

BUILDING A FULLY FUNCTIONAL VPC AND LAUNCHING A WEB SERVER

Aim:

To build a fully functional VPC in AWS and launch an instance as a Web Server.

Reference Diagram:

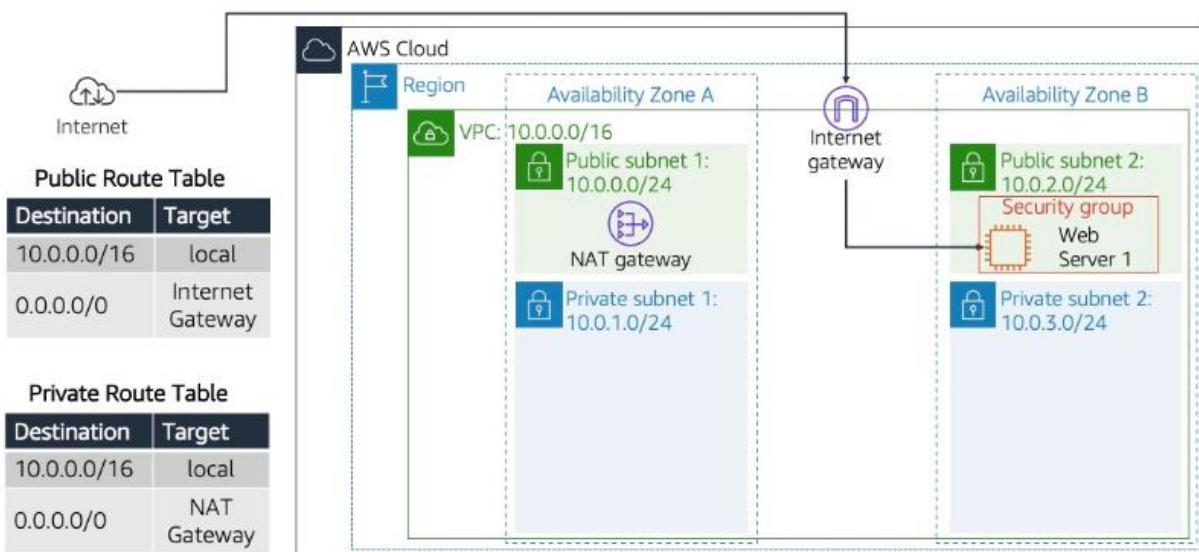


Figure: The customer is requesting the build of this architecture to launch their web server successfully.

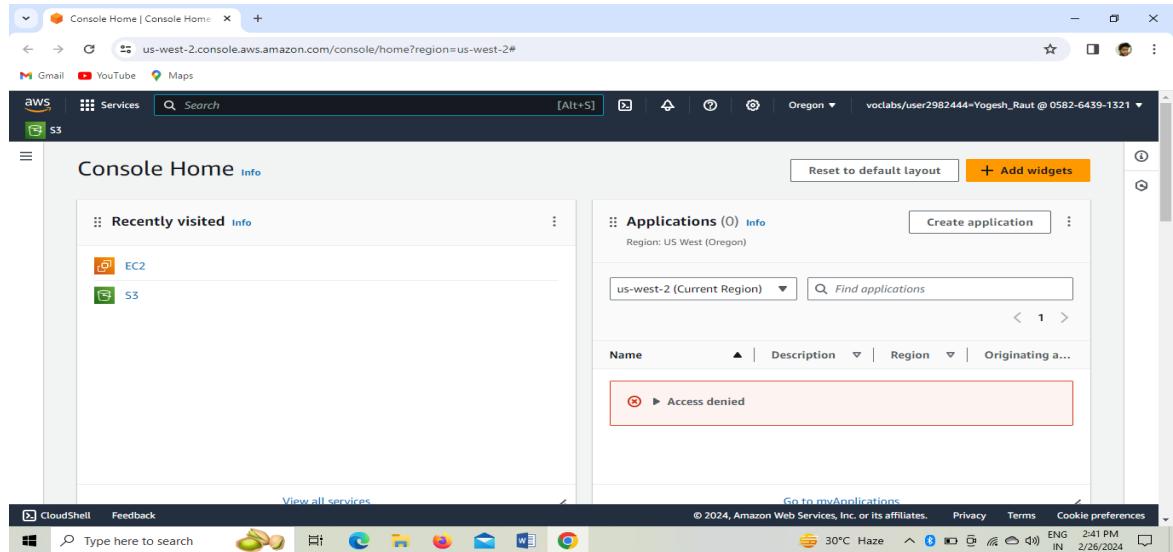
Steps I followed:

