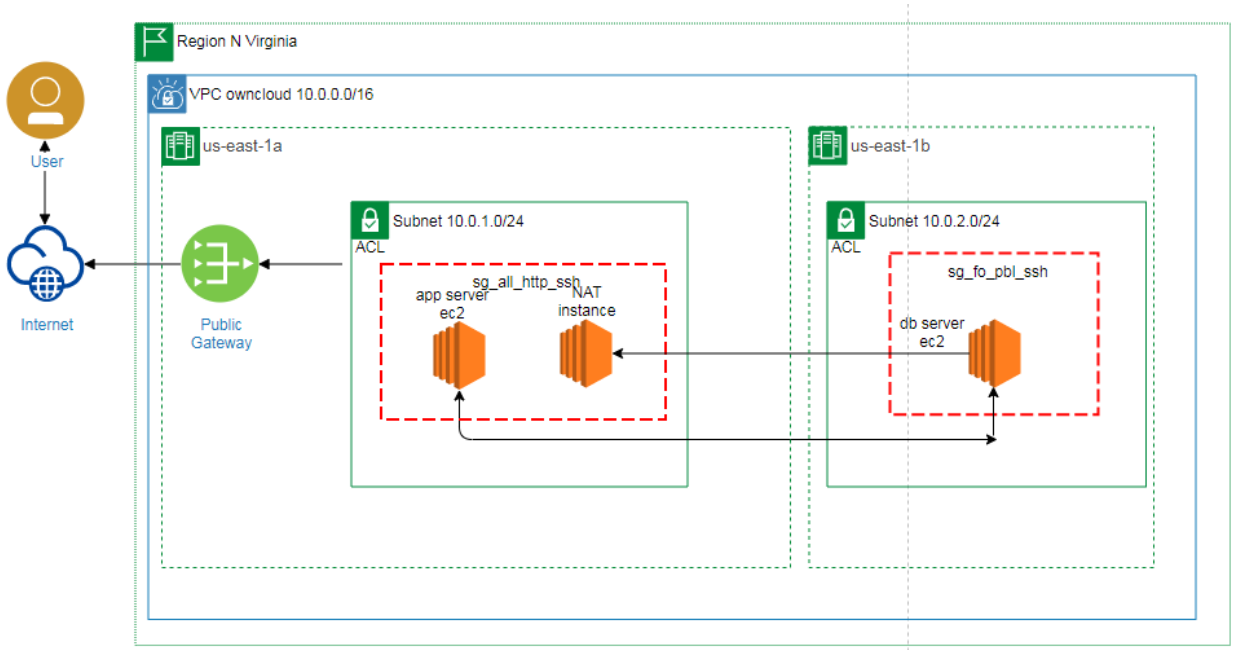
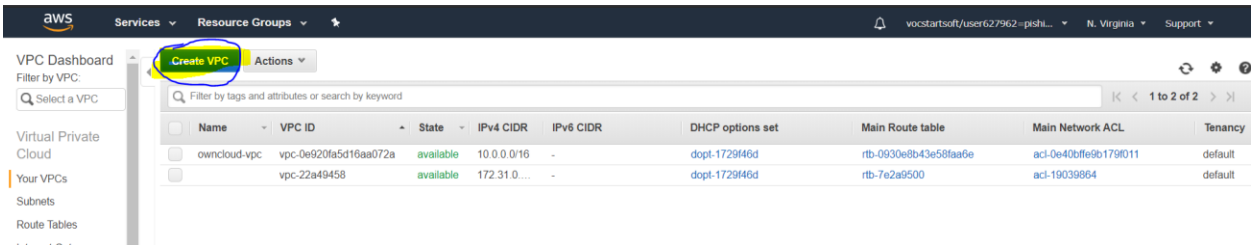
1. Phase 1 – Architecture:



2. Phase 2 – Implementation:

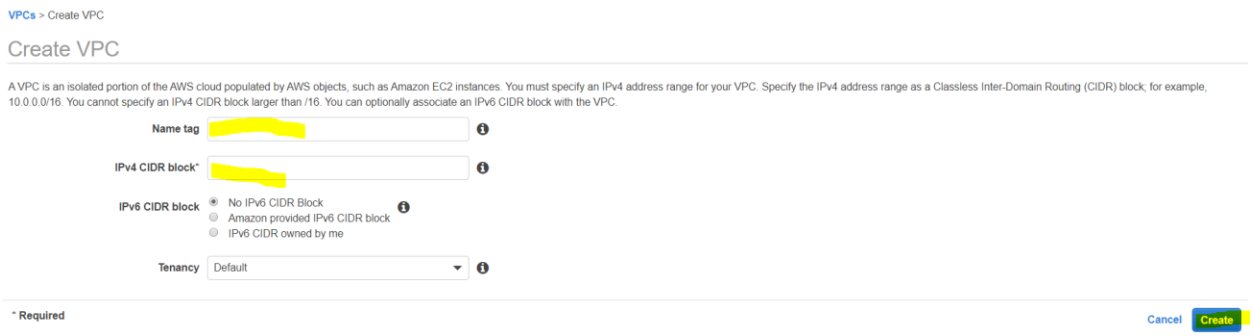
Creating the Custom VPC.

