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## **Describe IaaS**

Infrastructure as a Service (IaaS) is a cloud computing service model that provides virtualized computing resources over the internet. IaaS is one of the main categories of cloud computing services, alongside Software as a Service (SaaS) and Platform as a Service (PaaS).

In an IaaS model, a third-party provider hosts hardware, software, servers, storage, and other infrastructure components on behalf of its users. IaaS providers also offer a range of services to accompany those infrastructure components, such as monitoring, security, load balancing, and clustering.

Key characteristics of IaaS include:

- Scalability: Users can scale resources up and down as needed.
- On-Demand: Resources are available on-demand, reducing the need for upfront capital expenditure.
- Pay-as-You-Go: Users pay for the resources they use, often on a per-hour or per-gigabyte basis.
- Managed Infrastructure: The underlying physical infrastructure is managed by the cloud provider, allowing users to focus on their applications and services.

Common use cases for IaaS include:

- Hosting websites and web applications.
  - Providing virtual data centers for enterprise computing.
  - Supporting development and testing environments.
  - Offering disaster recovery solutions.
  -
- 1. List the Compute and Storage Services Available in AWS and GCP**

**AWS (Amazon Web Services)**

#### Compute Services:

1. Amazon EC2 (Elastic Compute Cloud): Scalable virtual servers in the cloud.
2. AWS Lambda: Serverless compute service to run code in response to events.
3. Amazon ECS (Elastic Container Service): Container management service to run Docker containers.
4. Amazon EKS (Elastic Kubernetes Service): Managed Kubernetes service.
5. AWS Fargate: Serverless compute engine for containers.
6. Amazon Lightsail: Simplified cloud platform for building applications and websites.
7. AWS Batch: Service for running batch computing jobs.
8. AWS Outposts: On-premises cloud infrastructure and services.

#### Storage Services:

1. Amazon S3 (Simple Storage Service): Scalable object storage.
2. Amazon EBS (Elastic Block Store): Block storage volumes for EC2 instances.
3. Amazon EFS (Elastic File System): Scalable file storage.
4. Amazon Glacier: Low-cost archival storage.
5. AWS Storage Gateway: Hybrid cloud storage service.
6. Amazon FSx: Managed file storage (FSx for Windows File Server and FSx for Lustre).
7. AWS Backup: Centralized backup service.

## **GCP (Google Cloud Platform)**

#### Compute Services:

1. Google Compute Engine: Scalable virtual machines.
2. Google Kubernetes Engine (GKE): Managed Kubernetes service.
3. Google App Engine: Platform as a Service (PaaS) for building scalable web applications and mobile backends.
4. Google Cloud Functions: Event-driven serverless compute service.
5. Google Cloud Run: Serverless container service.
6. Google Anthos: Multi-cloud and hybrid cloud platform.

#### Storage Services:

1. Google Cloud Storage: Scalable object storage.
2. Persistent Disk: Block storage for virtual machine instances.

3. Filestore: Managed file storage.
4. Google Cloud Storage Archive: Long-term storage for rarely accessed data.
5. Cloud Bigtable: Fully managed, scalable NoSQL database for large analytical and operational workloads.
6. Google Cloud Datastore: NoSQL document database built for automatic scaling, high performance, and ease of application development.
7. Google Cloud Spanner: Globally distributed and strongly consistent database.
8. Local SSD: High-performance temporary storage for virtual machine instances.

### 3) CREATED AN INSTANCE - 2348521\_EC2\_VM1:

The screenshot shows the 'Launch an instance' wizard in the AWS Management Console. The configuration includes:

- Name and tags:** Name is set to "2348521\_EC2\_VM1".
- Software Image (AMI):** Amazon Linux 2023 AMI 2023.5.2... (ami-01b799c439fd5516a)
- Virtual server type (instance type):** t2.micro
- Firewall (security group):** New security group
- Storage (volumes):** 1 volume(s) - 8 GiB

A modal window displays the **Free tier** information: "In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4".

At the bottom right are the **Launch instance** and **Review commands** buttons.

The screenshot shows the success page after launching the instance. The message says: "Successfully initiated launch of instance (i-0ee92ab13c7b16282)".

The "Next Steps" section contains the following links:

- Create billing and free tier usage alerts
- Connect to your instance
- Connect an RDS database
- Create EBS snapshot policy
- Manage detailed monitoring
- Create Load Balancer
- Create AWS budget
- Manage CloudWatch alarms

At the bottom right are the **CloudShell** and **Feedback** buttons.

