Academic Year: 2024-25	Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering & Research Ravet, Pune. Lab Manual	Term: II

Lab Manual

Third Year Computer Engineering

Class: Third Year

Prepared By:

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(Assistant Professor, Computer Engineering)

Academic year 2024-25

310258: Laboratory Practice II

Teaching Scheme	Credit	Examination Scheme
PR: 04 Hours/Week	02	TW : 50 Marks PR : 25 Marks

Guidelines for Instructor's Manual

The instructor„s manual is to be developed as a hands-on resource and reference. The instructor's manual need to include prologue (about University/program/ institute/ department/foreword/ preface etc), University syllabus, conduction & Assessment guidelines, topics under consideration-concept, objectives, outcomes, set of typical applications/practicals/ guidelines, and references.

Guidelines for Student Journal

The laboratory practical are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each practical (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- Concept in brief, algorithm, flowchart, test cases, conclusion/analysis. Program codes with sample output of all perform practical‟s are to be submitted as softcopy.

As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal may be avoided. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and lab practicals performance of student. Each lab practical assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab practical assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Guidelines for Practical Examination

Both internal and external examiners should jointly set problem statements. During practical assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation of the problem statement. The supplementary and relevant questions may be asked at the time of evaluation to test the student„s for advanced learning, understanding of the fundamentals, effective and efficient implementation. So encouraging efforts, transparent evaluation and fair approach of the evaluator will not create any uncertainty or doubt in the minds of the students. So adhering to these principles will consummate our team efforts to the promising start of the student's academics.

Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. Use of open source software is encouraged. Based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus.

Operating System recommended :- 64-bit Windows OS and Linux

Programming tools recommended: - Information Security : - C/C++/Java

Augmented and Virtual Reality :- Unity, C#, Blender, VRTK, ARTK, Vuforia VR Devices: HTC Vive, Google Daydream and Samsung gear VR.

Cloud Computing :- NA

Software Modeling and Architectures: Front end:HTML5, Bootstrap, jQuery, JS etc. Backend: MySQL/MongoDB/NodeJS

Practical No.	Laboratory Assignments
Cloud Computing	
1	Case study on Amazon EC2 and learn about Amazon EC2 web services.
2	Installation and configure Google App Engine.
3	Creating an Application in SalesForce.com using Apex programming Language.
4	Design and develop custom Application (Mini Project) using Salesforce Cloud.
5	**Mini-Project** Setup your own cloud for Software as a Service (SaaS) over the existing LAN in your laboratory. In this assignment you have to write your own code for cloud controller using open-source technologies to implement with HDFS. Implement the basic operations may be like to divide the file in segments/blocks and upload/ download file on/from cloud in encrypted form.

Practical No: 01

Practical Title: Case study on Amazon EC2 and learn about Amazon EC2 web services.

Objectives:

- To learn Amazon EC2 web services
- To study on Amazon EC2 and learn about Amazon EC2 web services.

Hardware Requirements :

- Pentium IV with latest configuration

Software Requirements :

- Ubuntu 20.04

Theory:

An EC2 instance is nothing but a virtual server in Amazon Web services terminology. It stands for Elastic Compute Cloud. It is a web service where an AWS subscriber can request and provision a compute server in AWS cloud.

An on-demand EC2 instance is an offering from AWS where the subscriber/user can rent the virtual server per hour and use it to deploy his/her own applications.

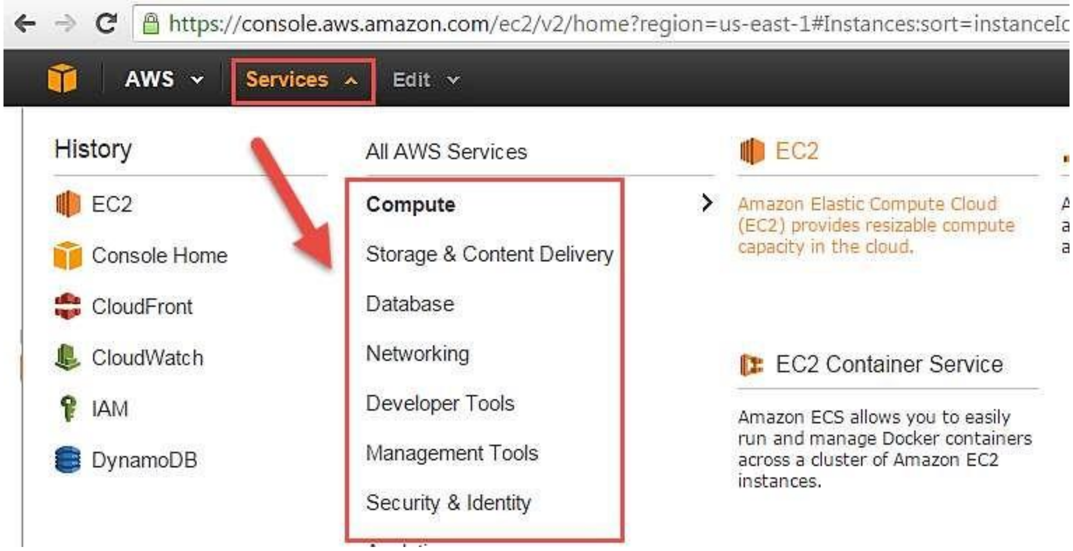
The instance will be charged per hour with different rates based on the type of the instance chosen. AWS provides multiple instance types for the respective business needs of the user.