Step 1. Click on Create VPC | VPC Management Console



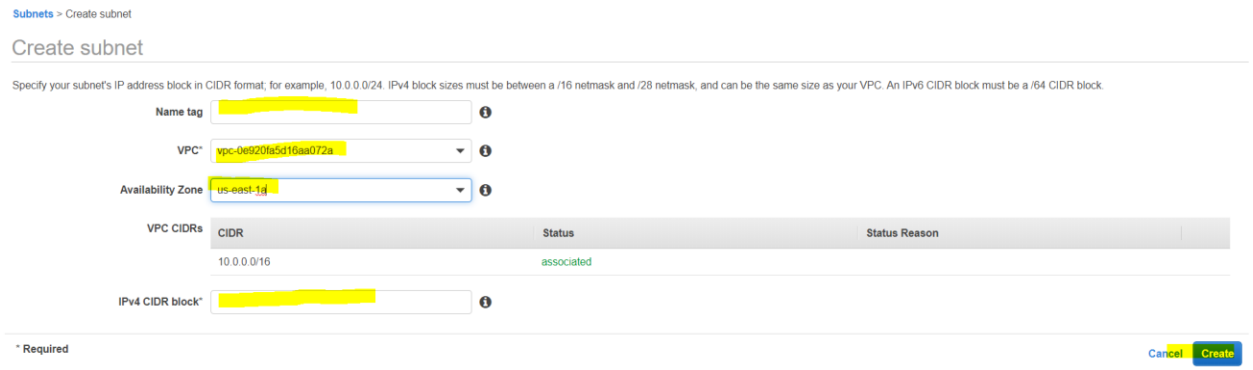
Step2:

- ✓ Enter the Name Tag (Owncloud-VPC)
- ✓ Enter the IPV4 CIDR Block (10.0.0.0/16)
- ✓ No need to change the IPv6 CIDR block and Tenancy
- ✓ Click on Create



Step 3: Now we need to create a Public and Private Subnets

- ✓ Click on Create Subnet
- ✓ Enter Name tag (Public1)
- ✓ Click on the dropdown and select the custom VPC which you had created earlier.
- ✓ Select the availability zone. Right now, I am using the US-EAST-1 Region so that I can see the six availability zones. In this case, I am using (us-east-1a)
- ✓ Enter the CIDR range (10.0.1.0/24)



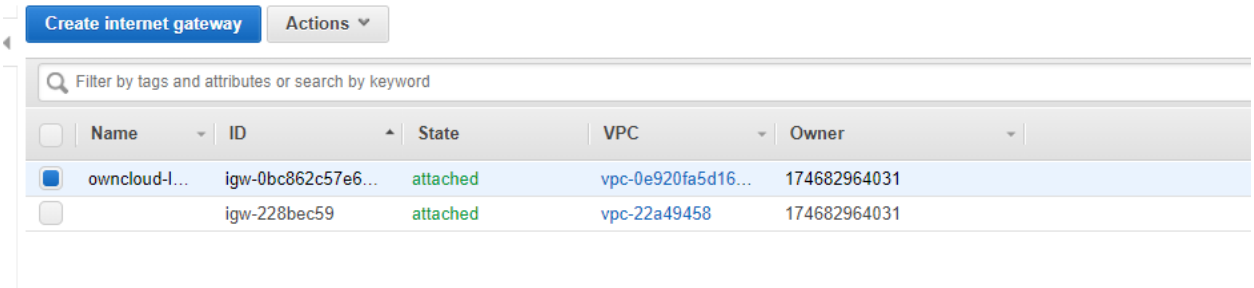
- ✓ Repeat the same process and create another public subnet in (us-east-1b) with CIDR 10.0.2.0/24
- ✓ Repeat the same process and create two private subnets one is in (us-east-1c with CIDR 10.0.3.0/24) another one is in (us-east-1d with CIDR 10.0.4.0/24)
- ✓ Once you created the four subnets, you will see the below screen with two public and two private subnets.

Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Zone	Availability Zone ID	Route table	Network ACL
Private2	subnet-0114314ee5b0dba9a	available	vpc-0e920fa5d16aa072a | ...	10.0.4.0/24	251	-	us-east-1d	use1-az2	rtb-08116aabe9aa87bcd | Priv...	acl-0e40bffe9b179f011
Private1	subnet-02812b393eb8a914b	available	vpc-0e920fa5d16aa072a | ...	10.0.3.0/24	251	-	us-east-1c	use1-az1	rtb-08116aabe9aa87bcd | Priv...	acl-0e40bffe9b179f011
Public2	subnet-0749c263f7ebb4933	available	vpc-0e920fa5d16aa072a | ...	10.0.2.0/24	251	-	us-east-1b	use1-az6	rtb-0f8bfe09b382f1b6d | Public...	acl-0e40bffe9b179f011
Public1	subnet-0bcdeb143bc78eb1d	available	vpc-0e920fa5d16aa072a | ...	10.0.1.0/24	251	-	us-east-1a	use1-az4	rtb-0f8bfe09b382f1b6d | Public...	acl-0e40bffe9b179f011

Step 4: Create an Internet gateway

- ✓ Select the Internet Gateways from VPC console
- ✓ Click on create **Create Internet Gateway**
- ✓ Enter the name of internet gateway

- ✓ In my case, I entered the Owncloud-IGW. You will see the below screen after you create.

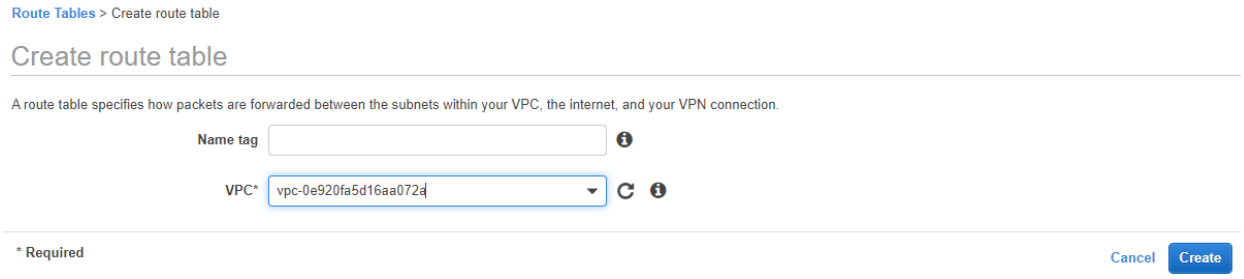


- ✓ Now we need to attach the VPC to our IGW
- ✓ Select the IGW which you have created and click on actions and select the attach to VPC.
- ✓ Click on the dropdown button, and you will see our custom VPC, Select the VPC and click on attach.

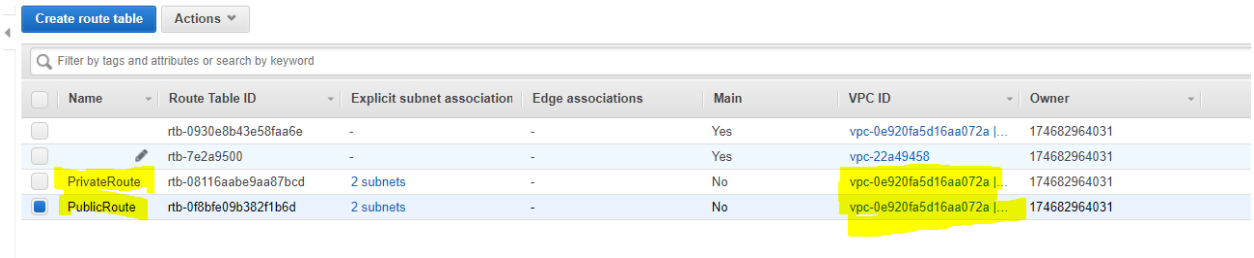
Step 5: Now we need to create Route tables for your subnets (You can explicitly associate a subnet with a particular route table. Otherwise, the Subnet is implicitly associated with the main route table. A subnet can only be associated with one route table at a time, but you can associate multiple subnets with the same subnet route table.)

- ✓ Select the **Route tables** from left side VPC panel
- ✓ Click on **create route table**
- ✓ Enter the name tag **public Route** and select our custom VPC from the dropdown.