I actually divided the task in two parts, one being the VPC build and other is Web Server launch.

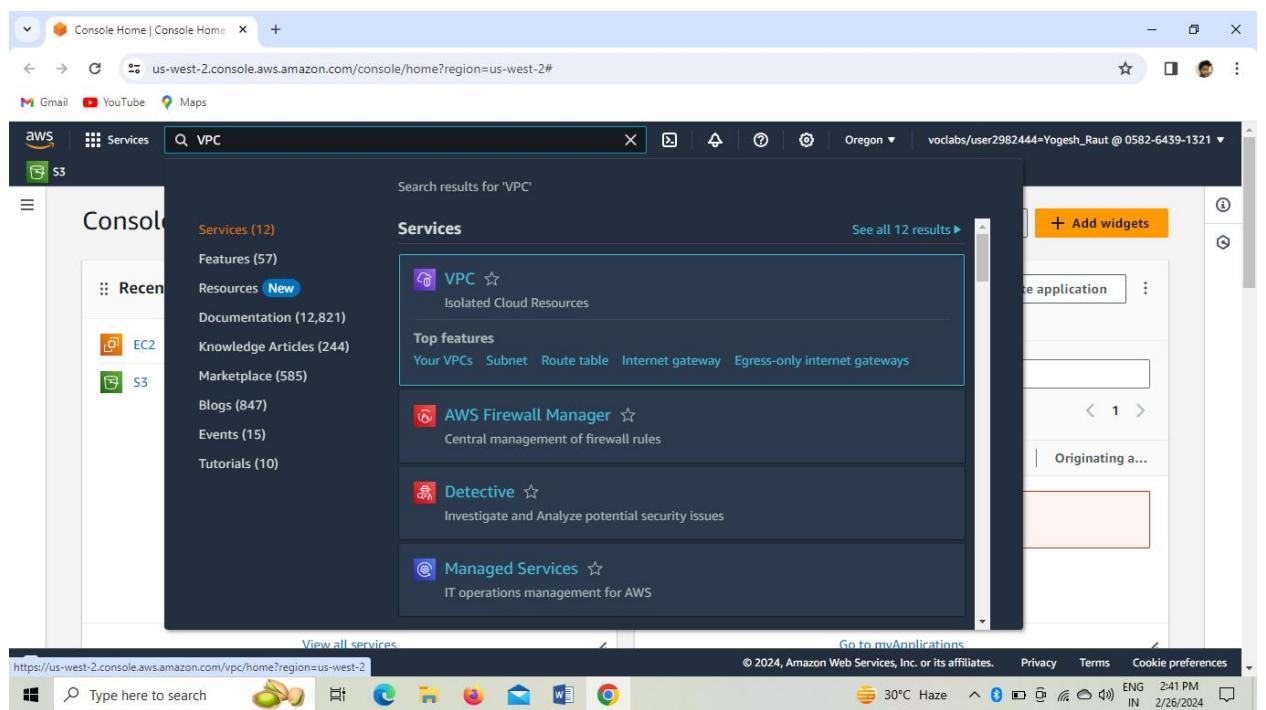
PART 1. THE VPC (Virtual Private Cloud) BUILD:

Actually AWS provides a fairly easy way to create VPCs, it is quite easy once you know the sequence of steps.

