
Deploying a Multi-Tier Website Using AWS EC2

Topic: Deploy a Multi-tier website using EC2

Description: Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates the need to invest in hardware upfront, so we can develop and deploy applications faster. We can use Amazon EC2 to launch as many or as few virtual servers as we 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.

Problem Statement: Assume a Company ABC wants to move its product to AWS. They have the following things set up right now:

1. MySQL DB
2. Website (PHP)

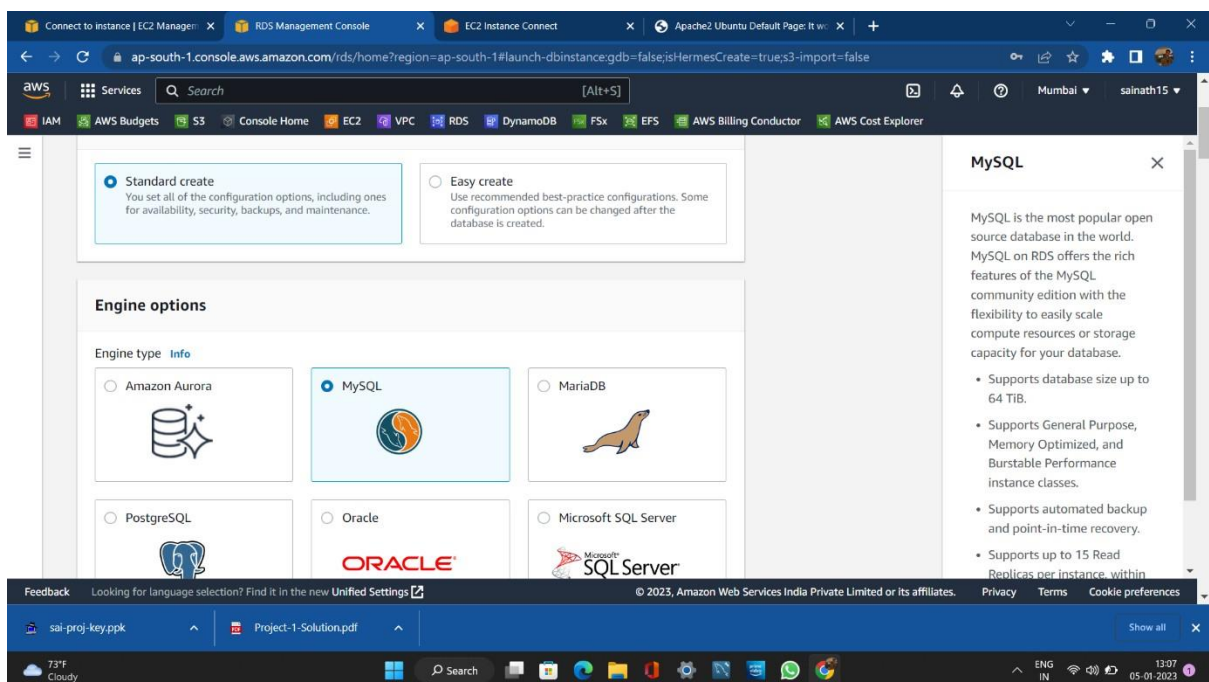
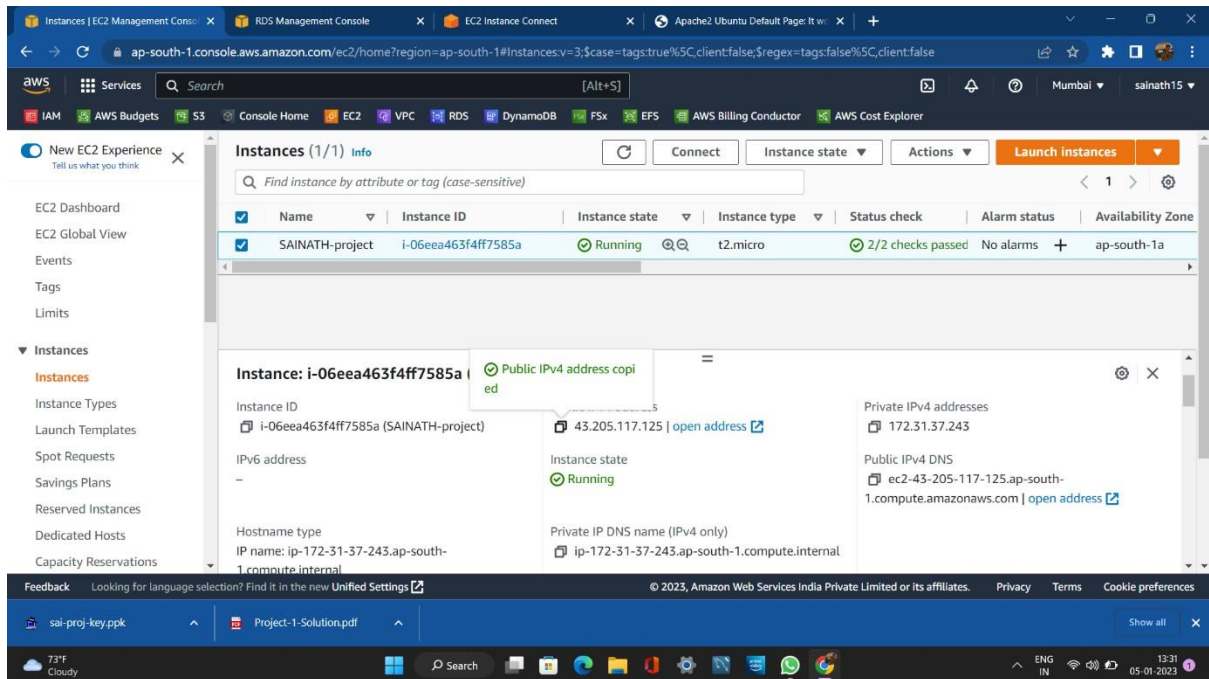
The company wants high availability of this product and, therefore, wants autoscaling to be enabled on this website.