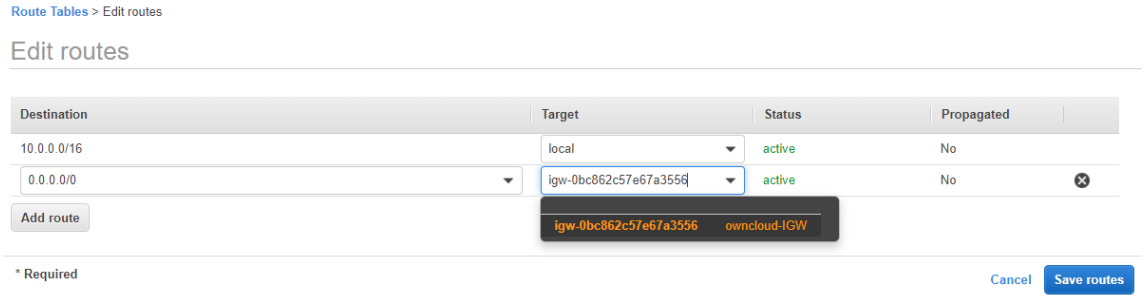
- ✓ Repeat the same steps and create one more route table with the **private route** name tag and select our custom VPC from the dropdown.



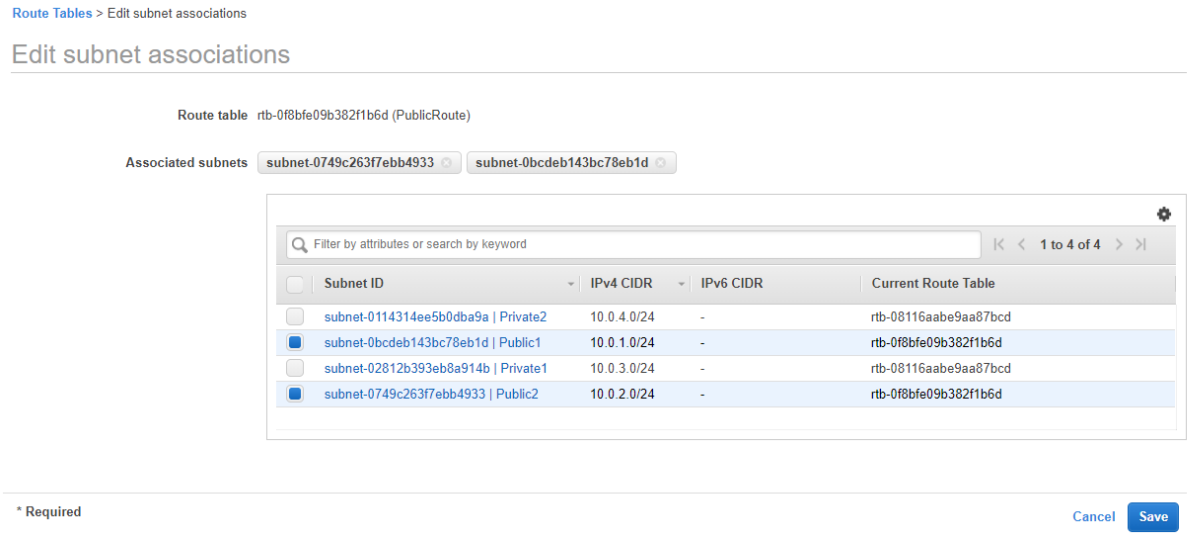
- ✓ Once you created the two route tables, you will see the below screen.



- ✓ Select the public Route and click on routes → edit routes
- ✓ Attach IGW to this route table so that subnets which are associated with this route table they will get the internet.



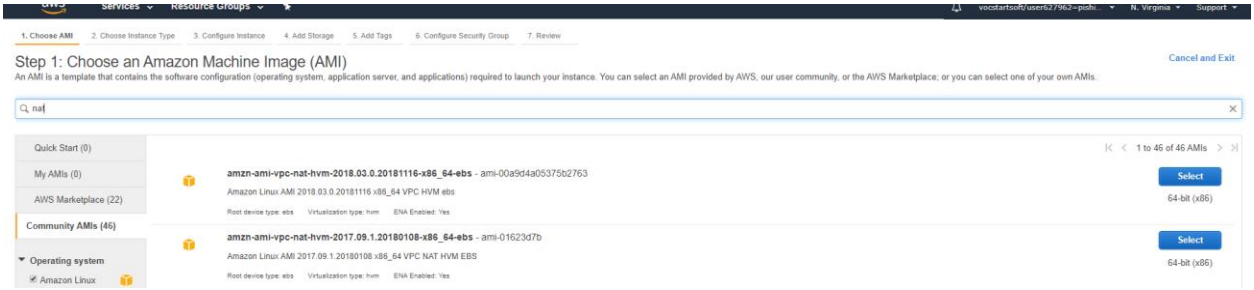
- ✓ Select the subnet associations → click on Edit Subnet associations → select the public subnets → click on save