1. Login to AWS Management Console, to get the following interface.



2. In the search bar, search for VPC and select **Create VPC** option.



Home | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#Home:

Gmail YouTube Maps

aws Services Search [Alt+S]

VPC dashboard EC2 Global View Filter by VPC: Select a VPC

VPC dashboard Virtual private cloud Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways Carrier gateways DHCP option sets Elastic IPs Managed prefix lists Endpoints

Create VPC Launch EC2 Instances Note: Your Instances will launch in the US West region.

Resources by Region Refresh Resources You are using the following Amazon VPC resources

VPCs	US West 1
See all regions	

NAT Gateways	US West 0
See all regions	

Subnets	US West 4
See all regions	

VPC Peering Connections	US West 0
See all regions	

Route Tables	US West 1
See all regions	

Network ACLs	US West 1
See all regions	

Internet Gateways	US West 1
See all regions	

Security Groups	US West 1
See all regions	

Service Health View complete service health details

Settings Zones Console Experiments

Additional Information VPC Documentation All VPC Resources Forums Report an Issue

AWS Network Manager AWS Network Manager provides tools and features to help you manage and monitor your network on AWS. Network Manager

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3. Configure the VPC as follows and create the VPC.

VPC > Your VPCs > Create VPC

Create VPC Info

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

VPC settings

Resources to create [Info](#)
Create only the VPC resource or the VPC and other networking resources.
 VPC only VPC and more

Name tag - *optional*
Creates a tag with a key of 'Name' and a value that you specify.
Test VPC

IPv4 CIDR block [Info](#)
 IPv4 CIDR manual input IPAM-allocated IPv4 CIDR block
10.0.0.0/16
CIDR block size must be between /16 and /28.

IPv6 CIDR block [Info](#)
 No IPv6 CIDR block IPAM-allocated IPv6 CIDR block
 Amazon-provided IPv6 CIDR block
 IPv6 CIDR owned by me

Tenancy [Info](#)
Default

CloudShell Feedback

4. Review VPC details as follows.

The screenshot shows the AWS VPC Console interface. A success message at the top right says "You successfully created vpc-0ad587445f5ca8680 / Test VPC". The main panel displays the details of the newly created VPC, including its ID (vpc-0ad587445f5ca8680), state (Available), and various network settings like CIDR ranges and route tables. The left sidebar shows the navigation pane with "Your VPCs" selected. The bottom status bar includes CloudShell, Feedback, search, and system information.

- Now that we have our VPC, we need to create subnets. **Subnets** option is available on the left navigation pane.

The screenshot shows the AWS Subnets console. The left sidebar has "Subnets" selected. The main area displays a table titled "Subnets Info" with a single row showing "No matching resource found". A "Create subnet" button is visible at the top right. The bottom status bar includes CloudShell, Feedback, search, and system information.

- Configure and create subnets as shown below.

aws Services Search [Alt+S] Oregon v vocabs/user2982444=Yogesh_Raut @ 0582-6439-1321 ▾

VPC > Subnets > Create subnet

Create subnet Info

VPC

VPC ID
Create subnets in this VPC.
vpc-0ad587445f5ca8680 (Test VPC)

Associated VPC CIDRs
IPv4 CIDRs
10.0.0.0/16

Subnet settings
Specify the CIDR blocks and Availability Zone for the subnet.

Subnet 1 of 1

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
Public Subnet 1
The name can be up to 256 characters long.

Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
No preference

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Subnet 1 of 1

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
Public Subnet 1
The name can be up to 256 characters long.

Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
No preference

IPv4 VPC CIDR block Info
Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.
10.0.0.0/16

IPv4 subnet CIDR block
10.0.0.0/24 256 IPs
◀ ▶ ⌂ ⌃ ⌄

▼ Tags - optional

Key	Value - optional
Q Name	Q Public Subnet 1 X Remove

Add new tag You can add 49 more tags.
Remove Add new subnet

Cancel **Create subnet** © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences

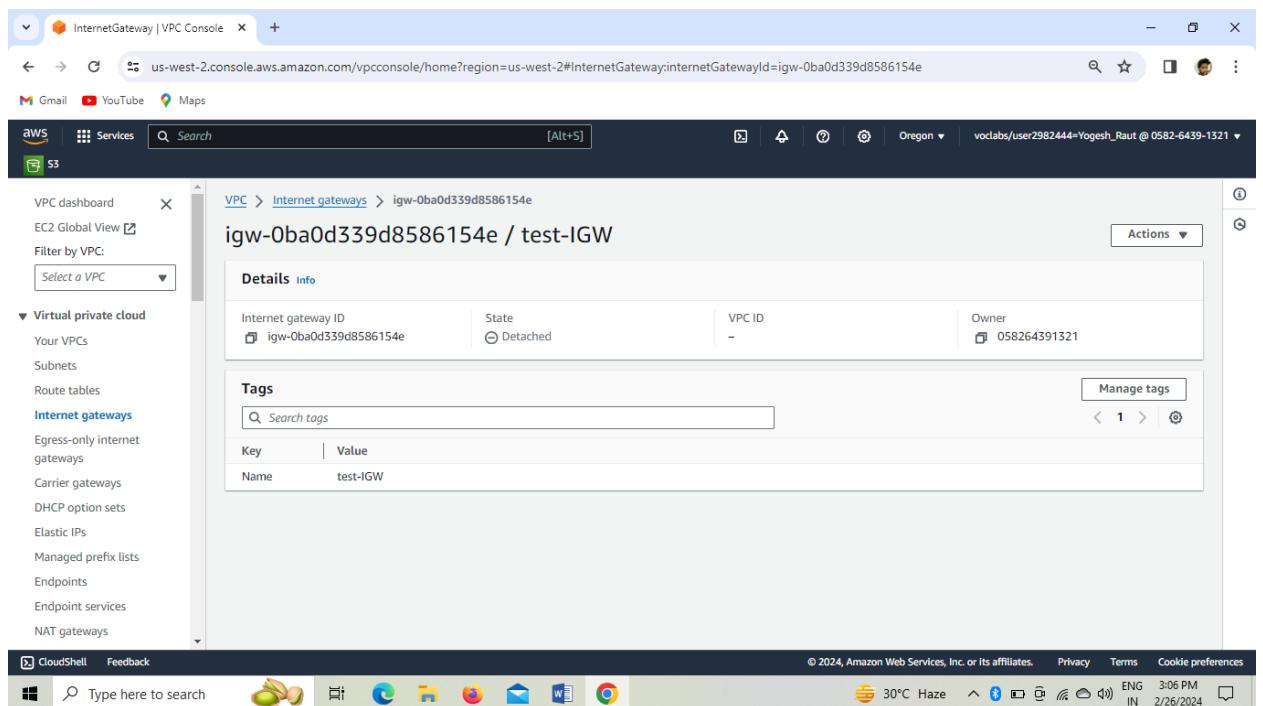
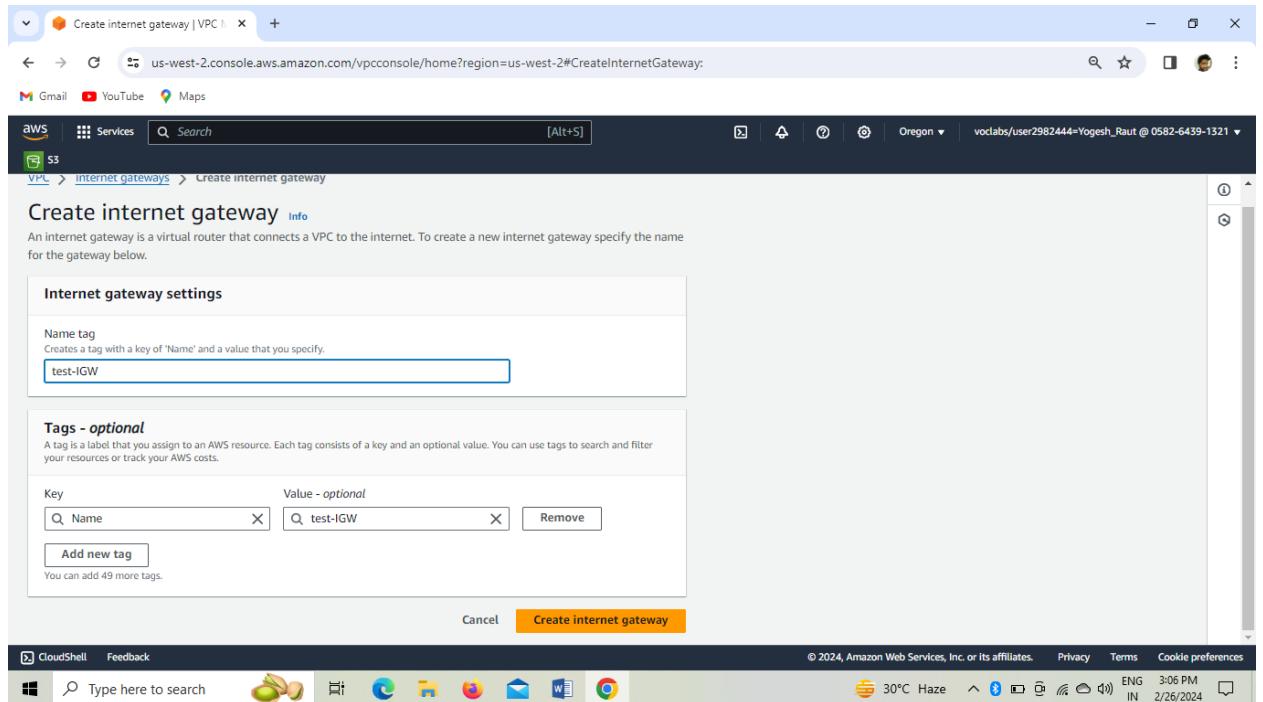
You have successfully created 4 subnets: subnet-006e8f9f4437cf651, subnet-0fea97cb1e8df1cb, subnet-0ba880e4ee5c8956a, subnet-036450c13014372df