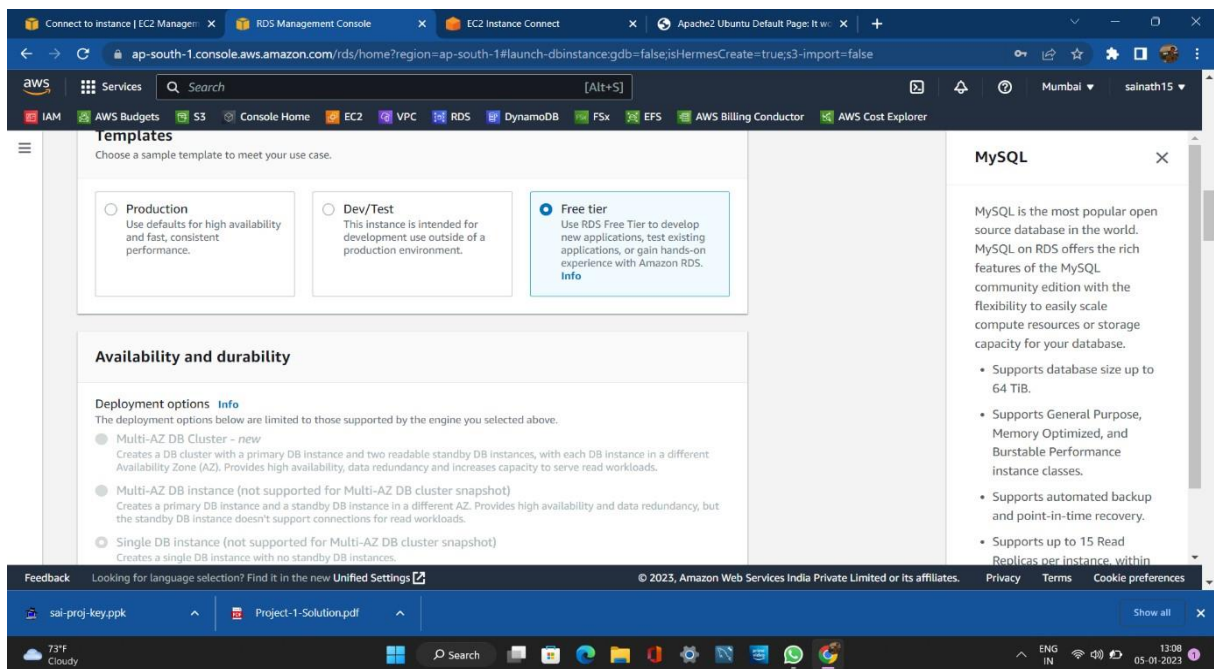
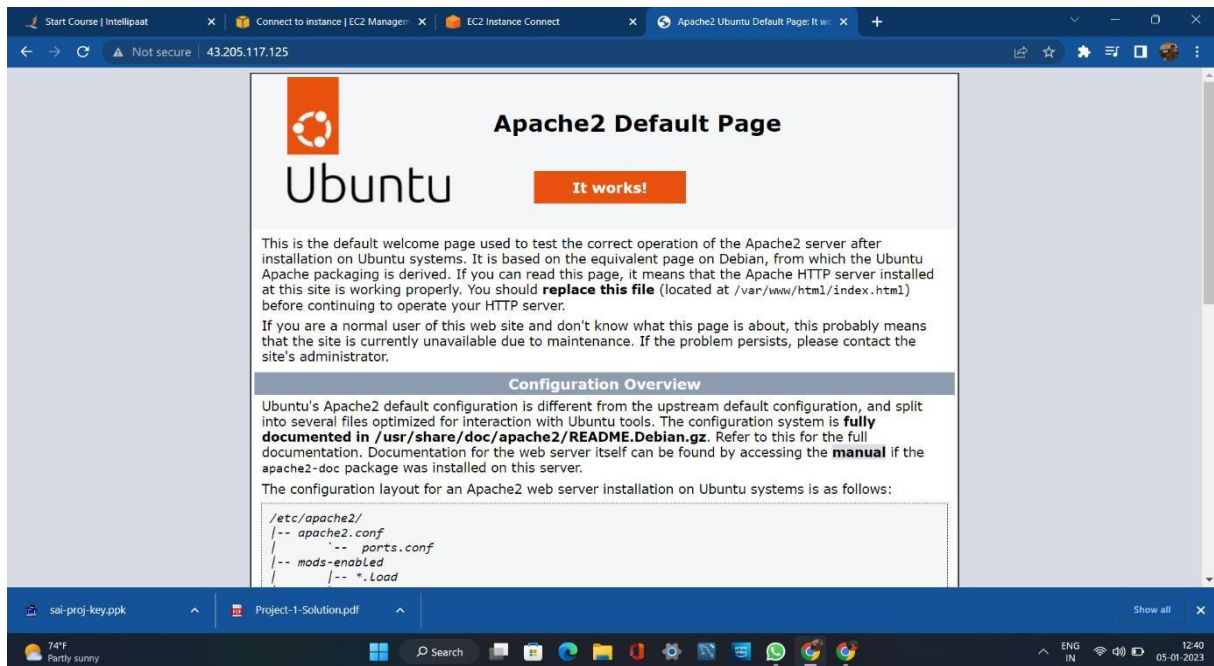
Steps to solve:

1. Launch an EC2 Instance.
2. Enable Auto Scaling on these instances (minimum 2).
3. Create an RDS Instance
4. Create Database & Table in RDS Instance
 - Database name: intel
 - Table name: data
 - Database password: intel123
5. Change the hostname on the website
6. Allow traffic from EC2 to RDS Instance

