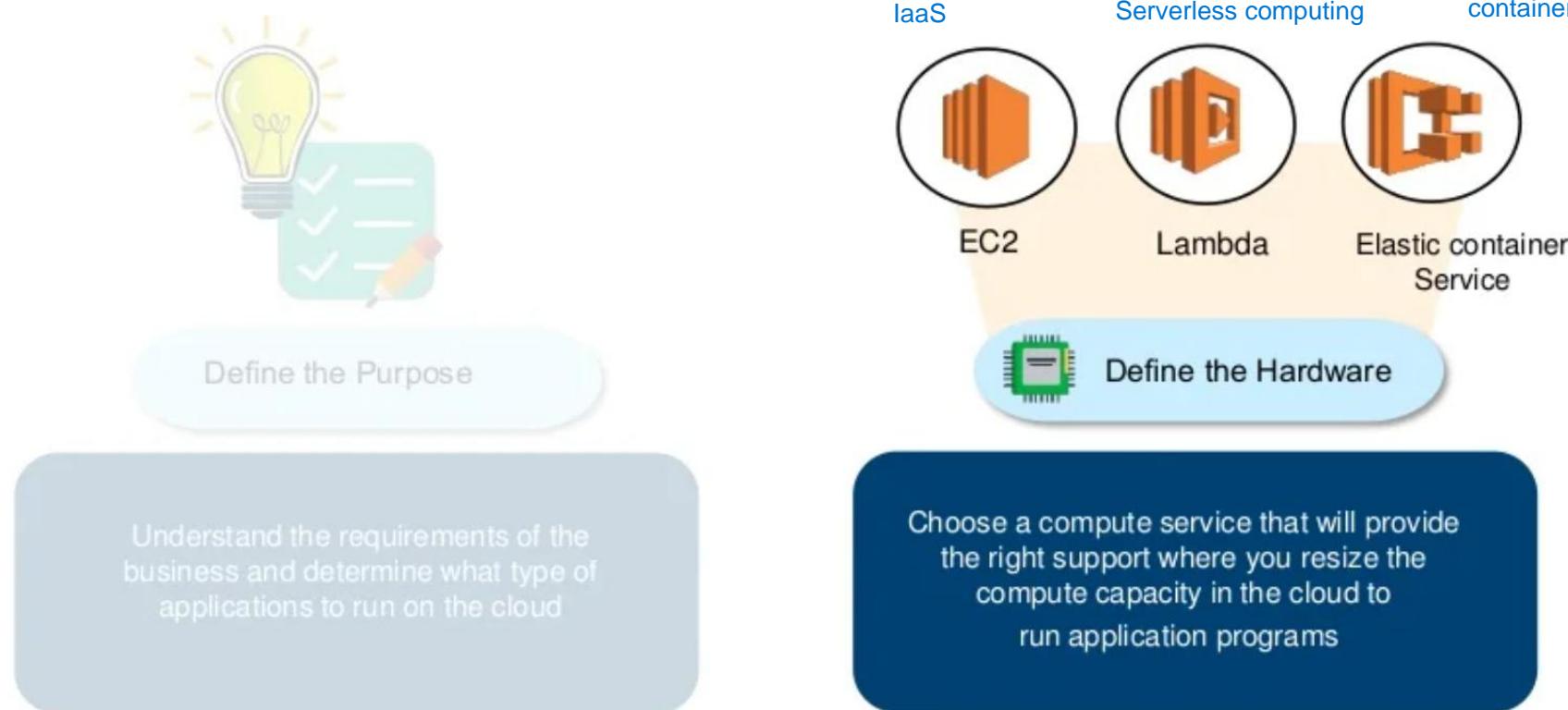


Define the Purpose

Understand the requirements of the business and determine what type of applications to run on the cloud

only then we'll be able to properly pick the right service offered by the provider