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with navigation links like EC2 Dashboard, EC2 Global View, Events, and Instances. The Instances section is expanded, showing sub-links for Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, and Capacity Reservations. Below the sidebar is a search bar and a filter bar with 'Instance ID' set to 'i-0ee92ab13c7b16282'. The main table lists one instance: '2348521\_EC2...' with 'Instance ID' 'i-0ee92ab13c7b16282', 'Instance state' 'Running', 'Instance type' 't2.micro', and 'Status check' 'Initializing'. It also shows 'View alarms +', 'Availability Zone' 'us-east-1b', and 'Public IPv4' 'ec2-34-234-56-78'. At the bottom of the table, there's a note: '© 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences'.

- CONNECTING TO THE LINUX INSTANCE AND WRITING THE CODE FOR THE PROGRAM (“hello world”)

The screenshot shows an EC2 Instance Connect terminal session. The terminal window title is 'Lab - 1'. The session is connected to the instance 'i-0ee92ab13c7b16282 (2348521\_EC2\_VM1)'. The terminal output shows the user running the 'sudo yum update -y' command, followed by 'sudo yum install python3 -y', creating a file 'hello.py' with the code 'print("Hello, World!")', and running it with 'python3 hello.py'. The terminal ends with a closing bracket ']' and a new line. Below the terminal window, a status bar displays 'i-0ee92ab13c7b16282 (2348521\_EC2\_VM1)', 'PublicIPs: 34.238.139.183 PrivateIPs: 172.31.39.181', and the footer '© 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences'.

## 4) CREATED ANOTHER INSTANCE - 2348521\_EC2\_VM2:

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with various navigation options like EC2 Dashboard, EC2 Global View, Events, and Instances. Under Instances, it shows 'Instances' selected, along with Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, and Capacity Reservations. Below that are 'Images' (AMIs, AMI Catalog), 'Elastic Block Store' (Volumes, Snapshots, Lifecycle Manager), and 'Network & Security' (CloudShell, Feedback). The main area displays a table of instances. The first instance is named '2348521\_EC2...', has an ID of 'i-01d5497b461122603', is 'Running', is a 't2.micro' type, and its status check is 'Initializing'. It's in 'us-east-1b' availability zone with a public IPv4 of 'ec2-54-19'. The second instance is named '2348521\_EC2...', has an ID of 'i-0ee92ab13c7b16282', is 'Stopped', is a 't2.micro' type, and its status check is '-' (indicated by a dash). It's also in 'us-east-1b' availability zone with a public IPv4 of '-'. Below the table, a modal window titled 'Select an instance' lists the same two instances.

- MODIFYING ITS SECURITY GROUP TO PROVIDE ACCESS ONLY TO MY MACHINE

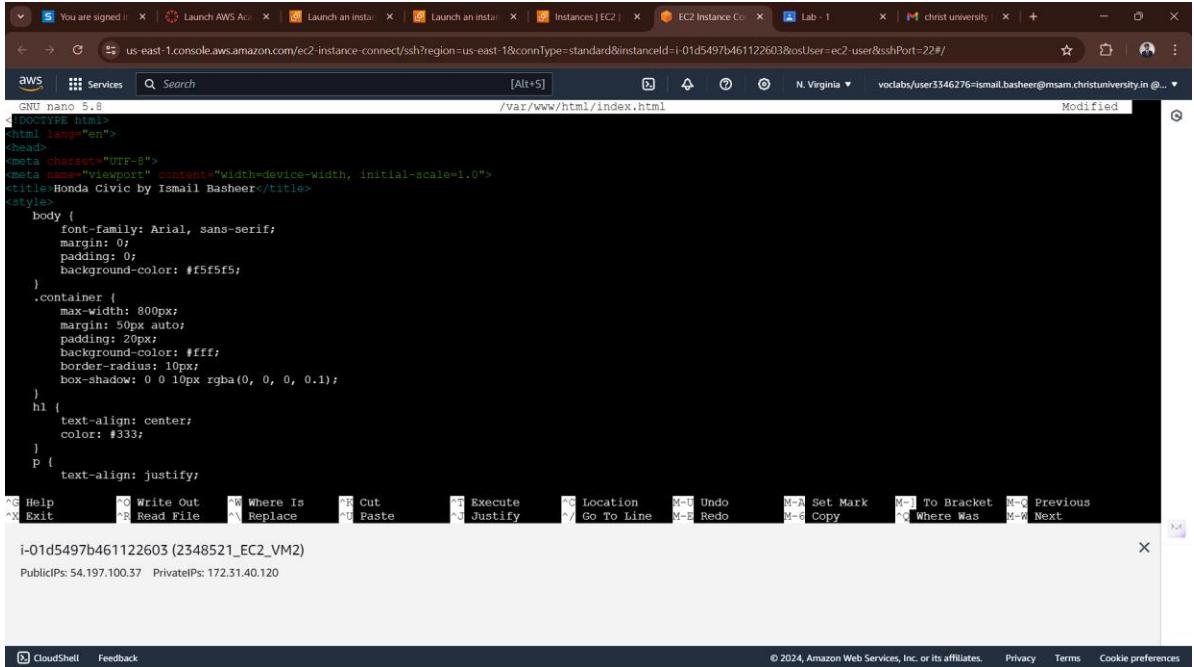
The screenshot shows the 'Launch Instances' wizard. In the 'Security group' section, there are two rules: one for 'HTTP' (port 80) from 'My IP' and another for 'HTTPS' (port 443) from 'Anywhere'. A warning message at the bottom left says: '⚠ Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.' In the 'Summary' section, it shows 'Number of instances' set to 1, using the 'Amazon Linux 2023 AMI 2023.5.2...' and 'Virtual server type (instance type)' as 't2.micro'. It also shows 'Storage (volumes)' with 1 volume(s) of 8 GiB. At the bottom right, there are 'Cancel', 'Launch instance', and 'Review commands' buttons. The 'Launch instance' button is highlighted with a yellow background.