7. Allow all traffic to the EC2 instance

STEP1-Launch an EC2 instance





Connect to instance | EC2 Manager | RDS Management Console | EC2 Instance Connect | Apache2 Ubuntu Default Page: It w... | +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

aws Services Search [Alt+S] IAM AWS Budgets S3 Console Home EC2 VPC RDS DynamoDB FSx EFS AWS Billing Conductor AWS Cost Explorer

```
ubuntu@ip-172-31-37-243:~$ sudo add-apt-repository -y ppa:ondrej/php
PPA publishes dbgsym, you may need to include 'main/debug' component
Repository: 'deb https://ppa.launchpadcontent.net/ondrej/php/ubuntu/ jammy main'
Description:
Co-installable PHP versions: PHP 5.6, PHP 7.x and most requested extensions are included. Only Supported Versions of PHP (http://php.net/supported-versions.php) for Supported Ubuntu Releases (https://wiki.ubuntu.com/Releases) are provided. Don't ask for end-of-life PHP versions or Ubuntu release, they won't be provided.
Debian oldstable and stable packages are provided as well: https://deb.sury.org/#debian-dpa
You can get more information about the packages at https://deb.sury.org
IMPORTANT: The <foo>-backports is now required on older Ubuntu releases.
BUGS&FEATURES: This PPA now has a issue tracker:
https://deb.sury.org/#bug-reporting
CAVEATS:
1. If you are using php-gearman, you need to add ppa:ondrej/pkg-gearman
2. If you are using apache2, you are advised to add ppa:ondrej/apache2
3. If you are using nginx, you are advised to add ppa:ondrej/nginx-mainline
   or ppa:ondrej/nginx
```

i-06eea463f4ff7585a (SAINATH-project)
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Connect to instance | EC2 Manager | RDS Management Console | EC2 Instance Connect | Apache2 Ubuntu Default Page: It w... | +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

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```
PLEASE READ: If you like my work and want to give me a little motivation, please consider donating regularly: https://donate.sury.org/
WARNING: add-apt-repository is broken with non-UTF-8 locales, see
https://github.com/oerdnj/deb.sury.org/issues/56 for workaround:
# LC_ALL=C.UTF-8 add-apt-repository ppa:ondrej/php
More info: https://launchpad.net/~ondrej/+archive/ubuntu/php
Adding repository.
Adding deb entry to /etc/apt/sources.list.d/ondrej-ubuntu-php-jammy.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/ondrej-ubuntu-php-jammy.list
Adding key to /etc/apt/trusted.gpg.d/ondrej-ubuntu-php.gpg with fingerprint 14AA40EC0831756756D7F66C4F4EA0AAE5267A6C
Hit:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease [114 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:4 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease [99.8 kB]
Get:5 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy InRelease [23.9 kB]
Get:6 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy/main amd64 Packages [108 kB]
Get:7 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy/main Translation-en [33.3 kB]
Fetched 490 kB in 2s (204 kB/s)
Reading package lists... Done
ubuntu@ip-172-31-37-243:~$
```

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```
Connect to instance | EC2 Manager | X | RDS Management Console | X | EC2 Instance Connect | X | Apache2 Ubuntu Default Page: It w... X | +
ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu&region=ap-south-1&sshP...
AWS IAM AWS Budgets S3 Console Home EC2 VPC RDS DynamoDB FSx EFS AWS Billing Conductor AWS Cost Explorer
ubuntu@ip-172-31-37-243:~$ sudo apt install php5.6 mysql-client php5.6-mysql
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libapache2-mod-php5.6 mysql-client-8.0 mysql-client-core-8.0 mysql-common php-common php5.6-cli php5.6-common php5.6-json php5.6-opcache php5.6-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php5.6 mysql-client mysql-client-8.0 mysql-client-core-8.0 mysql-common php-common php5.6 php5.6-cli php5.6-common php5.6-json php5.6-mysql
php5.6-opcache php5.6-readline
0 upgraded, 13 newly installed, 0 to remove and 27 not upgraded.
Need to get 6782 kB of archives.
After this operation, 77.0 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

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```
Connect to instance | EC2 Manager | X | RDS Management Console | X | EC2 Instance Connect | X | Apache2 Ubuntu Default Page: It w... X | +
ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu&region=ap-south-1&sshP...
AWS IAM AWS Budgets S3 Console Home EC2 VPC RDS DynamoDB FSx EFS AWS Billing Conductor AWS Cost Explorer
Creating config file /etc/php/5.6/apache2/php.ini with new version
Module mpm_event disabled.
Enabling module mpm_prefork.
apache2_switch mpm Switch to prefork
apache2 invoke: Enable module php5.6
Setting up php5.6 (5.6.40-63+ubuntu22.04.1+deb.sury.org+2) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for php5.6-cli (5.6.40-63+ubuntu22.04.1+deb.sury.org+2) ...
Processing triggers for libapache2-mod-php5.6 (5.6.40-63+ubuntu22.04.1+deb.sury.org+2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-37-243:~$
```