Thus, you can rent an instance based on your own CPU and memory requirements and use itas long as you want. You can terminate the instance when it‟s no more used and save on costs. This is the most striking advantage of an on-demand instance- you can drastically save on your CAPEX.

Let us see in detail how to launch an on-demand EC2 instance in AWS Cloud.Login and access to AWS services

Step 1) In this step,

- Login to your AWS account and go to the AWS Services tab at the top left corner.
- Here, you will see all of the AWS Services categorized as per their area viz. Compute, Storage, Database, etc. For creating an EC2 instance, we have to choose Computeà EC2 as in the next step.



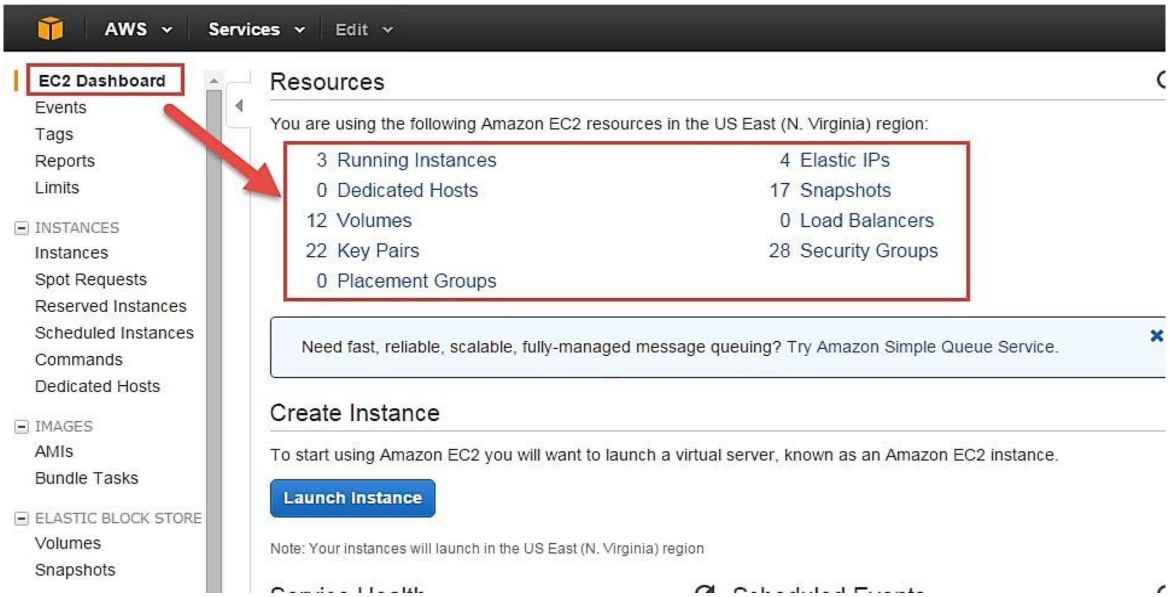
https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:sort=instanceIc

Amazon Elastic Compute Cloud (EC2) provides resizable compute capacity in the cloud.

Amazon ECS allows you to easily run and manage Docker containers across a cluster of Amazon EC2 instances.

- Open all the services and click on EC2 under Compute services. This will launch the dashboard of EC2.

Here is the EC2 dashboard. Here you will get all the information in gist about the AWS EC2 resources running.



Resources

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

3 Running Instances
0 Dedicated Hosts
12 Volumes
22 Key Pairs
0 Placement Groups
4 Elastic IPs
17 Snapshots
0 Load Balancers
28 Security Groups

Need fast, reliable, scalable, fully-managed message queuing? Try Amazon Simple Queue Service.