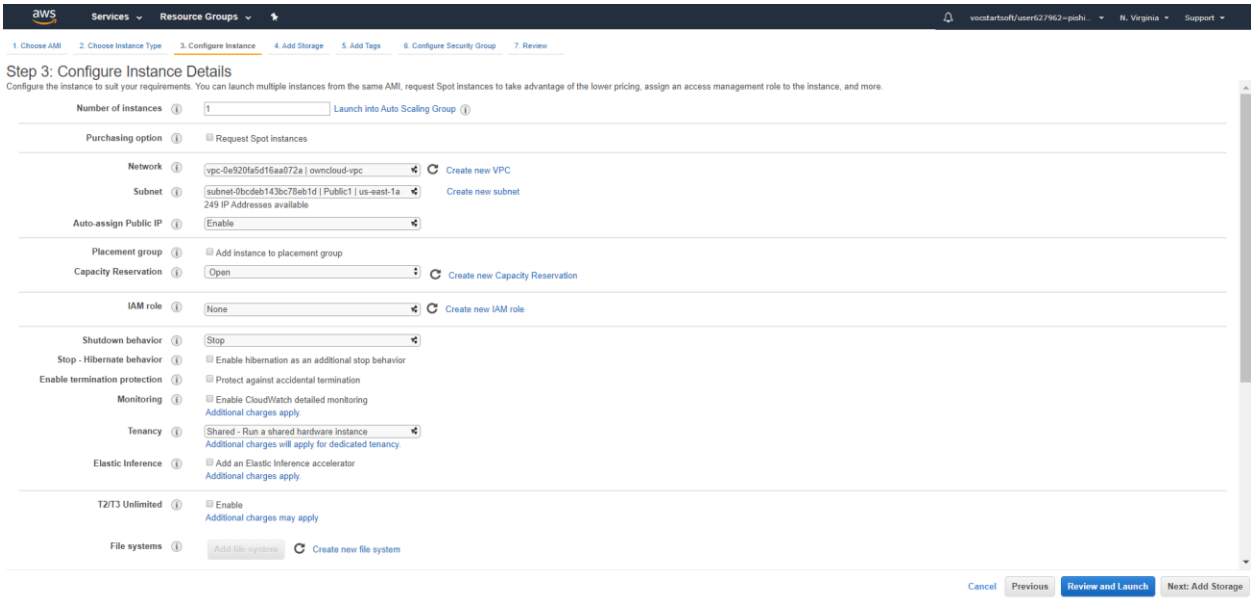
- ✓ Respect the same step for the Private Route
- ✓ Select the private route → Select the subnet associations → click on Edit Subnet associations → select the Private subnets → click on save
- ✓ But in this case, we are not adding the IGW in the private route table. So, the traffic will not leave the VPC.

Creating the NAT instance.

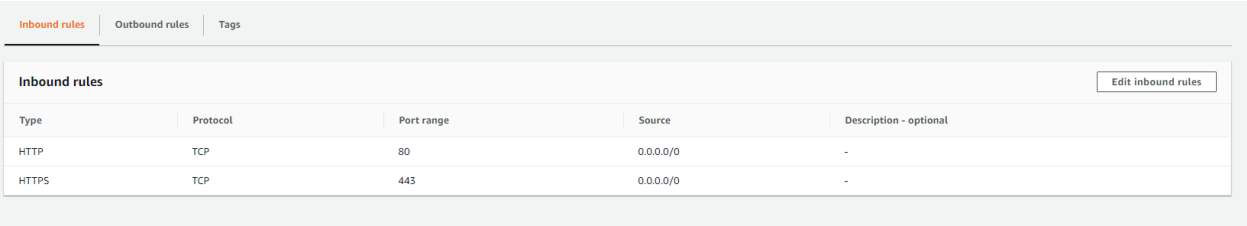
- ✓ Click on service → Select the ec2 from compute category.
- ✓ Select the launch instance → under the Operating system select the amazon Linux → Enter the nat in the search box → press enter
- ✓ You will get below screen



- ✓ Select **ami-00a9d4a05375b2763** → click on select
- ✓ Choose the instance as t2.micro → click on next
- ✓ In the networking, the section clicks on the dropdown → select the custom VPC which we have created earlier
- ✓ Subnet section → select the public Subnet → select enable in auto assign Public IP



- ✓ Leave as it is remaining fields and click on Next: add storage
- ✓ For our demo purpose, we do not add volume; we are keeping as it is → now click on next add: Tags → add the tags → add security groups
- ✓ For our demo, I am allowing the only Http, and Https port's only for IPV4