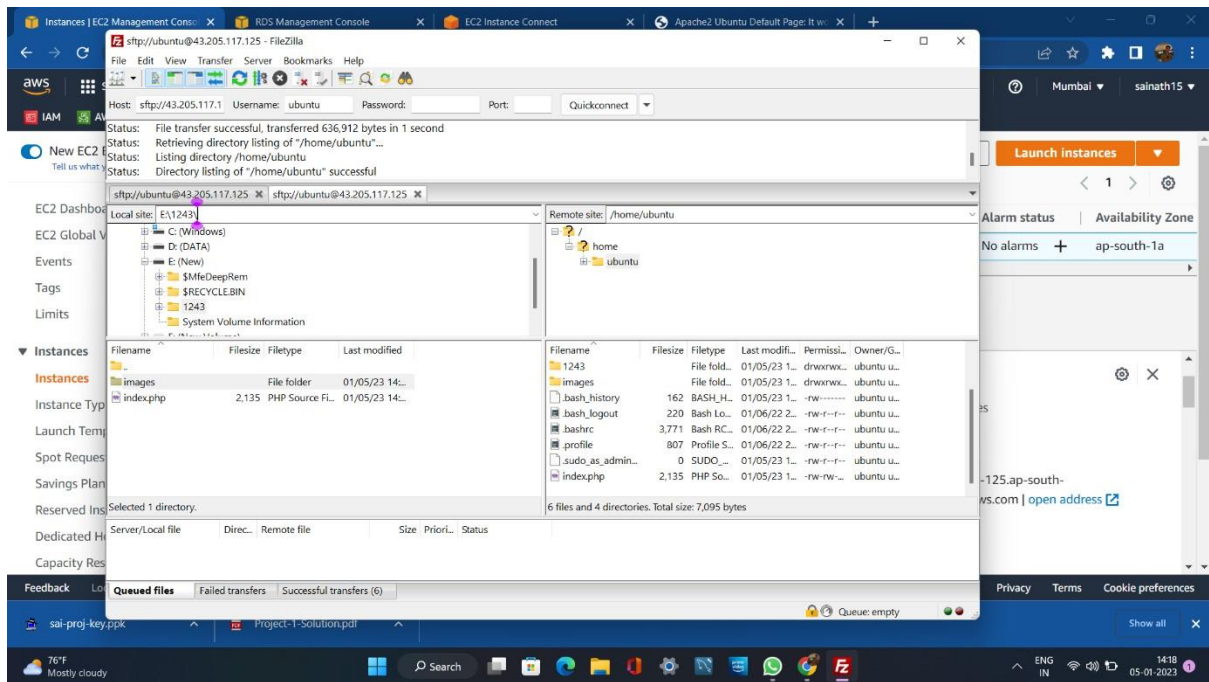
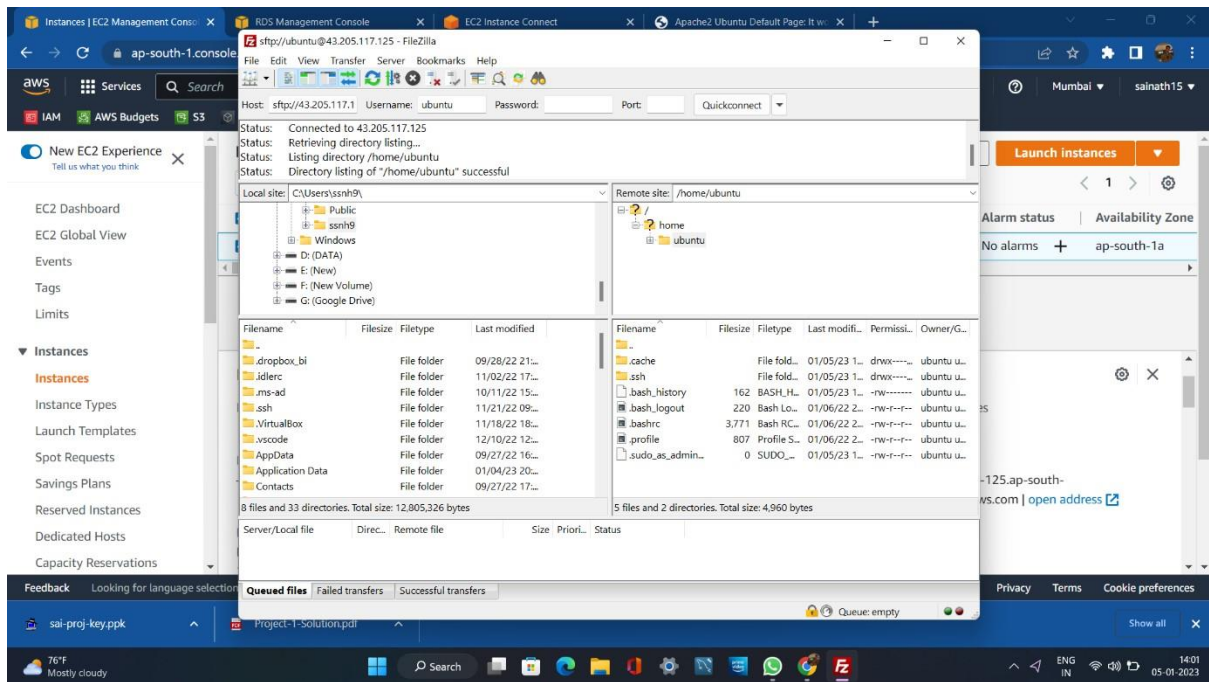
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Instances | EC2 Management Console | RDS Management Console | EC2 Instance Connect | Apache2 Ubuntu Default Page: It w... | +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

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```
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Thu Jan 5 08:49:33 UTC 2023

System load: 0.0 Processes: 111
Usage of /: 23.4% of 7.57GB Users logged in: 0
Memory usage: 26% IPv4 address for eth0: 172.31.37.243
Swap usage: 0%

18 updates can be applied immediately.
6 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Thu Jan 5 07:04:41 2023 from 13.233.177.3
ubuntu@ip-172-31-37-243:~$ ls
1243 images index.php
ubuntu@ip-172-31-37-243:~$
```

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Instances | EC2 Management Console | RDS Management Console | EC2 Instance Connect | Apache2 Ubuntu Default Page: It w... | +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

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```
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

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Last login: Thu Jan 5 07:04:41 2023 from 13.233.177.3
ubuntu@ip-172-31-37-243:~$ ls
1243 images index.php
ubuntu@ip-172-31-37-243:~$
```