Create Instance

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

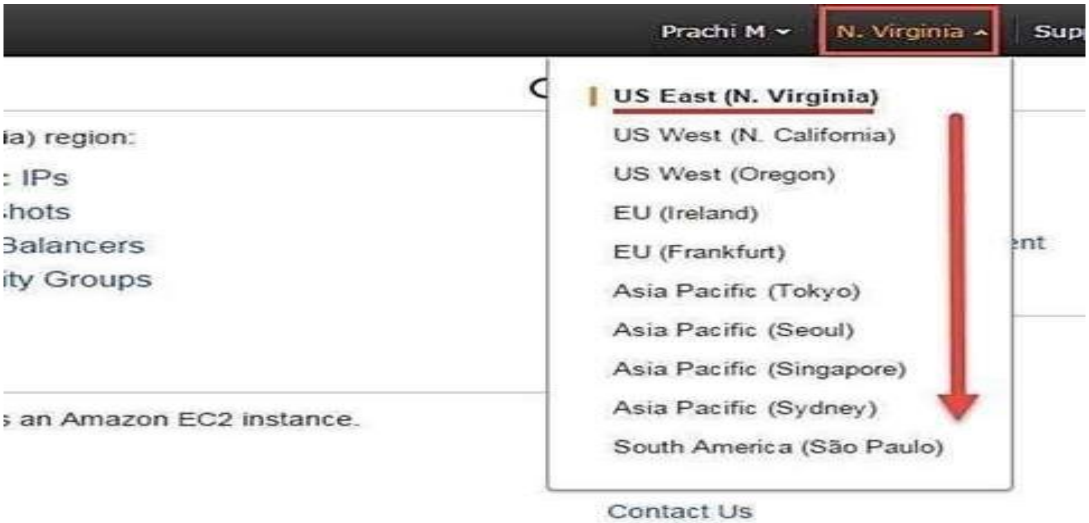
Note: Your instances will launch in the US East (N. Virginia) region

Step 2) On the top right corner of the EC2 dashboard, choose the AWS Region in which youwant to provision the EC2 server.

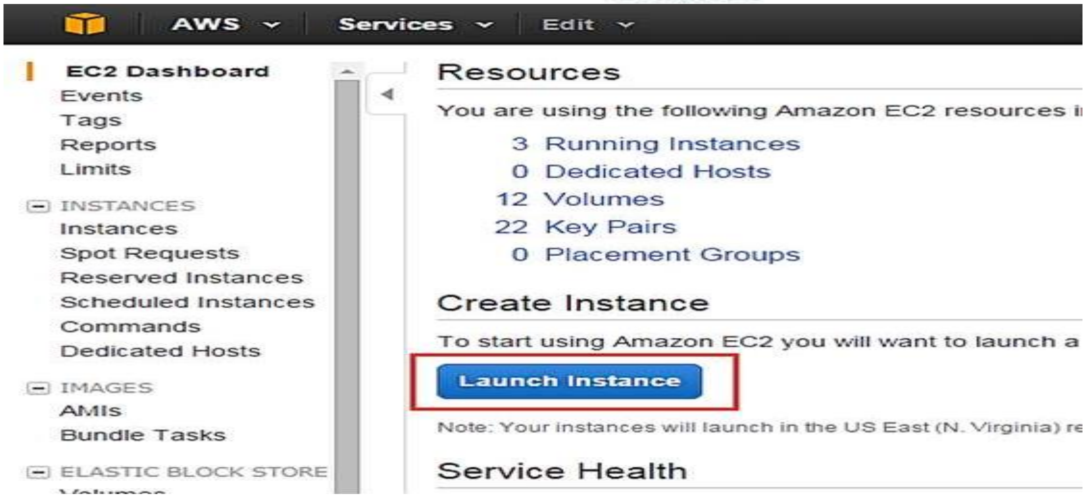
Here we are selecting N. Virginia. AWS provides 10 Regions all over the globe

Step 3) In this step

- Once your desired Region is selected, come back to the EC2 Dashboard.
- Click on 'Launch Instance' button in the section of Create Instance (as shown below).



s an Amazon EC2 instance.



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12 Volumes
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Create Instance

To start using Amazon EC2 you will want to launch a

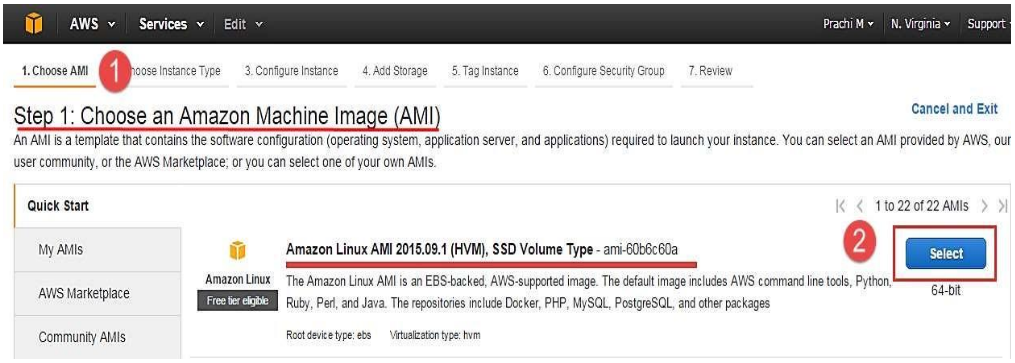
Note: Your instances will launch in the US East (N. Virginia) re