Lifecycle of a Cloud Computing Solution

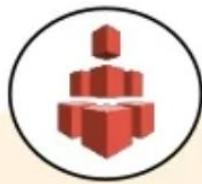


Lifecycle of a Cloud Computing Solution

for backup

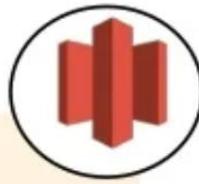


S3



EFS

for archiving



Glacier



EC2



Lambda



Elastic container Service



Define the Storage

Choose a storage service where you can backup and archive your data over the internet



Define the Hardware

Choose a compute service that will provide the right support where you resize the compute capacity in the cloud to run application programs

Lifecycle of a Cloud Computing Solution



S3



EFS



Glacier

for network



VPC

for DNS



Route 53

for private p2p line from office to the AWS data center



Direct Connect



Define the Storage

Choose a storage service where you can backup and archive your data over the internet



Define the Network

Define a network that securely delivers data, videos, applications etc. with low latency and high transfer speeds

Lifecycle of a Cloud Computing Solution

for authentication
and authorization



IAM

for data encryption
at rest



KMS



Cognito



VPC



Route 53



Direct
Connect



Define Security

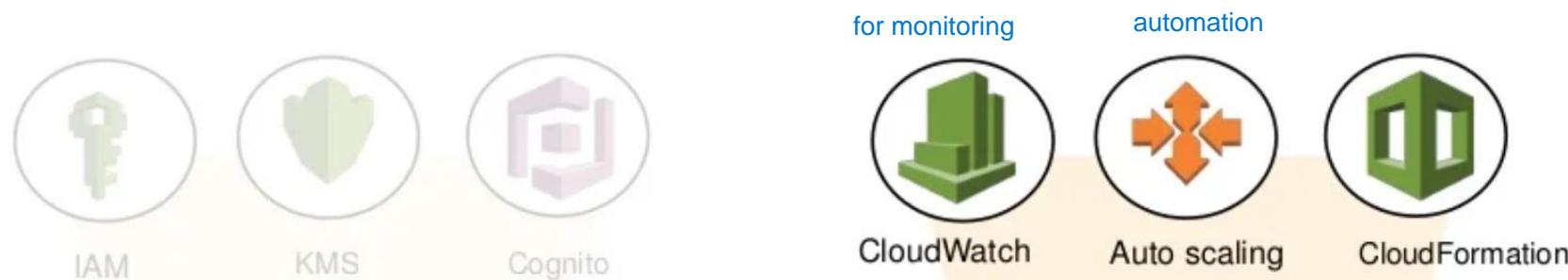
Set up your security service which enable services for user authentication or limiting access to a certain set of users on your AWS resources



Define the Network

Define a network that securely delivers data, videos, applications etc. with low latency and high transfer speeds

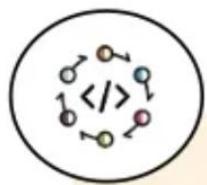
Lifecycle of a Cloud Computing Solution



Set up your security service which enable services for user authentication or limiting access to a certain set of users on your AWS resources

You can have complete control on your cloud environment by defining management tools which monitor AWS resources and the customer applications running on AWS platform

Lifecycle of a Cloud Computing Solution



CodeStar



CodeBuild



CodePipeline



CloudWatch



Auto scaling



CloudFormation



Testing the process

Verify the process using AWS developer tools where you can build, test and deploy your code quickly



Define Management Processes and Tools

You can have complete control on your cloud environment by defining management tools which monitor AWS resources and the customer applications running on AWS platform

Lifecycle of a Cloud Computing Solution



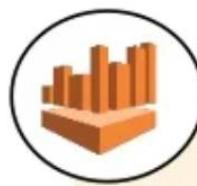
CodeStar



CodeBuild



CodePipeline



Athena



EMR



CloudSearch



Testing the process

Verify the process using AWS developer tools where you can build, test and deploy your code quickly



Analytics

Finally, analyze and visualize data by using analytic service where you can start querying data instantly and get results

Demo – AWS EC2 and AWS S3



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Demo - AWS EC2 and AWS S3



I have an application which takes a lot of storage and works only in the Linux system, which I don't have right now