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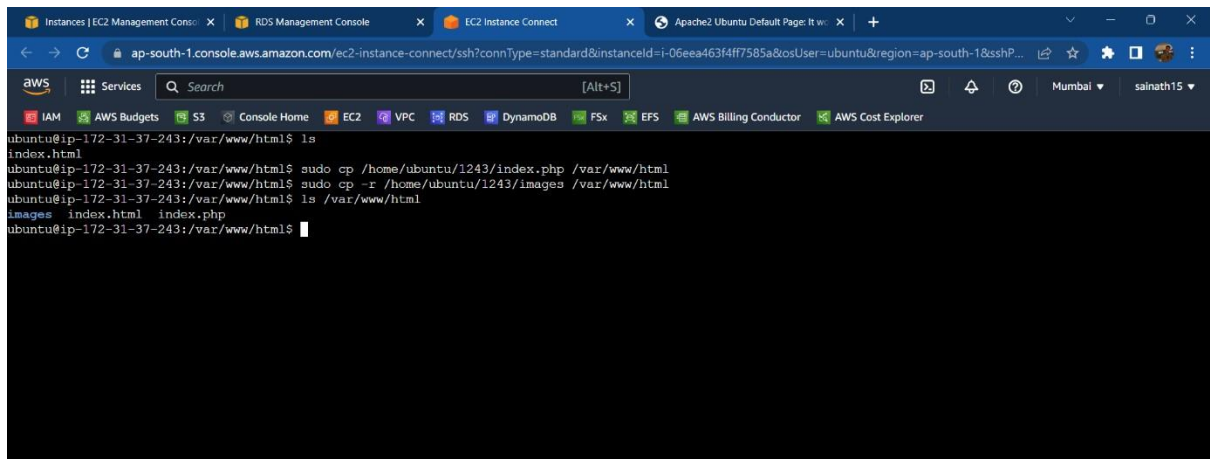
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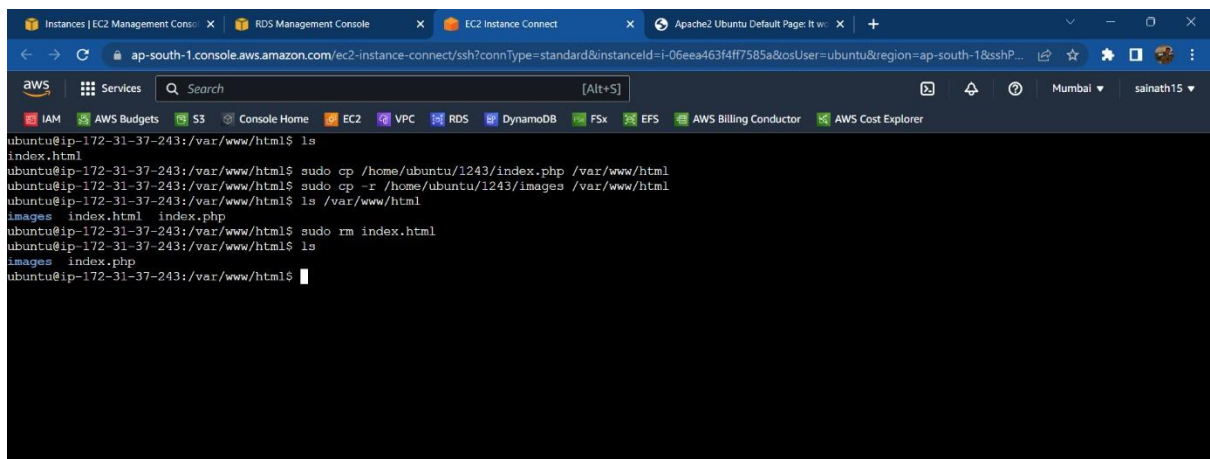
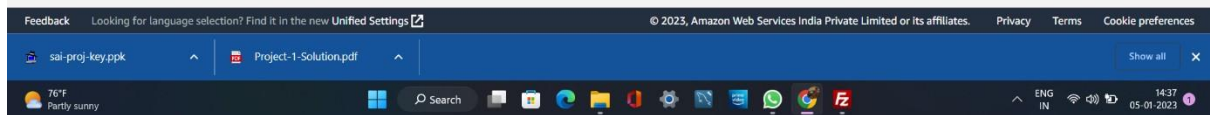
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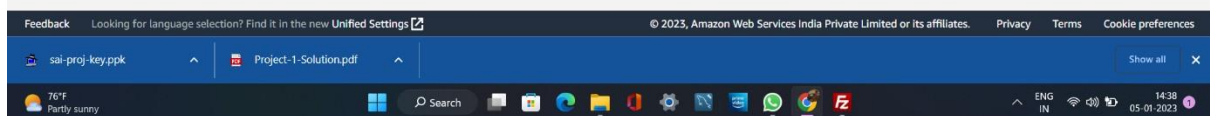
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Instances | EC2 Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

IntelliPaat

Name:

Email:

Submit

Connection failed: php_network_getaddresses: getaddrinfo failed: Name or service not known

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Instances | EC2 Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#databases:

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Amazon RDS

- Dashboard
- Databases
- Query Editor
- Performance insights
- Snapshots
- Exports in Amazon S3
- Automated backups
- Reserved instances
- Proxies
- Subnet groups
- Parameter groups
- Option groups
- Custom engine versions

Successfully created database database-1 View connection details

RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. [RDS User Guide](#) [Aurora User Guide](#)

Databases Group resources Modify Actions Restore from S3 Create database

Filter by databases

DB identifier	Role	Engine	Region & AZ	Size	Status
database-1	Instance	MySQL Community	ap-south-1c	db.t3.micro	Available

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EC2 Management Console x RDS Management Console x EC2 Instance Connect x 43.205.117.125 x +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

aws Services Search [Alt+S]

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```
ubuntu@ip-172-31-37-243:/var/www/html$ ls /var/www/html
images  index.html  index.php
ubuntu@ip-172-31-37-243:/var/www/html$ sudo rm index.html
ubuntu@ip-172-31-37-243:/var/www/html$ ls
images  index.php
ubuntu@ip-172-31-37-243:/var/www/html$ sudo mysql -h
mysql: [ERROR] mysql: option '-h' requires an argument.
ubuntu@ip-172-31-37-243:/var/www/html$ sudo mysql -h database-1.cqnwrzb3lp6p.ap-south-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 34
Server version: 8.0.30 Source distribution