Service Health

- Instance creation wizard page will open as soon as you click 'LaunchInstance'.Choose AMI

Step 1) In this step we will do,

1. You will be asked to choose an AMI of your choice. (An AMI is an Amazon Machine Image. It is a template basically of an Operating System platform which you can use as a base to create your instance). Once you launch an EC2 instance from your preferred AMI, the instance will automatically be booted with the desired OS. (We will see more about AMIs in the coming part of the tutorial).
2. Here we are choosing the default Amazon Linux (64 bit) AMI.



Step 1: Choose an Amazon Machine Image (AMI)

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.

Amazon Linux AMI 2015.09.1 (HVM), SSD Volume Type - ami-60b6c60a

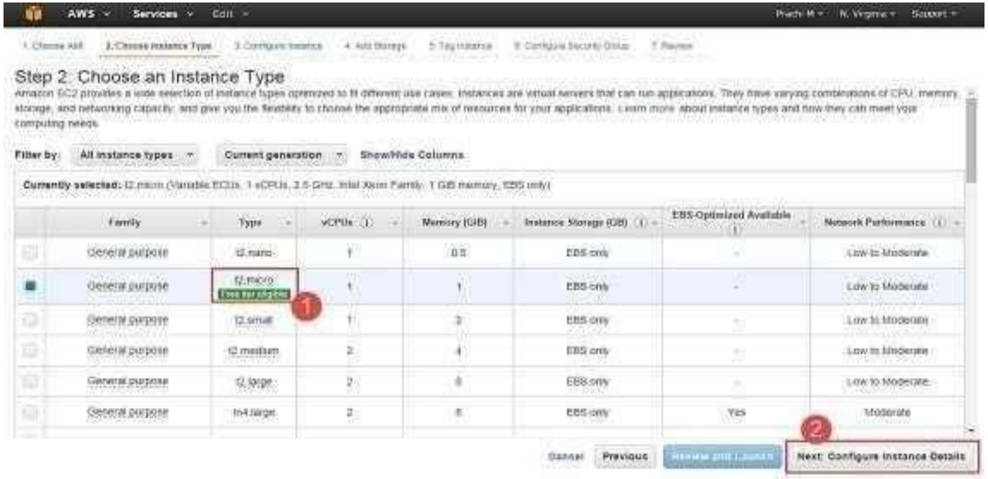
The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages

Root device type: ebs Virtualization type: hvm

Choose EC2 Instance Types

Step 1) In the next step, you have to choose the type of instance you require based on yourbusiness needs.

1. We will choose t2.micro instance type, which is a 1vCPU and 1GB memory serveroffered by AWS.
2. Click on "Configure Instance Details" for further configurations



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

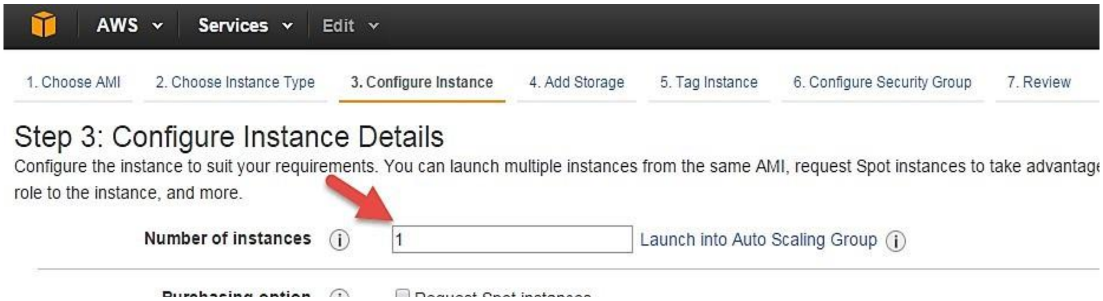
Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
□	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
■	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
□	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
□	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
□	General purpose	t2.large	2	8	EBS only	-	Low to Moderate
□	General purpose	m4.large	2	8	EBS only	Yes	Moderate

- In the next step of the wizard, enter details like no. of instances you want to launch at a time.
- Here we are launching one

instance.Configure Instance

Step 1) No. of instances- you can provision up to 20 instances at a time. Here we are launchingone instance.