Name	Subnet ID	State	VPC	IPv4 CIDR
Public Subnet 2	subnet-0ba880e4ee5c8956a	Available	vpc-0ad587445f5ca8680 Test ...	10.0.2.0/24
Public Subnet 1	subnet-006e8f9f4437cf651	Available	vpc-0ad587445f5ca8680 Test ...	10.0.0.0/24
Private Subnet 1	subnet-0fea97cb1e8df1cb	Available	vpc-0ad587445f5ca8680 Test ...	10.0.1.0/24
Private Subnet 2	subnet-036450c13014372df	Available	vpc-0ad587445f5ca8680 Test ...	10.0.3.0/24

7. Now we have our place within the network. But what if you need to connect to outside world? We have to create gateways to the Internet. We're building a web server in there after all!!!

VPC ID : vpc-0ad587445f5ca8680

Name	Internet gateway ID	State	VPC ID	Owner
No matching resource found				



- As we can see, our Internet gateway is still detached. We need it attached to our VPC. Do it from the actions tab as shown.

InternetGateway | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#InternetGateway:id=igw-0ba0d339d8586154e

VPC > Internet gateways > igw-0ba0d339d8586154e / test-IGW

Details		Actions	
Internet gateway ID igw-0ba0d339d8586154e	State Detached	VPC ID -	Owner 0582643913
Attach to VPC Detach from VPC Manage tags Delete			

Tags

Search tags	
Key	Value
Name	test-IGW

CloudShell Feedback

Type here to search

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Attach internet gateway | VPC

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#AttachInternetGateway:id=igw-0ba0d339d8586154e

VPC > Internet gateways > Attach to VPC (igw-0ba0d339d8586154e)

Attach to VPC (igw-0ba0d339d8586154e) [Info](#)

VPC

Attach an internet gateway to a VPC to enable the VPC to communicate with the internet. Specify the VPC to attach below.