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

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EC2 Management Console x RDS Management Console x EC2 Instance Connect x 43.205.117.125 x +

ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

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```
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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show database;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'dat
abase' at line 1
mysql> show databases;
+-----+
| Database |
+-----+
| information_schema |
| intel |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.00 sec)

mysql>
```

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ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

Services Search [Alt+S]

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```
GNU nano 6.2 index.php *
<form></td>
<td colspan="4"></td>
</tr>
</table>
</div>
</div>
<?php
$firstname=$ POST['firstname'];
$email=$ POST['email'];
$servername = "database-1.cqnrz3lp6p.ap-south-1.rds.amazonaws.com";
$username = "admin";
$password = "intel123";
$db = "intel";
// Create connection
$conn = new mysqli($servername, $username, $password, $db);
// Check connection
```

Help Write Out Where Is Cut Execute Location Undo Set Mark To Bracket
Exit Read File Replace Paste Justify Go To Line Redo Copy Where Was

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ap-south-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-06eea463f4ff7585a&osUser=ubuntu®ion=ap-south-1&sshP...

Services Search [Alt+S]

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```
owners.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use intel;
Database changed
mysql> create table data (firstname varchar(20),email varchar(30));
Query OK, 0 rows affected (0.03 sec)

mysql> describe data;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'des
cribe data' at line 1
mysql> describe data;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| firstname | varchar(20) | YES | | NULL | |
| email | varchar(30) | YES | | NULL | |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.01 sec)