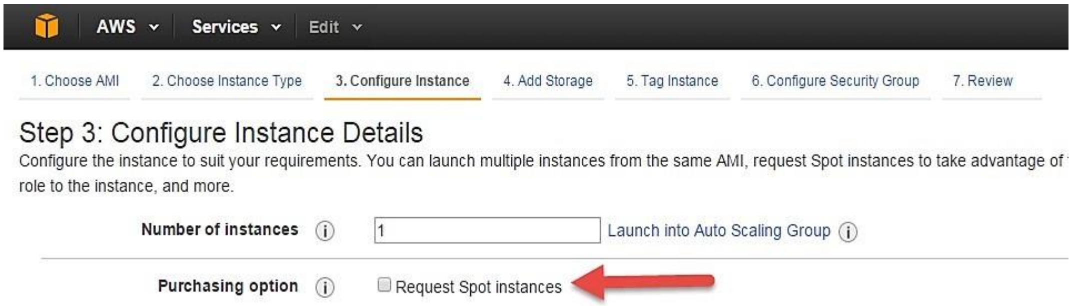


Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage role to the instance, and more.

Number of instances 1

Step 2) Under Purchasing Options, keep the option of 'Request Spot Instances' unchecked as ofnow. (This is done when we wish to launch Spot instances instead of on-demand ones. We will come back to Spot instances in the later part of the tutorial).



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of role to the instance, and more.

Number of instances 1

Purchasing option □ Request Spot instances

Step 3) Next, we have to configure some basic networking details for our EC2 server.

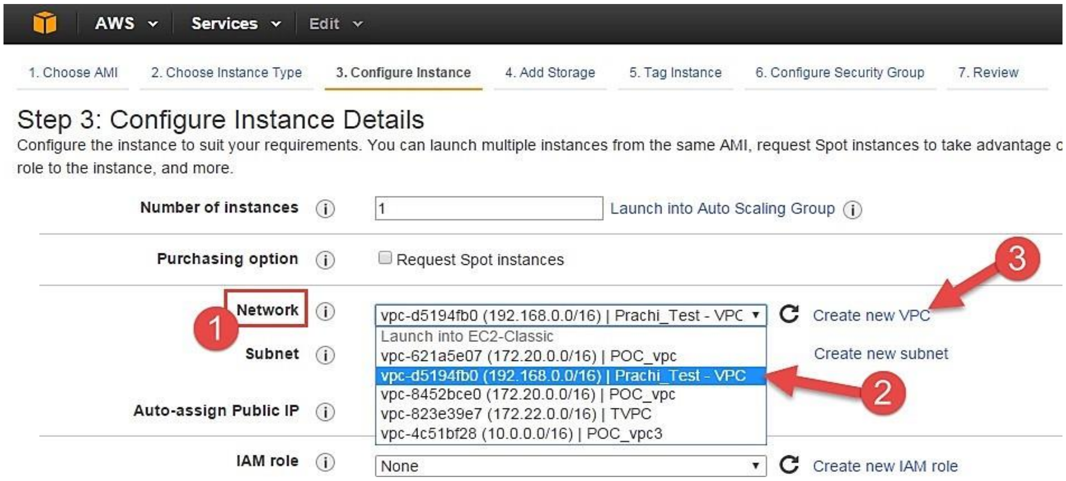
- You have to decide here, in which VPC (Virtual Private Cloud) you want to launch your instance and under which subnets inside your VPC. It is better to determine and plan this prior to launching the instance. Your AWS architecture set-up should include IP ranges for your subnets etc. pre-planned for better management. (We will see how to create a

- Subnetting should also be pre-planned. E.g.: If it's a web server you should place it in the public subnet and if it's a DB server, you should place it in a private subnet all inside yourVPC.

Below,

1. Network section will give a list of VPCs available in our platform.
2. Select an already existing VPC
3. You can also create a new VPC

Here I have selected an already existing VPC where I want to launch my instance.



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage c
role to the instance, and more.