Demo - AWS EC2 and AWS S3

I have an application which takes a lot of storage and works only in the Linux system, which I don't have right now



You can store all your data in AWS S3



Demo - AWS EC2 and AWS S3

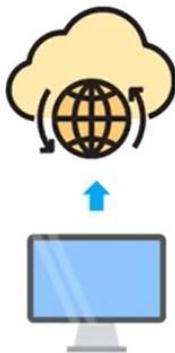
I have an application which takes a lot of storage and works only in the Linux system, which I don't have right now



And you can launch a Linux instance using AWS EC2



Demo - AWS EC2 and AWS S3



AWS EC2

- AWS EC2 is a web service that provides a secure and resizable compute capacity in the cloud
- It can be used to launch as many virtual servers you need



AWS S3

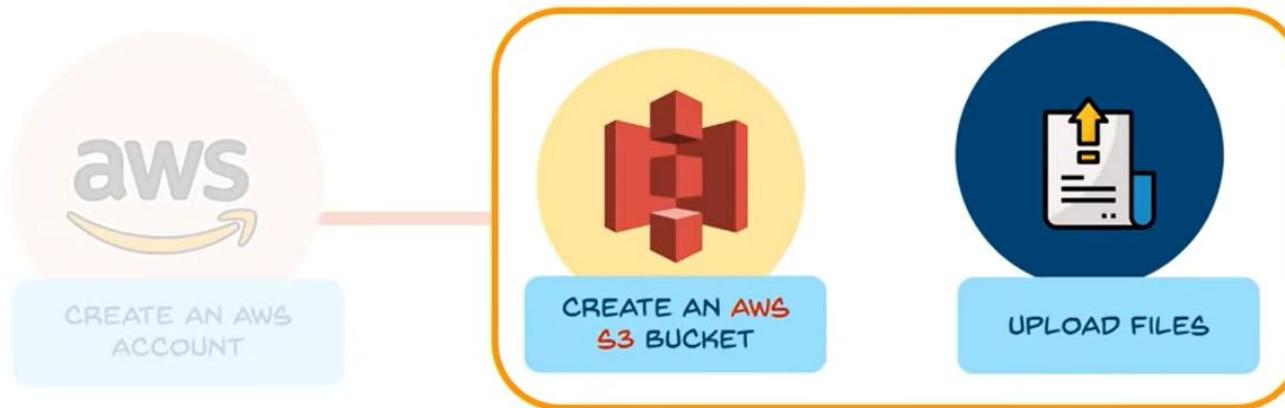
- AWS S3 is a Simple Storage Service provided by AWS
- Using Amazon S3, you can store and retrieve any amount of data at any time on the web



Demo - AWS EC2 and AWS S3



Demo - AWS EC2 and AWS S3



Secure | https://s3.console.aws.amazon.com/s3/home?region=us-east-1

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AWS Services Resource Groups

Stream Video to AWS for Analytics—Easily capture, process, and store video streams for analytics and machine learning. [Learn More »](#)

Documentation

Amazon S3

Discover the new console Quick tips

Search for buckets

+ Create bucket Delete bucket Empty bucket

Bucket name	Access	Region	Date created
awssrecording	Public	Asia Pacific (Mumbai)	Apr 3, 2018 12:59:36 AM GMT+0530
elasticbeanstalk-ap-south-1-672403442155	Not public *	Asia Pacific (Mumbai)	Feb 17, 2018 7:48:12 PM GMT+0530
elasticbeanstalk-us-east-1-672403442155	Not public *	US East (N. Virginia)	May 5, 2018 5:49:23 PM GMT+0530
elasticbeanstalk-us-west-2-672403442155	Not public *	US West (Oregon)	Jan 26, 2018 2:03:24 AM GMT+0530