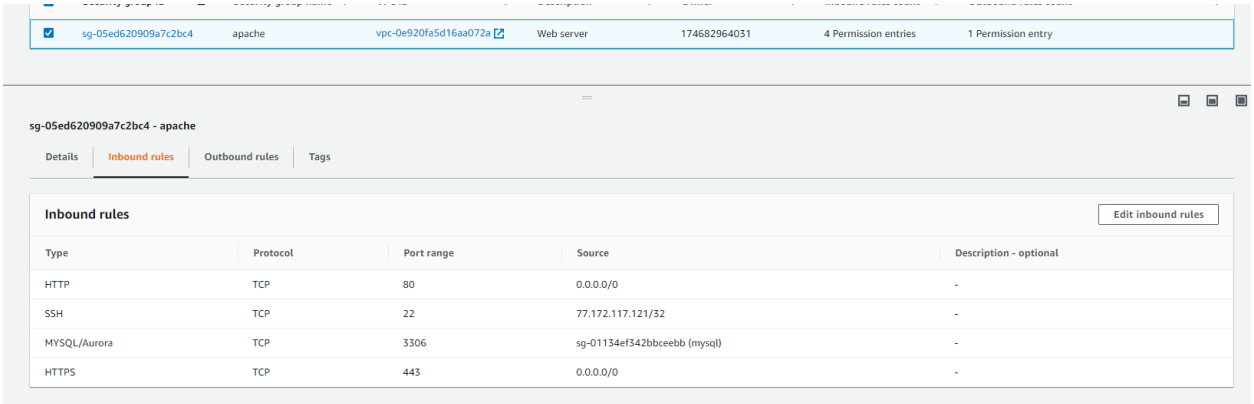
Type	Protocol	Port range	Source	Description - optional
HTTP	TCP	80	0.0.0.0/0	-
HTTPS	TCP	443	0.0.0.0/0	-

- ✓ Click on Review and Launch

Creating Ec2 instance in Public Subnet and installation of apache and PHP.

- ✓ Go to ec2 console
- ✓ Click on launch instance → select the **Ubuntu Server 18.04 LTS (HVM), SSD Volume Type** - ami-07ebfd5b3428b6f4d → Chose the instance type t2.micro → click on Next: Configure Instance Details
- ✓ Select our custom VPC from the dropdown in VPC section
- ✓ Select the Public Subnet from the dropdown in the Subnet section
- ✓ Click on add storage
- ✓ No need to change the storage section for our demo → click on add: Tags
- ✓ Add the tags (Key → Name & Value: Apache) → Click on configure security groups
- ✓ Allow Http and Https from anywhere and ssh from your computer
- ✓ Once you are done with the creation of MySQL server come back to a security group and allow MySQL from that server specifically

- ✓ Please find the below screenshot for your reference.



- ✓ Download the .pem file and Click on review and launch
- ✓ Login to the server using .pem file
- ✓ Run the below commands to install required packages for owncloud

sudo apt-get update
sudo apt-get install apache
sudo apt install php libapache2-mod-php php-mysql
vim /etc/apache2/mods-enabled/dir.conf