Number of instances: 1 Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

Network: vpc-d5194fb0 (192.168.0.0/16) | Prachi_Test - VPC Create new VPC

Launch into EC2-Classic
vpc-621a5e07 (172.20.0.0/16) | POC_vpc
vpc-d5194fb0 (192.168.0.0/16) | Prachi_Test - VPC
vpc-8452bce0 (172.20.0.0/16) | POC_vpc
vpc-823e39e7 (172.22.0.0/16) | TVPC
vpc-4c51bf28 (10.0.0.0/16) | POC_vpc3

Subnet: Create new subnet

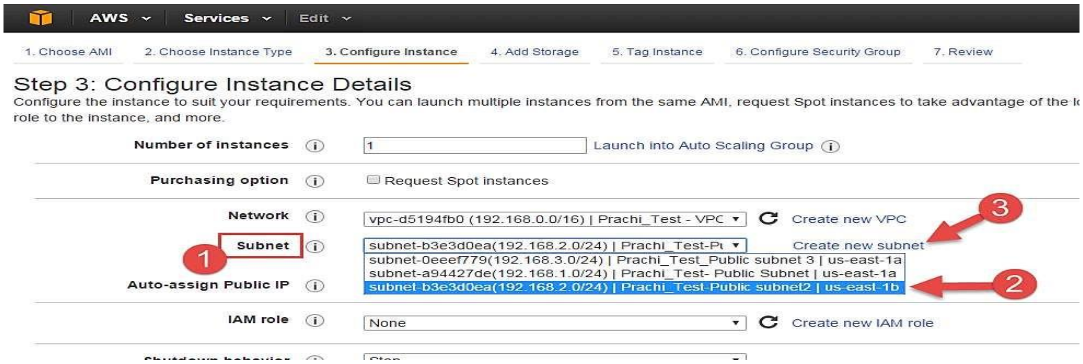
Auto-assign Public IP

IAM role: None Create new IAM role

Step 4) In this step,

- A VPC consists of subnets, which are IP ranges that are separated for restricting access.
- Below,

1. Under Subnets, you can choose the subnet where you want to place your instance.
2. I have chosen an already existing public subnet.
3. You can also create a new subnet in this step.



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the l
role to the instance, and more.

Number of instances: 1 Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

Network: vpc-d5194fb0 (192.168.0.0/16) | Prachi_Test - VPC Create new VPC

Subnet: subnet-b3e3d0ea(192.168.2.0/24) | Prachi_Test-Pu Create new subnet

subnet-0eeef779(192.168.3.0/24) | Prachi_Test_Public subnet 3 | us-east-1a
subnet-a94427de(192.168.1.0/24) | Prachi_Test- Public Subnet | us-east-1a
subnet-b3e3d0ea(192.168.2.0/24) | Prachi_Test-Public subnet2 | us-east-1b

Auto-assign Public IP

IAM role: None Create new IAM role

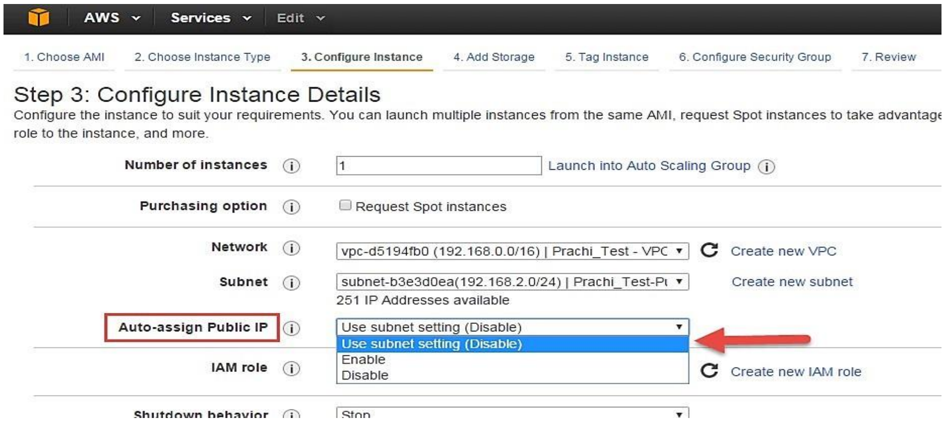
Shutdown behavior: Stop

- Once your instance is launched in a public subnet, AWS will assign a dynamic public IPto it from their pool of IPs.

Step 5) In this step,

- You can choose if you want AWS to assign it an IP automatically, or you want to do itmanually later. You can enable/ disable 'Auto assign Public IP' feature here likewise.

- Here we are going to assign this instance a static IP called as EIP (Elastic IP) later. So we keep this feature disabled as of now.



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage
role to the instance, and more.