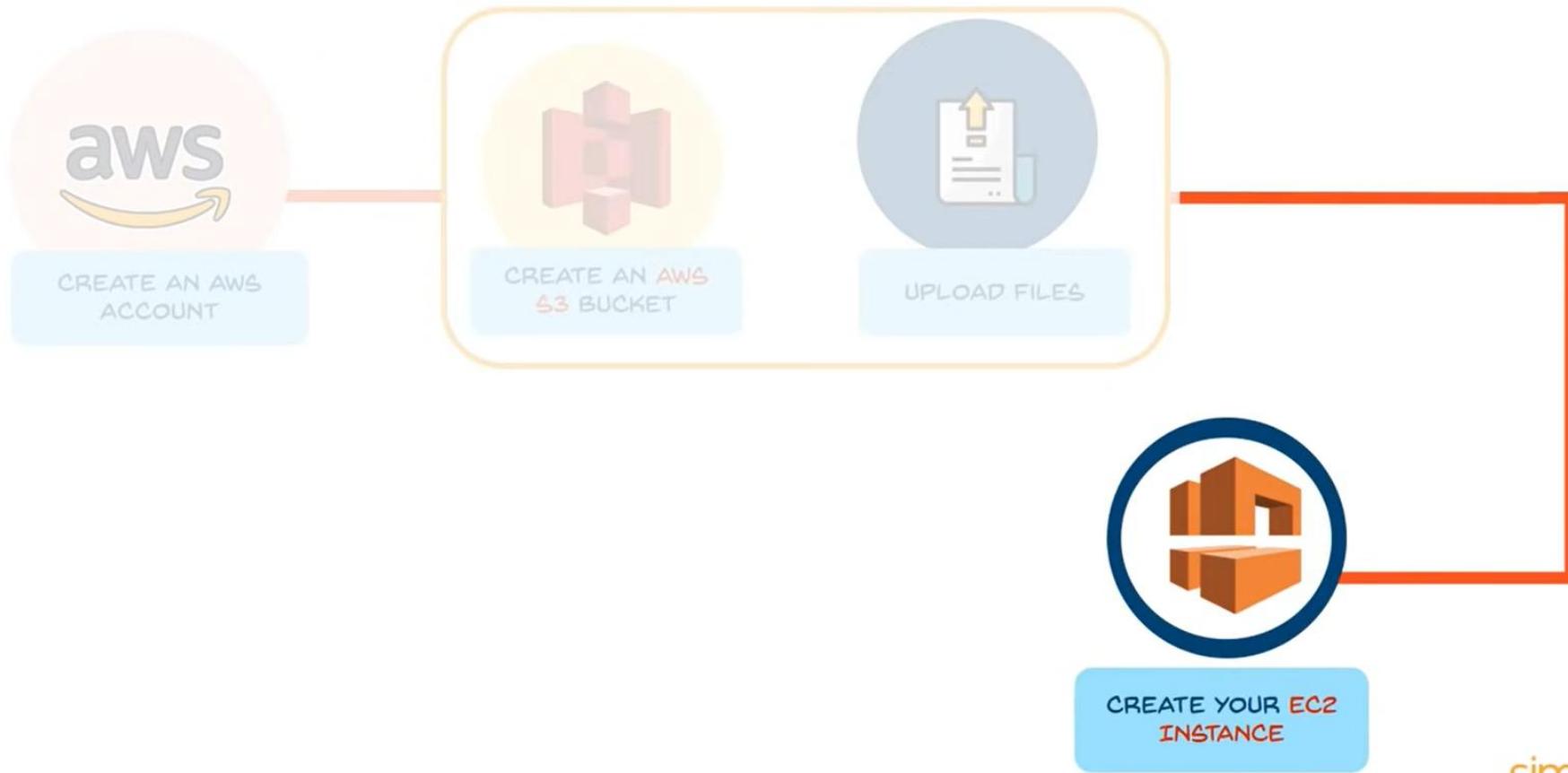
* Objects might still be publicly accessible due to object ACLs. [Learn more](#)

Operations 0 In progress 1 Success 0 Error

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Demo - AWS EC2 and AWS S3



Secure | https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Home:

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Services Resource Groups

EC2 Dashboard

- Events
- Tags
- Reports
- Limits

INSTANCES

- Instances
- Launch Templates
- Spot Requests
- Reserved Instances
- Dedicated Hosts
- Scheduled Instances

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK & SECURITY

- Security Groups

Resources

You are using the following Amazon EC2 resources in the US East (N. Virginia) region:

0 Running Instances	0 Elastic IPs
0 Dedicated Hosts	0 Snapshots
0 Volumes	0 Load Balancers
7 Key Pairs	3 Security Groups
0 Placement Groups	

Learn more about the latest in AWS Compute from AWS re:Invent 2017 by viewing the EC2 Videos.

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Launch Instance

Note: Your instances will launch in the US East (N. Virginia) region

Service Health

Service Status:

- US East (N. Virginia): This service is operating normally

Availability Zone Status:

Scheduled Events

US East (N. Virginia):

No events

Account Attributes

Supported Platforms

VPC

Default VPC

vpc-70386117

Resource ID length management

Additional Information

Getting Started Guide

Documentation

All EC2 Resources

Forums

Pricing

Contact Us

AWS Marketplace

Find free software trial products in the AWS Marketplace from the EC2 Launch Wizard. Or try these popular AMIs:

Barracuda CloudGen Firewall for AWS - PAYG

Provided by Barracuda Networks, Inc.

Rating ★★★★☆

https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:

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1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 1: Choose an Amazon Machine Image (AMI)

[Cancel and Exit](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Quick Start

My AMIs

AWS Marketplace

Community AMIs

Free tier only ⓘ



Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-14c5486b

[Select](#)

64-bit

Amazon Linux

Free tier eligible

The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes



Amazon Linux 2 LTS Candidate 2 AMI (HVM), SSD Volume Type - ami-afd15ed0

[Select](#)

64-bit

Amazon Linux

Free tier eligible

Amazon Linux 2 LTS Candidate 2 provides an updated version of the Linux Kernel (4.14) tuned for EC2, systemd support, a newer compiler (gcc 7.3), an updated C runtime (glibc 2.26), newer tooling (binutils 2.29.1), and the latest software packages through the extras mechanisms.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes



SUSE Linux Enterprise Server 12 SP3 (HVM), SSD Volume Type - ami-62bda218

[Select](#)

64-bit

SUSE Linux

Free tier eligible

SUSE Linux Enterprise Server 12 Service Pack 3 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

Secure | https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#LaunchInstanceWizard:

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Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types Current generation Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes

Cancel Previous **Review and Launch** Next: Configure Instance Details

Secure | https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:sort=instanceId

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Services Resource Groups

EC2 Dashboard Events Tags Reports Limits

INSTANCES

Instances (selected)

- Launch Templates
- Spot Requests
- Reserved Instances
- Dedicated Hosts
- Scheduled Instances

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK &

Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

1 to 1 of 1

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
	i-0aedb6073a230a7e2	t2.micro	us-east-1c	running	Initializing	None	ec2-54-224-59-25.

Instance: i-0aedb6073a230a7e2 Public DNS: ec2-54-224-59-25.compute-1.amazonaws.com

Description Status Checks Monitoring Tags

Instance ID	i-0aedb6073a230a7e2	Public DNS (IPv4)	ec2-54-224-59-25.compute-1.amazonaws.com
Instance state	running	IPv4 Public IP	54.224.59.25
Instance type	t2.micro	IPv6 IPs	-
Elastic IPs		Private DNS	ip-172-31-54-151.ec2.internal
Availability zone	us-east-1c	Private IPs	172.31.54.151
Security groups	launch-wizard-2, view inbound rules	Secondary private IPs	

Secure | https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:sort=instanceId

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Services Resource Groups

EC2 Dashboard Events Tags Reports Limits

INSTANCES

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- Scheduled Instances

IMAGES

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- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK &

Launch Instance Connect Actions

root@ip-172-31-54-151:/var/www/html

```
[root@ip-172-31-54-151 html]#
[root@ip-172-31-54-151 html]#
[root@ip-172-31-54-151 html]#
[root@ip-172-31-54-151 html]# pwd
/var/www/html
[root@ip-172-31-54-151 html]#
```

Elastic IPs

Availability zone us-east-1c

Security groups launch-wizard-2, view inbound rules

Instance State Status Checks Alarm Status Public DNS (IPv4)

running Initializing None ec2-54-224-59-25

IPs (IPv4) ec2-54-224-59-25.compute-1.amazonaws.com

Public IP 54.224.59.25

IPv6 IPs -

Private DNS ip-172-31-54-151.ec2.internal

Private IPs 172.31.54.151

Secondary private IPs

Amazon Linux AMI Test Page

This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page, it means that the Apache HTTP server installed at this site is working properly.

If you are a member of the general public:

The fact that you are seeing this page indicates that the website you just visited is either experiencing problems, or is undergoing routine maintenance.

If you would like to let the administrators of this website know that you've seen this page instead of the page you expected, you should send them e-mail. In general, mail sent to the name "webmaster" and directed to the website's domain should reach the appropriate person.

For example, if you experienced problems while visiting www.example.com, you should send e-mail to "webmaster@example.com".

For information on Amazon Linux AMI , please visit the [Amazon AWS website](#).

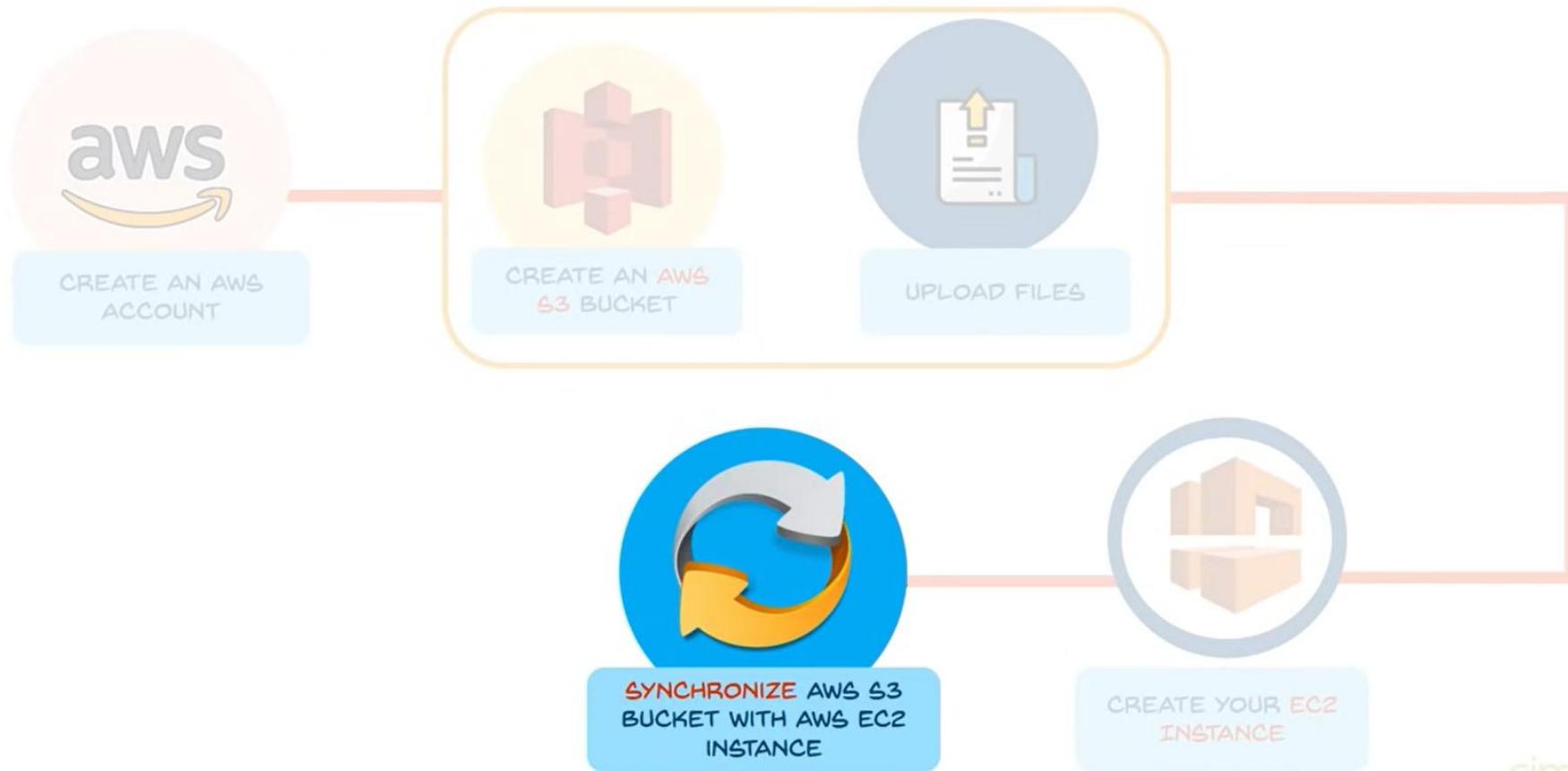
If you are the website administrator:

You may now add content to the directory `/var/www/html/`. Note that until you do so, people visiting your website will see this page, and not your content. To prevent this page from ever being used, follow the instructions in the file `/etc/httpd/conf.d/welcome.conf`.

You are free to use the image below on web sites powered by the Apache HTTP Server:



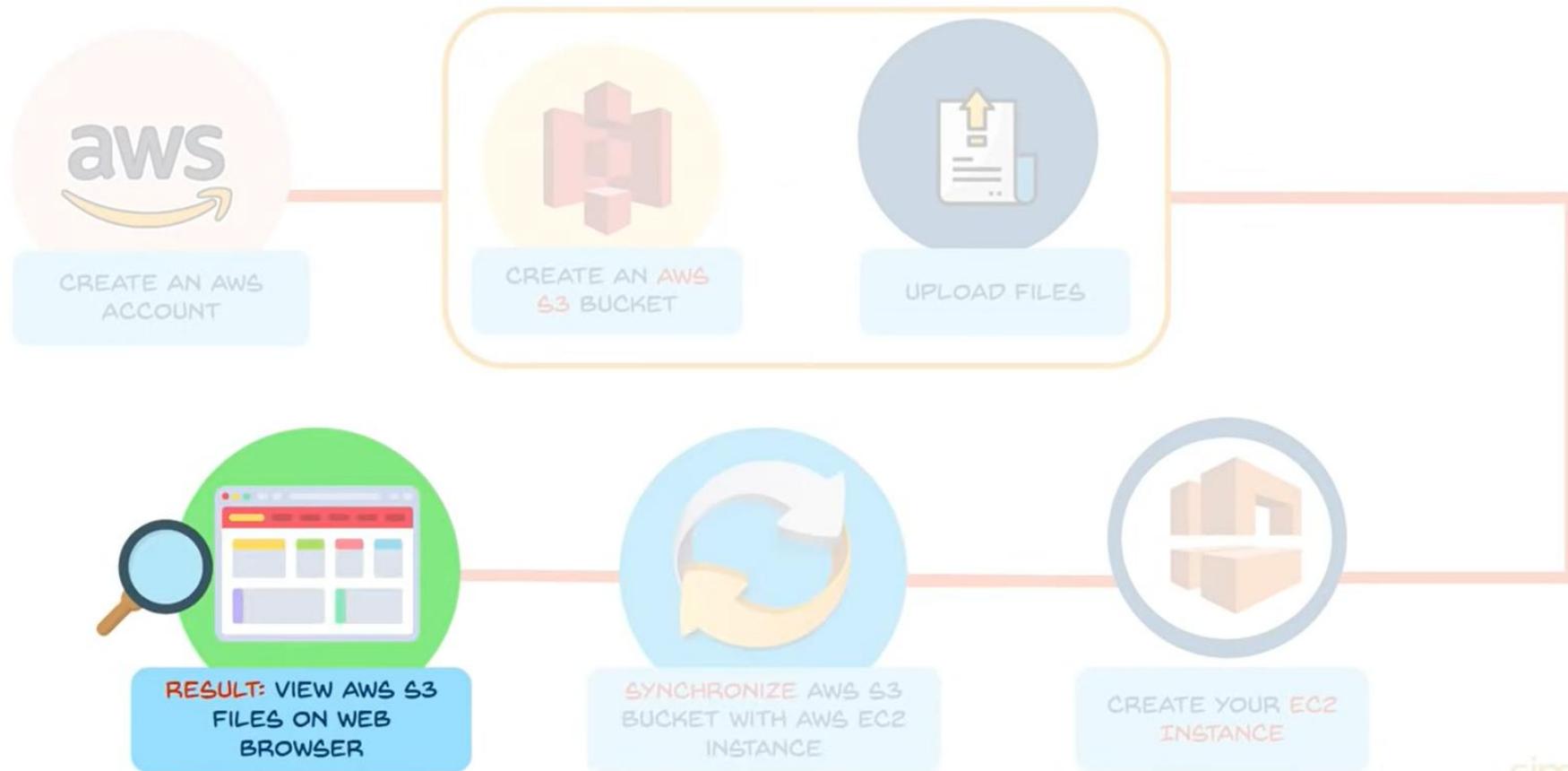
Demo - AWS EC2 and AWS S3