## • INSTALLING PACKAGES AND APACHE SERVER

```
System Load: 0.00 CPU Usage: 0% (0.00% user, 0.00% system)
CPU Usage by Task: 0.00% (idle)
Memory Usage: 1.00% (0.00% used, 99.00% free)
Swap Usage: 0.00% (0.00% used, 100.00% free)
Filesystem Usage: 0.00% (0.00% used, 100.00% free)
Network Usage: 0.00% (0.00% used, 100.00% free)
Disk Usage: 0.00% (0.00% used, 100.00% free)
AWS Lambda Metrics: 0.00% (0.00% used, 100.00% free)

[ec2-user@ip-172-31-40-120 ~]$ sudo systemctl start httpd
[ec2-user@ip-172-31-40-120 ~]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-172-31-40-120 ~]$ [REDACTED]
```

# CREATING THE HTML PAGE FOR WEBSITE

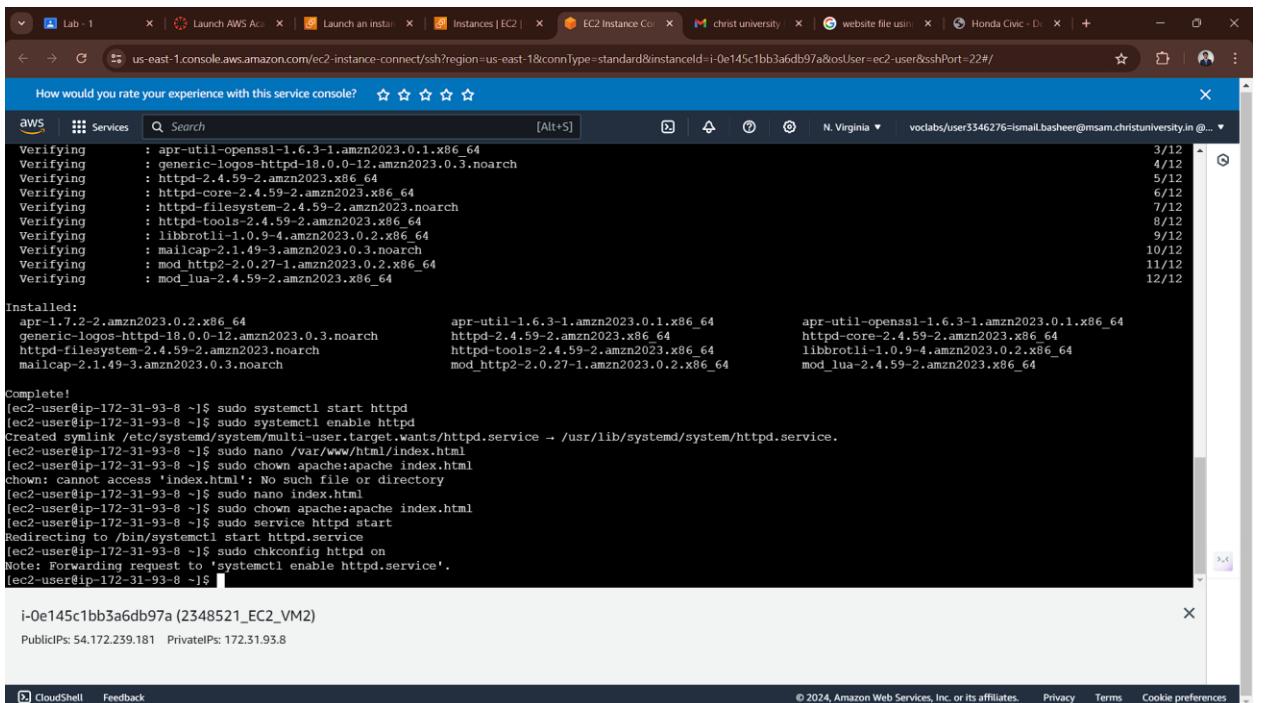


```

GNU nano 5.8
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Honda Civic by Ismail Basheer</title>
<style>
body {
    font-family: Arial, sans-serif;
    margin: 0;
    padding: 0;
    background-color: #f5f5f5;
}
.container {
    max-width: 800px;
    margin: 50px auto;
    padding: 20px;
    background-color: #fff;
    border-radius: 10px;
    box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
}
h1 {
    text-align: center;
    color: #333;
}
p {
    text-align: justify;
}
</style>
<h1>Honda Civic by Ismail Basheer</h1>
<p>Honda Civic is a compact car produced by Honda. It has been in production since 1972 and is known for its reliability and fuel efficiency. The current generation of the Honda Civic is the 11th generation, which was introduced in 2016. It comes in various trims, including the EX-L, LX, and Sport. The Honda Civic is a popular choice among car buyers due to its spacious interior, advanced safety features, and efficient engine options. It is available in both sedan and hatchback configurations. The Honda Civic is also known for its strong resale value and low maintenance costs. Overall, the Honda Civic is a well-rounded and reliable vehicle that is suitable for a wide range of drivers and purposes.</p>
<pre>i-01d5497b46112603 (2348521_EC2_VM2)<br/>PublicIPs: 54.197.100.37 PrivateIPs: 172.31.40.120</pre>