Number of instances: 1 — Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

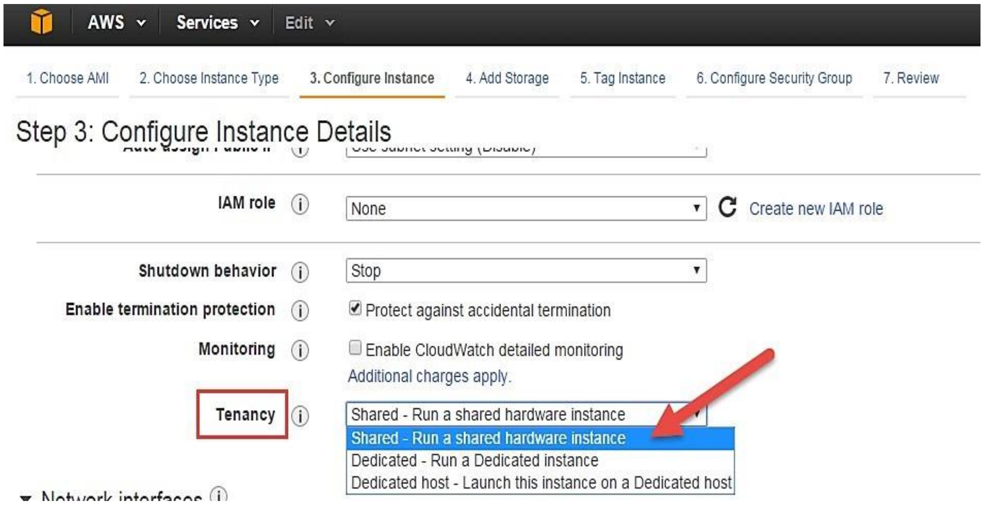
Network: vpc-d5194fb0 (192.168.0.0/16) | Prachi_Test - VPC — Create new VPC

Subnet: subnet-b3e3d0ea(192.168.2.0/24) | Prachi_Test-Pu — Create new subnet
251 IP Addresses available

Auto-assign Public IP: Use subnet setting (Disable)
- Use subnet setting (Disable)
- Enable
- Disable

IAM role — Create new IAM role

Shutdown behavior: Stop



Step 3: Configure Instance Details

Auto-assign Public IP: Use subnet setting (Disable)

IAM role: None — Create new IAM role

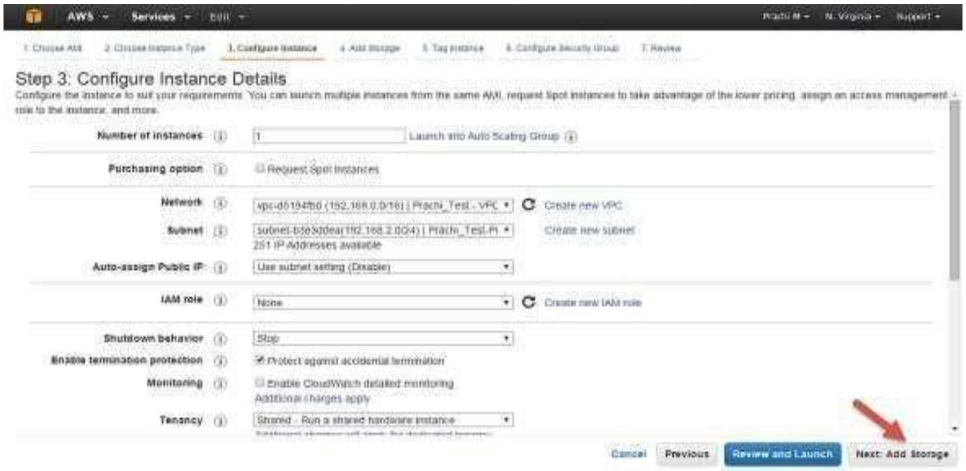
Shutdown behavior: Stop

Enable termination protection: ☑ Protect against accidental termination

Monitoring: □ Enable CloudWatch detailed monitoring
Additional charges apply.

Tenancy: Shared - Run a shared hardware instance
- Shared - Run a shared hardware instance
- Dedicated - Run a Dedicated instance
- Dedicated host - Launch this instance on a Dedicated host

Network interfaces



Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 — Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

Network: vpc-d5194fb0 (192.168.0.0/16) | Prachi_Test - VPC — Create new VPC

Subnet: subnet-b3e3d0ea(192.168.2.0/24) | Prachi_Test-Pi — Create new subnet
251 IP Addresses available

Auto-assign Public IP: Use subnet setting (Disable)