- ✓ update the configuration file

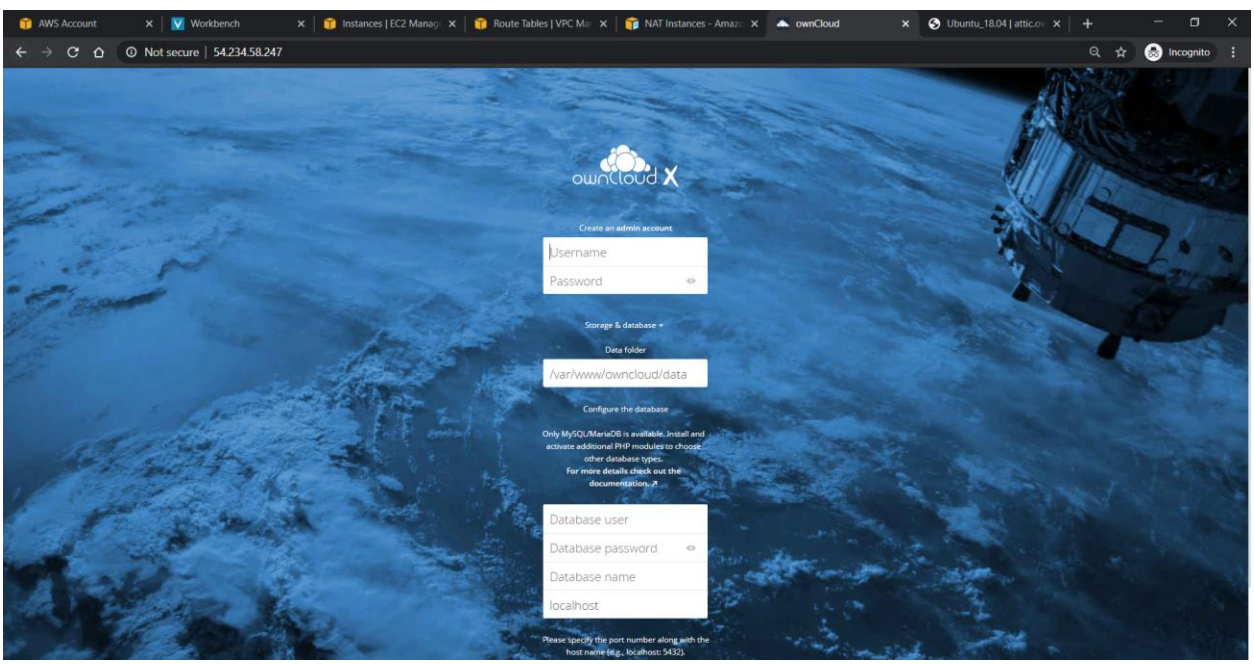
```
<IfModule mod_dir.c>
        DirectoryIndex index.php index.html index.cgi index.pl index.php index.xhtml index.htm
</IfModule>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
~
```

sudo systemctl restart apache2
curl https://attic.owncloud.org/download/repositories/10.0/Ubuntu_18.04/Release.key | sudo apt-key add -
sudo apt update
apt install php-bz2 php-curl php-gd php-imagick php-intl php-mbstring php-xml php-zip owncloud-files
vim /etc/apache2/sites-enabled/000-default.conf

```
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port that
        # the server uses to identify itself. This is used when creating
        # redirection URLs. In the context of virtual hosts, the ServerName
        # specifies what hostname must appear in the request's Host: header to
        # match this virtual host. For the default virtual host (this file) this
        # value is not decisive as it is used as a last resort host regardless.
        # However, you must set it for any further virtual host explicitly.
        #ServerName www.example.com

        ServerAdmin webmaster@localhost
        #DocumentRoot /var/www/html
        DocumentRoot /var/www/owncloud

        # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
        # error, crit, alert, emerg.
        # It is also possible to configure the loglevel for particular
        # modules, e.g.
        #LogLevel info ssl:warn

        ErrorLog ${APACHE_LOG_DIR}/error.log
        CustomLog ${APACHE_LOG_DIR}/access.log combined

        # For most configuration files from conf-available/, which are
        # enabled or disabled at a global level, it is possible to
        # include a line for only one particular virtual host. For example the
        # following line enables the CGI configuration for this host only
        # after it has been globally disabled with "a2disconf".
        #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
~
```

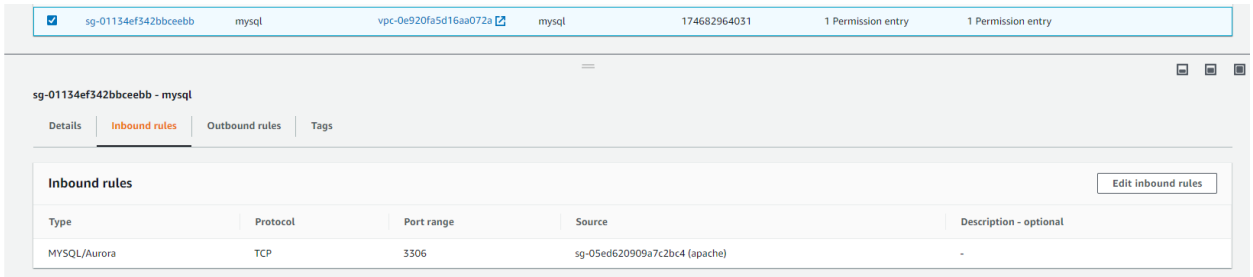
sudo systemctl reload apache2

- ✓ Go to the browser and enter the IP address of your server
- ✓ You will see the below screen



Creating Ec2 instance and installation of MySQL in private Subnet.