Available VPCs

Attach the internet gateway to this VPC.

vpc-0ad587445f5ca8680	X
Use: "vpc-0ad587445f5ca8680"	
vpc-0ad587445f5ca8680 - Test VPC	

Cancel [Attach internet gateway](#)

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- Also with private subnets present, we need NAT gateways too!! Private Subnets can communicate through NAT gateway. Follow the images for creating NAT gateway.

NatGateways | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#NatGateways:vpcId=vpc-0ad587445f5ca8680

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S3

Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways Carrier gateways DHCP option sets Elastic IPs Managed prefix lists Endpoints Endpoint services **NAT gateways** Peering connections

▼ Security Network ACLs Security groups

▼ DNS firewall

NAT gateways Info

Find resources by attribute or tag

yvc-0ad587445f5ca8680 X Clear filters

Name NAT gateway ID Connectivity... State State message Primary public I... Primary pr...

No matching resource found

Select a NAT gateway

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CreateNatGateway | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#CreateNatGateway:

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S3

VPC > NAT gateways > Create NAT gateway

Create NAT gateway Info

A highly available, managed Network Address Translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the internet.

NAT gateway settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

The name can be up to 256 characters long.

Subnet
Select a subnet in which to create the NAT gateway.

Connectivity type
Select a connectivity type for the NAT gateway.
 Public
 Private

Private NAT gateway traffic can't reach the internet.

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NAT gateway nat-00f6346c12aa22d0b | Test NGW was created successfully.

nat-00f6346c12aa22d0b / Test NGW

Details	
NAT gateway ID nat-00f6346c12aa22d0b	Connectivity type Private
NAT gateway ARN arn:aws:ec2:us-west-2:058264391321:natgateway/nat-00f6346c12aa22d0b	Primary public IPv4 address -
VPC vpc-0ad587445f5ca8680 / Test VPC	Subnet subnet-006e8f9f4437cf651 / Public Subnet 1
State Pending	Primary private IPv4 address -
Created Monday, February 26, 2024 at 15:14:51 GMT+5:30	Deleted -
State message Info	
Primary network interface ID -	

Secondary IPv4 addresses

Secondary IPv4 addresses

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- Now that we have our gateways ready, let's configure the route tables to provide communication routes for subnets. Since we have public and private subnets, we need two route tables, one each for public and private subnets.

Create route table [Info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - *optional*
Create a tag with a key of 'Name' and a value that you specify.

VPC
The VPC to use for this route table.

Tags
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value - <i>optional</i>
<input type="text" value="Name"/>	<input type="text" value="Public RTB"/>

[Add new tag](#)

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Name	Route table ID	Explicit subnet associations	Edge associations	Main	VPC
-	rtb-02180fdcfabb76035	-	-	Yes	vpc-0ad587445f5ca8680
Public RTB	rtb-086c70a19a76678eb	-	-	No	vpc-0ad587445f5ca8680
Private RTB	rtb-0de77171cb86e6034	-	-	No	vpc-0ad587445f5ca8680

11. We still need to do two things here, one is to provide the communication paths (IGW for Public and NGW for Private Subnet) and associate respective subnets to corresponding route tables. This can be done as given in images.
(0.0.0.0/0 means it can be accessed from anywhere.)

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No

EditRoutes | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#EditRoutes:RouteTableId=rtb-086c70a19a76678eb

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aws Services Search [Alt+S]

VPC > Route tables > rtb-086c70a19a76678eb > Edit routes

Edit routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	Internet Gateway		No
	igw-0ba0d339d8586154e		
	Add route		
	igw-0ba0d339d8586154e (test-IGW)		

Cancel Preview Save changes

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RouteTableDetails | VPC Console

us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#RouteTableDetails:RouteTableId=rtb-086c70a19a76678eb

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aws Services Search [Alt+S]

VPC > Route tables > rtb-086c70a19a76678eb

rtb-086c70a19a76678eb / Public RTB

Actions

Details Info

Route table ID	Main	Explicit subnet associations	Edge associations
rtb-086c70a19a76678eb	No	-	-
VPC	Owner ID		
vpc-0ad587445f5ca8680 Test VPC	058264391321		

Routes Subnet associations Edge associations Route propagation Tags

Explicit subnet associations (0) Edit subnet associations

Name Subnet ID IPv4 CIDR IPv6 CIDR

No subnet associations

You do not have any subnet associations.