```

- HOSTING THE WEBSITE ON APACHE SERVER



```

How would you rate your experience with this service console? ★ ★ ★ ★ ★
[Alt+S] N. Virginia v vodlabs/user3346276=ismail.basheer@msam.christuniversity.in @...
Verifying : apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64
Verifying : generic-logos-https-18.0.0-12.amzn2023.0.3.noarch
Verifying : httpd-2.4.59-2.amzn2023.x86_64
Verifying : httpd-core-2.4.59-2.amzn2023.noarch
Verifying : httpd-filesystem-2.4.59-2.amzn2023.noarch
Verifying : httpd-tools-2.4.59-2.amzn2023.x86_64
Verifying : libbrotli-1.0.9-4.amzn2023.0.2.x86_64
Verifying : mod_lfcap-2.1.49-3.amzn2023.0.3.noarch
Verifying : mod_http2-2.0.27-1.amzn2023.0.2.x86_64
Verifying : mod_lua-2.4.59-2.amzn2023.x86_64
3/12
4/12
5/12
6/12
7/12
8/12
9/12
10/12
11/12
12/12

Installed:
apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64
generic-logos-https-18.0.0-12.amzn2023.0.3.noarch
httpd-filesystem-2.4.59-2.amzn2023.noarch
mailcap-2.1.49-3.amzn2023.0.3.noarch
apr-util-1.6.3-1.amzn2023.0.1.x86_64
httpd-2.4.59-2.amzn2023.x86_64
httpd-tools-2.4.59-2.amzn2023.x86_64
mod_http2-2.0.27-1.amzn2023.0.2.x86_64
apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64
httpd-core-2.4.59-2.amzn2023.x86_64
libbrotli-1.0.9-4.amzn2023.0.2.x86_64
mod_lua-2.4.59-2.amzn2023.x86_64
4/12
5/12
6/12
7/12
8/12
9/12
10/12
11/12
12/12

Complete!
(iec2-user@ip-172-31-93-8 ~)$ sudo systemctl start httpd
(iec2-user@ip-172-31-93-8 ~)$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
(iec2-user@ip-172-31-93-8 ~)$ sudo nano /var/www/html/index.html
(iec2-user@ip-172-31-93-8 ~)$ sudo chown apache:apache index.html
chown: cannot access 'index.html': No such file or directory
(iec2-user@ip-172-31-93-8 ~)$ sudo nano index.html
(iec2-user@ip-172-31-93-8 ~)$ sudo chown apache:apache index.html
(iec2-user@ip-172-31-93-8 ~)$ sudo service httpd start
Redirecting to /bin/systemctl start httpd.service
(iec2-user@ip-172-31-93-8 ~)$ sudo chkconfig httpd on
Note: Forwarding request to 'systemctl enable httpd.service'.
(iec2-user@ip-172-31-93-8 ~)$

i-0e145c1bb3a6db97a (2348521_EC2_VM2)
PublicIPs: 54.172.239.181 PrivateIPs: 172.31.93.5

```

- ACCESSING THE WEBSITE VIA THE PUBLIC IP ADDRESS OF THE INSTANCE THROUGH MY MACHINE