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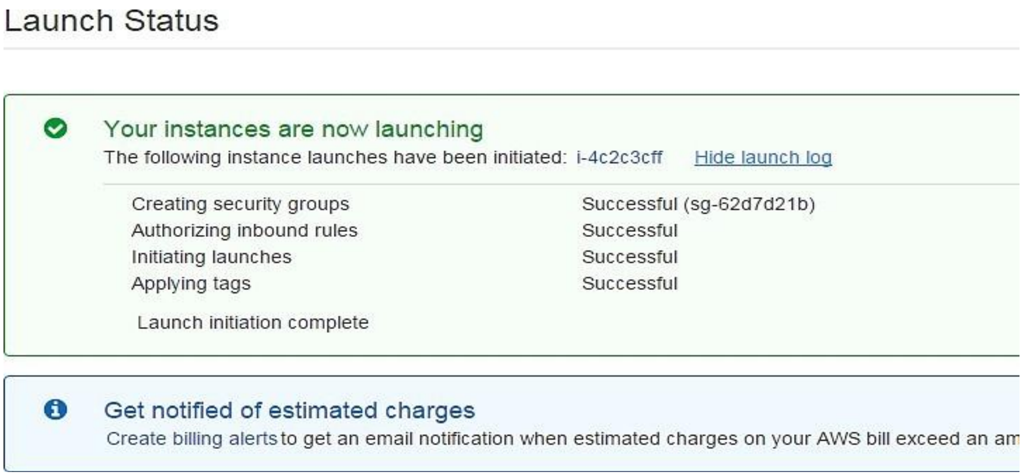


Launch Status

Your instances are now launching

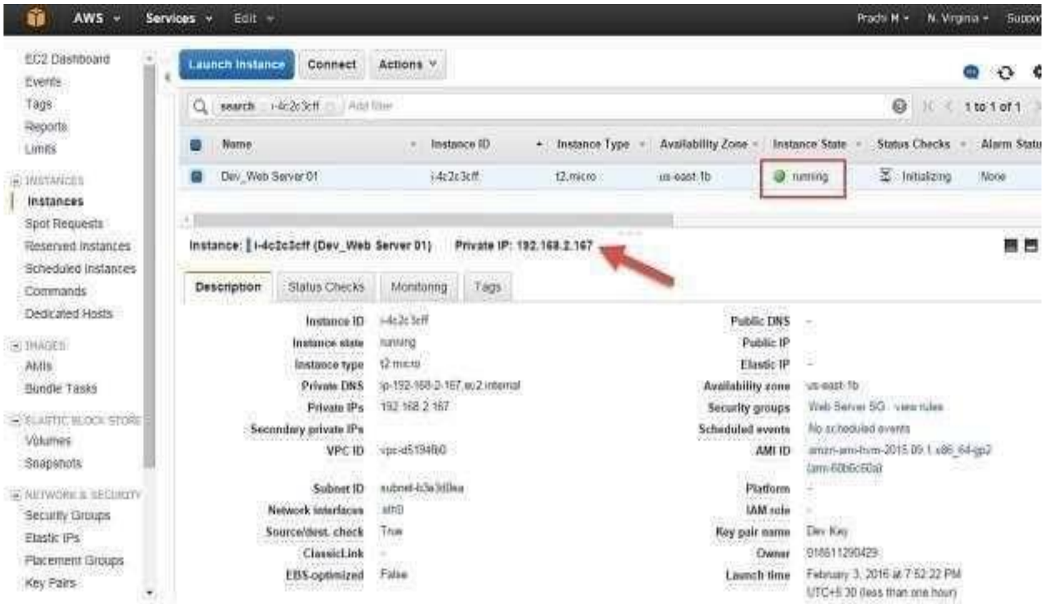
The following instance launches have been initiated: i-4c2c3cff Hide launch log

Creating security groups	Successful (sg-62d7d21b)
Authorizing inbound rules	Successful
Initiating launches	Successful
Applying tags	Successful

Launch initiation complete

Get notified of estimated charges

Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an am



search : i-4c2c3cff Add filter

1 to 1 of 1

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Statu
Dev_Web Server 01	i-4c2c3cff	t2.micro	us-east-1b	running	Initializing	None

Instance: i-4c2c3cff (Dev_Web Server 01) Private IP: 192.168.2.167

Instance ID	i-4c2c3cff	Public DNS	-
Instance state	running	Public IP	
Instance type	t2.micro	Elastic IP	-
Private DNS	ip-192-168-2-167.ec2.internal	Availability zone	us-east-1b
Private IPs	192.168.2.167	Security groups	Web Server SG . view rules
Secondary private IPs		Scheduled events	No scheduled events
VPC ID	vpc-d51948b0	AMI ID	amzn-ami-hvm-2015.09.1.x86_64-gp2 (ami-60b6c60a)
Subnet ID	subnet-b3a3d8ea	Platform	-
Network interfaces	eth0	IAM role	-
Source/dest. check	True	Key pair name	Dev Key
ClassicLink	-	Owner	016611290429
EBS-optimized	False	Launch time	February 3, 2016 at 7:52:22 PM UTC+5:30 (less than one hour)

Conclusion:

Thus, we saw in detail how to create an on-demand EC2 instance in this tutorial. Because it is an on-demand server, you can keep it running when in use and 'Stop' it when it's unused to save on your costs