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Screenshot of the AWS VPC console showing the "Edit subnet associations" page for route table rtb-086c70a19a76678eb.

Available subnets (2/4)

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
Public Subnet 2	subnet-0ba880e4ee5c8956a	10.0.2.0/24	-	Main (rtb-02180ffffabb76035)
Public Subnet 1	subnet-006e8f9f4437cf651	10.0.0.0/24	-	Main (rtb-02180ffffabb76035)
Private Subnet 1	subnet-0fea997cb1e8df1cb	10.0.1.0/24	-	Main (rtb-02180ffffabb76035)
Private Subnet 2	subnet-036450c13014372df	10.0.3.0/24	-	Main (rtb-02180ffffabb76035)

Selected subnets

- subnet-0ba880e4ee5c8956a / Public Subnet 2
- subnet-006e8f9f4437cf651 / Public Subnet 1

Buttons: Cancel, Save associations

Screenshot of the AWS VPC console showing the "Edit routes" page for route table rtb-0de77171cb86e6034.

Edit routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	NAT Gateway	-	No
	nat-00f6346c12aa22d0b (Test NGW)		

Buttons: Add route, Remove, Cancel, Preview, Save changes

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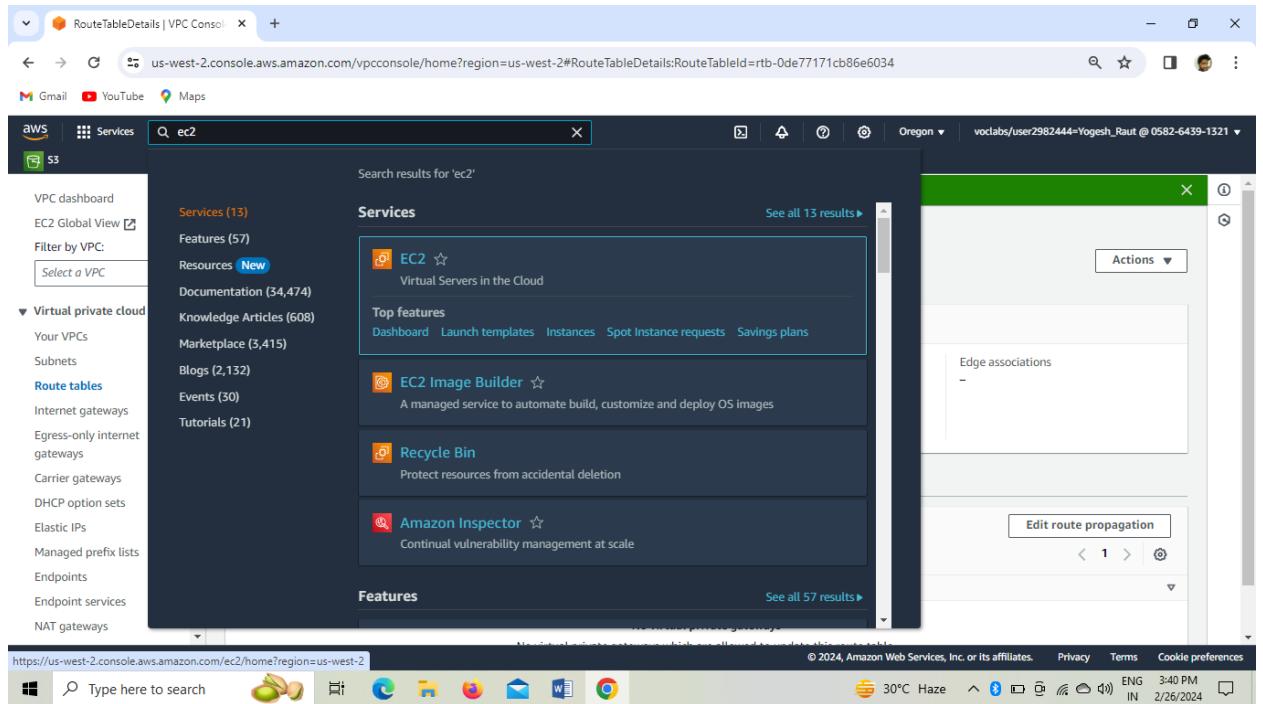
The screenshot shows the AWS VPC console interface. The user is navigating through the 'Route tables' section to edit subnet associations for a specific route table. The 'Available subnets' table lists four subnets: 'Public Subnet 2', 'Public Subnet 1', 'Private Subnet 1', and 'Private Subnet 2'. 'Private Subnet 1' and 'Private Subnet 2' are selected and highlighted in blue. In the 'Selected subnets' section, the two selected subnets are listed. At the bottom right, there are 'Cancel' and 'Save associations' buttons. The browser address bar shows the URL: us-west-2.console.aws.amazon.com/vpcconsole/home?region=us-west-2#EditRouteTableSubnetAssociations:RouteTableId=rtb-0de77171cb86e6034.