Welcome to my website

This website uses S3 as its source Code Control

Demo - AWS EC2 and AWS S3



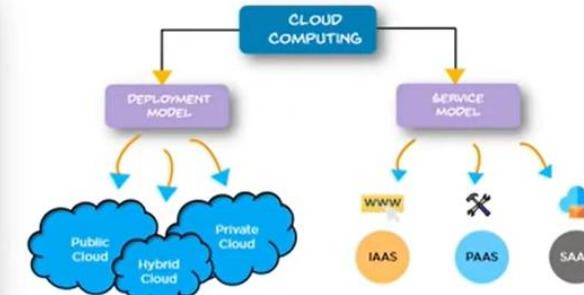
Key Takeaways

What is Cloud Computing?

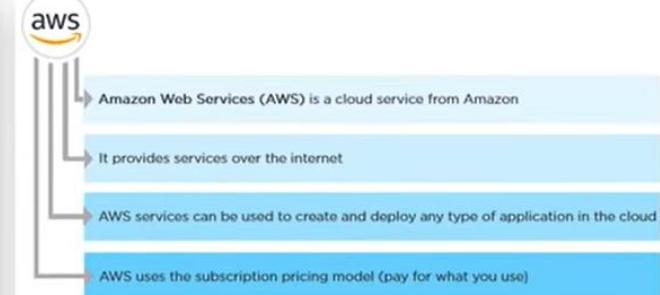
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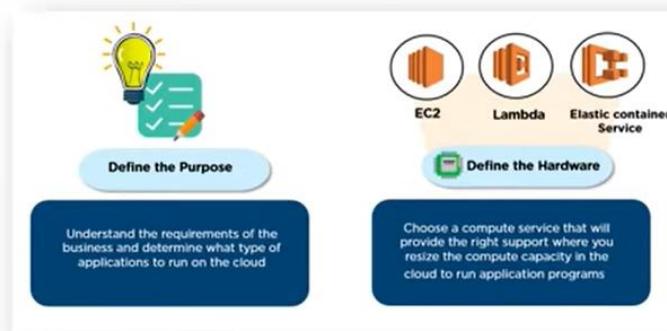
Types of Cloud Computing



Cloud Computing with AWS



Lifecycle of a Cloud Computing Solution



Demo - AWS EC2 and S3