mysql>
```

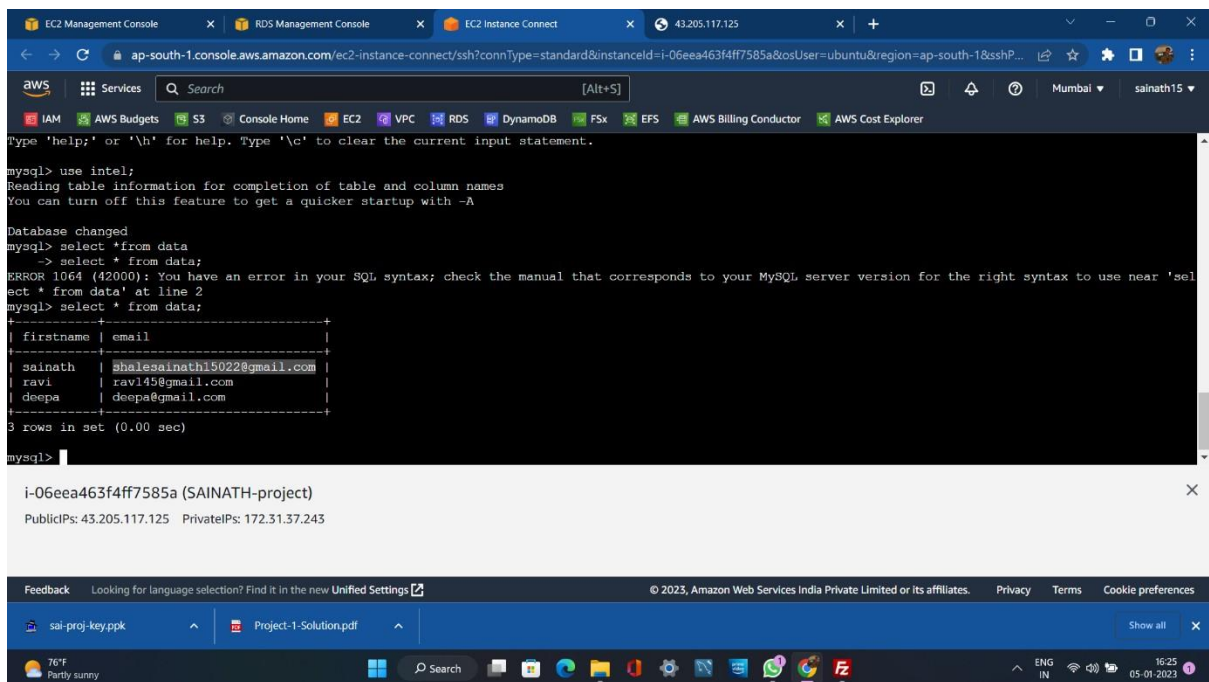
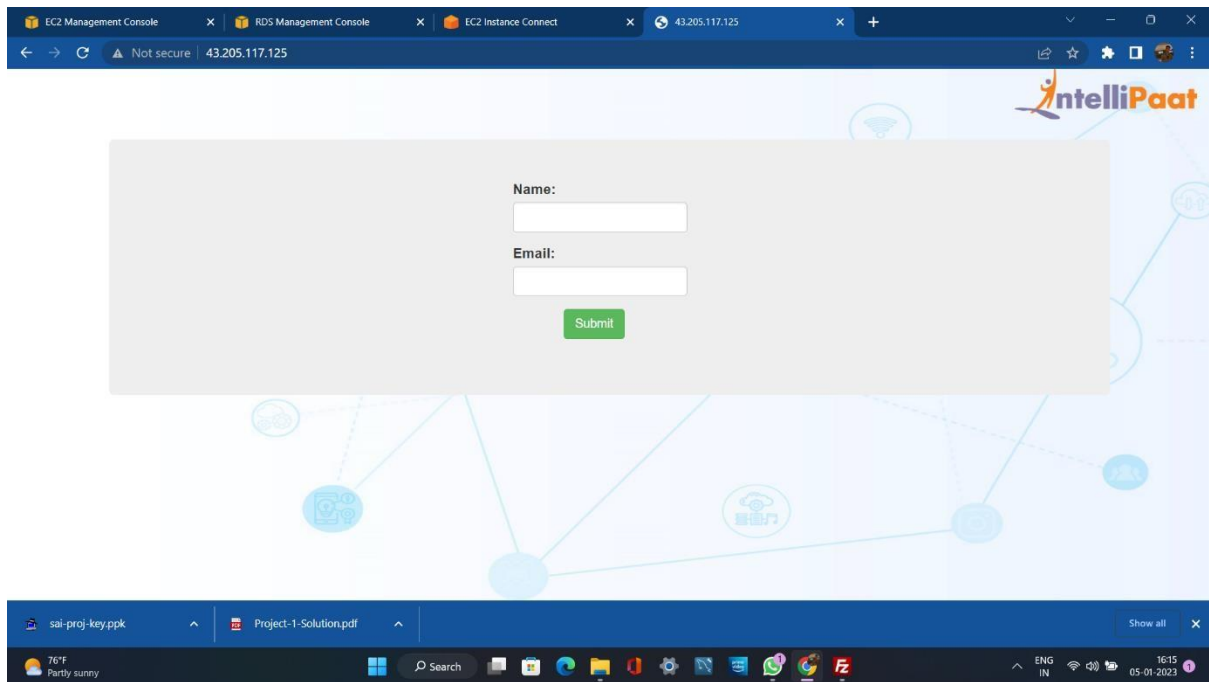
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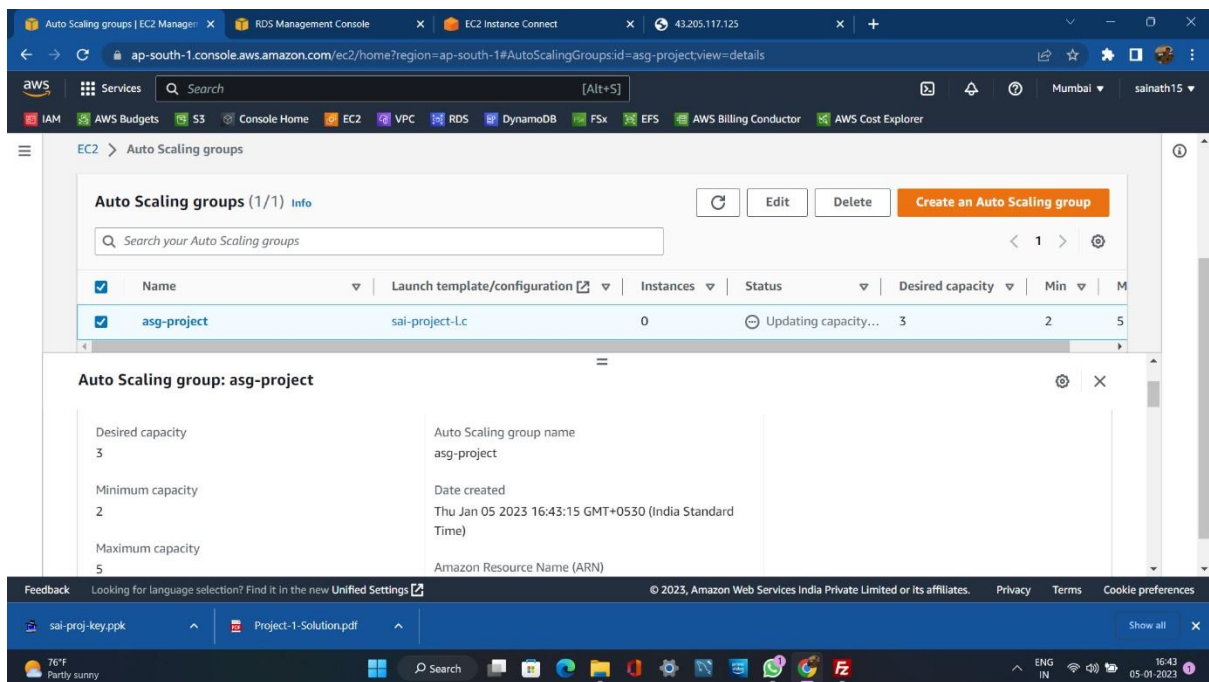
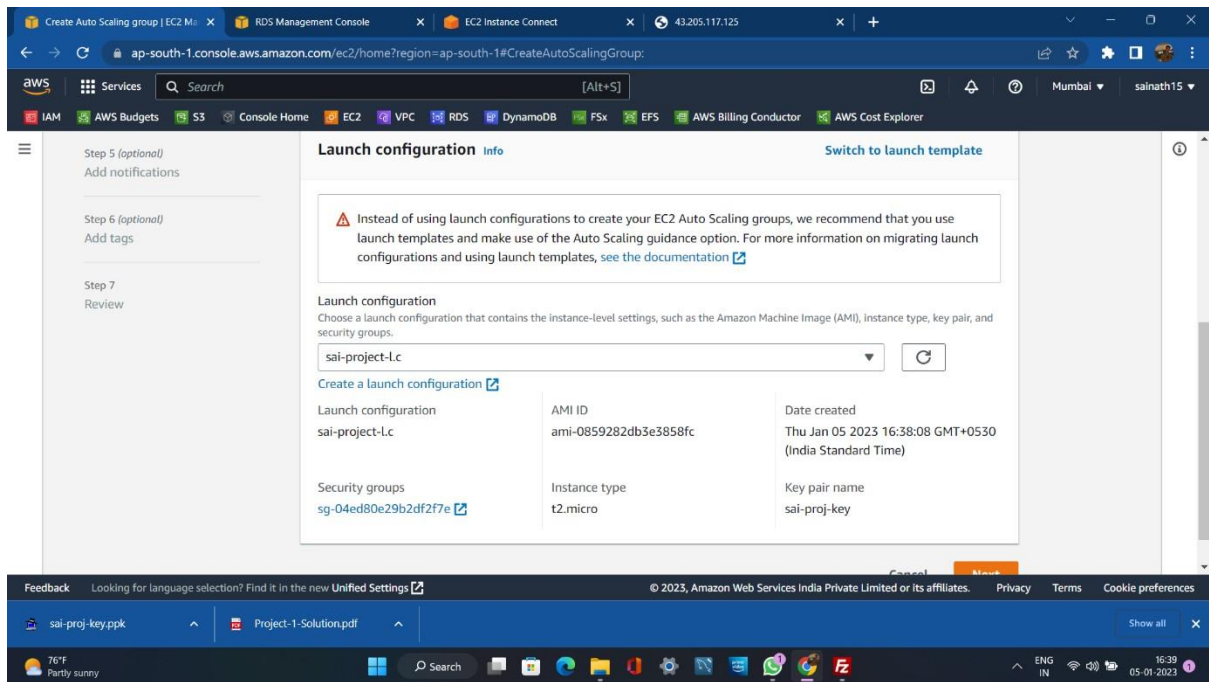
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EC2 Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchConfigurations

Recommendation to not use launch configurations
Amazon EC2 Auto Scaling no longer adds support for new EC2 features to launch configurations and will stop supporting new EC2 instances types after December 31, 2022. We recommend that customers using launch configurations migrate to launch templates. For more information, see the documentation.

Successfully created launch configuration: sai-project-Lc

EC2 > Launch configurations

Launch configurations (1) Info

Search launch configurations

<input type="checkbox"/>	Name	AMI ID	Instance type	Spot price	Creation time
<input type="checkbox"/>	sai-project-Lc	ami-0859282db3...	t2.micro	-	Thu Jan 05 2023 16:38:08 GMT+0530 (India Standa...

Select a launch configuration above

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Auto Scaling group details | EC2 | CloudWatch Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#AutoScalingGroupDetails:asg=sai/view=scaling

asg-sai

Details Activity Automatic scaling Instance management Monitoring Instance refresh

Dynamic scaling policy created or edited successfully.

Dynamic scaling policies (2) Info

Create dynamic scaling policy

Policy Name	Policy Type	Enabled
scale-down	Step scaling	<input type="checkbox"/>
scale-up	Step scaling	<input type="checkbox"/>

scale-down Step scaling Enabled

scale-up Step scaling Enabled

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Auto Scaling group details | EC2 | CloudWatch Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#AutoScalingGroupDetails:id=asg-sai;view=scaling

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Snapshots Lifecycle Manager

▼ Network & Security

- Security Groups
- Elastic IPs
- Placement Groups
- Key Pairs
- Network Interfaces

▼ Load Balancing

- Load Balancers
- Target Groups

▼ Auto Scaling

- Launch Configurations
- Auto Scaling Groups

scale-down

Step scaling

Enabled

scale-down

breaches the alarm threshold: CPUUtilization <= 50 for 1 consecutive periods of 60 seconds for the metric dimensions:

AutoScalingGroupName = asg-sai

Add 1 capacity units when 50 >= CPUUtilization > -infinity

300 seconds to warm up after each step

scale-up

Step scaling

Enabled

scale-up

breaches the alarm threshold: CPUUtilization >= 80 for 1 consecutive periods of 60 seconds for the metric dimensions:

AutoScalingGroupName = asg-sai

Add 2 capacity units when 80 <= CPUUtilization < +infinity

300 seconds to warm up after each step

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Auto Scaling group details | EC2 | CloudWatch Management Console | RDS Management Console | EC2 Instance Connect | 43.205.117.125