12. There we go!! We now have a **fully functioned VPC**.

PART 2. LAUNCHING AN EC2 INSTANCE AS A WEB SERVER

Now that we have a functional VPC, we move on to EC2 for instance launch to have a running web server.

1. Go to EC2 from the search bar as shown.



2. Select the **Launch Instance** option.

3. Configure instance as follows:
 - I. **Name** : Web Server
 - II. **AMI** : Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type
 - III. **Instance Type** : t3.micro
 - IV. **Key Pair**: For this case, I used the key pair I created. You can also create your own too.
 - V. **Network Settings** : **VPC** : Test VPC
 - VI. **Subnet** : Public Subnet 2
 - VII. **Auto-assign Public IP** : Enable
 - VIII. **Firewall (Security Groups)** , choose create security group
 - i. **Security group name** : Web Server SG
 - ii. **Description** : Web Server Security Group
 - iii. **In Inbound Security Group Rules** , choose **Add security group rules**
 - a. **Type**: HTTP
 - b. **Source type**: Anywhere
 - IX. Expand **advanced details** tab and write the following script in **User data**.

```
#!/bin/bash
#Install Apache Web Server and PHP
yum install -y httpd mysql php
#Download files
wget https://aws-tc-largeobjects.s3.us-west-2.amazonaws.com/CUR-TF-100-RESTR-T-1/267-lab-NF-build-vpc-web-server/s3/lab-app.zip
unzip lab-app.zip -d /var/www/html/
```

```
#Turn on web server  
chkconfig httpd on  
service httpd start
```

X. Now click on **Launch instance**.

XI. Finally, you can now view your instance from dashboard. To run, the instance has to pass security checks. While we wait, let's copy Public IP of the Instance from **Details** tab.

The screenshot shows the AWS EC2 Instances dashboard. On the left, there is a sidebar with various navigation options: EC2 Dashboard, EC2 Global View, Events, Instances (selected), Instances Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations (New), Images (AMIs, AMI Catalog), and Elastic Block Store (Volumes). The main area displays a table titled "Instances (1/1) Info" with one row. The row details are: Name (Web Server), Instance ID (i-0a35eba4deeda5249), Instance state (Running), Instance type (t3.micro), Status check (Initializing), Alarm status (View alarms +), Availability Zone (us-west-2c), and Public IP (34.220.214.153). Below the table, a modal window titled "Instance: i-0a35eba4deeda5249 (Web Server)" is open, specifically showing the "Details" tab. In this tab, the "Public IPv4 address copied" message is visible above the public IP address field, which contains "34.220.214.153 [open address]". Other details shown include Instance ID (i-0a35eba4deeda5249 (Web Server)), Instance state (Running), and Private IP DNS name (IPv4 only).

- XII. Once checks are passed, open a new tab and paste the IP in address tab and see that your server is ready to go!! Here is how it looks.