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#AutoScalingGroupDetails:id=asg-sai;view=scaling

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EC2 > Auto Scaling groups > asg-sai

asg-sai

Details Activity Automatic scaling Instance management Monitoring Instance refresh

Dynamic scaling policy created or edited successfully.

Dynamic scaling policies (2) Info

Create dynamic scaling policy

scale-down

Step scaling

Enabled

scale-up

Step scaling

Enabled

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Instances | EC2 M... | Dashboard | EC2 I... | Images | EC2 Man... | EC2 Instance Con... | 43.205.117.125 | 52.66.195.67 | 3.110.224.41 | + | - | ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#Images:visibility=owned-by-me

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Spot Requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations

Images AMIs AMI Catalog

Elastic Block Store Volumes Snapshots Lifecycle Manager

Network & Security Security Groups Elastic IPs Placement Groups

Successfully terminated i-06eea463f4ff7585a,i-0546c7f878b8a2b66,i-05218efb3c8fd33e9,i-03edfa8fb424fbbc6,i-098a8825821ae3574,i-07c904ec18fd84777

Amazon Machine Images (AMIs) (1/1) Info

Recycle Bin EC2 Image Builder Actions Launch instance from AMI

Owned by me Find AMI by attribute or tag

Name	AMI ID	AMI name	Source	Owner
-	ami-0859282db3e3858fc	sainath-project-ami	281762697759/sainath-project-ami	281762697759

AMI ID: ami-0859282db3e3858fc

Details Permissions Storage Tags

AMI ID	ami-0859282db3e3858fc	Image type	machine	Platform details	Linux/UNIX	Root device type	EBS
AMI name	sainath-project-ami	Owner account ID	281762697759	Architecture	x86_64	Usage operation	RunInstances
Root device name		Status		Source		Virtualization type	

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Auto Scaling group details | EC... | CloudWatch Management Con... | RDS Management Console | EC2 Instance Connect | 43.205.117.125 | + | - | ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#AutoScalingGroupDetails:id=asg-sai;view=details

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Snapshots Lifecycle Manager

Network & Security Security Groups Elastic IPs Placement Groups Key Pairs Network Interfaces

Load Balancing Load Balancers Target Groups

Auto Scaling Launch Configurations Auto Scaling Groups

asg-sai

Details Activity Automatic scaling Instance management Monitoring Instance refresh

Group details

Edit

Desired capacity	3	Auto Scaling group name	asg-sai
Minimum capacity	2	Date created	Thu Jan 05 2023 17:20:53 GMT+0530 (India Standard Time)
Maximum capacity	5	Amazon Resource Name (ARN)	arn:aws:autoscaling:ap-south-1:281762697759:autoScalingGroup:abe9f797-a5b7-4244-8382-ac67b1419c17:autoScalingGroupName/asg-sai

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