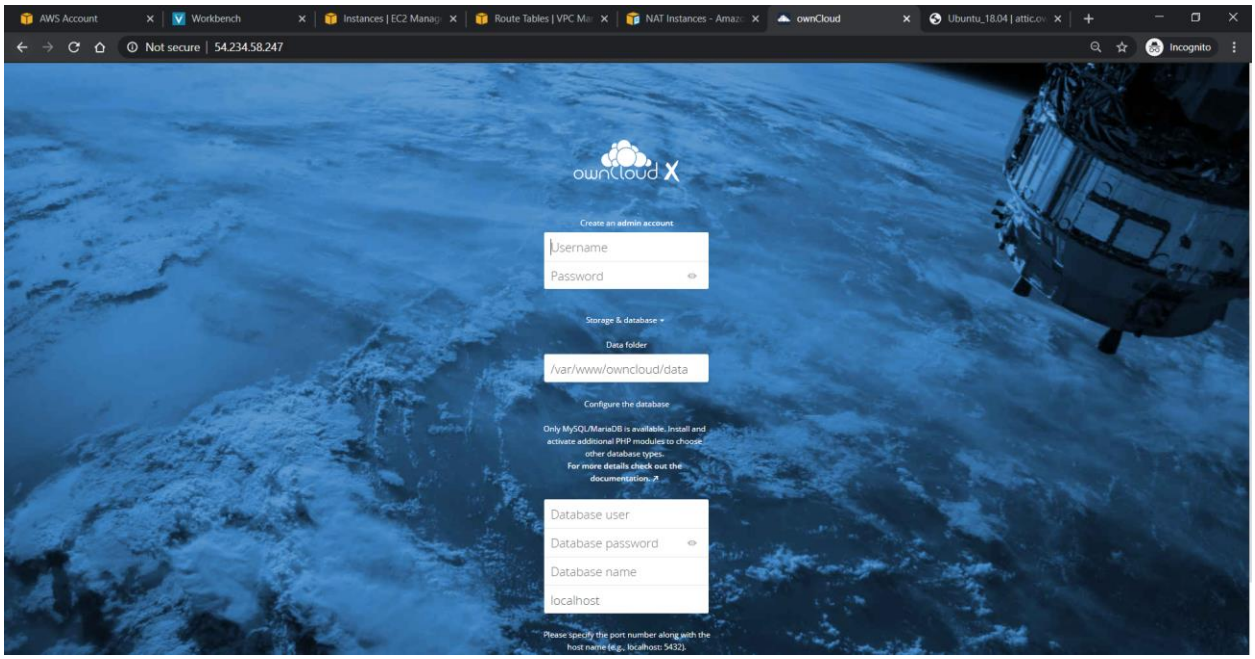
- ✓ Go to ec2 console
- ✓ Click on launch instance → select the **Amazon Linux 2 AMI (HVM), SSD Volume Type** → Chose the instance type t2.micro → click on Next: Configure Instance Details
- ✓ Select our custom VPC from the dropdown in VPC section
- ✓ Select the private Subnet from the dropdown in the Subnet section
- ✓ Click on add storage
- ✓ No need to change the storage section for our demo → click on add: Tags
- ✓ Add the tags (Key → Name & Value: Mysql) → Click on configure security groups
- ✓ Please find the below screenshot for your reference.



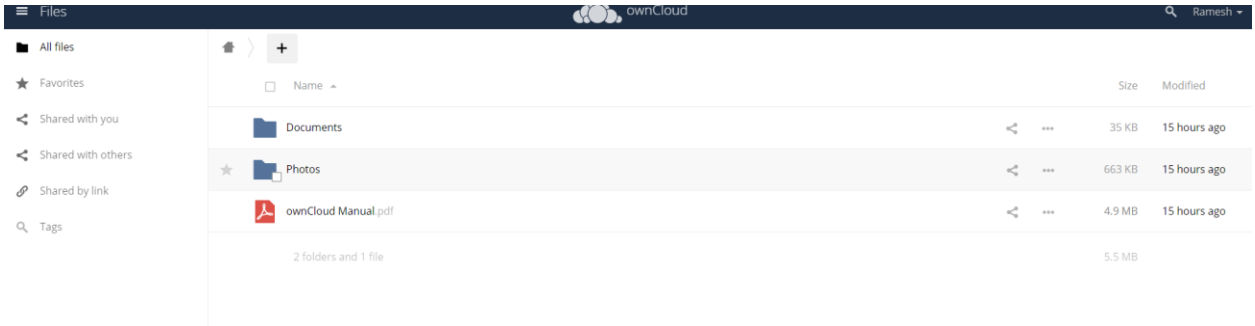
- ✓ Now click on review and launch
- ✓ To install the MySQL servers and to create and configure a database you need to login to server
- ✓ For the temporary purpose, I am allowing the 22, 80, 443 ports from the webserver.
- ✓ Copy the .pem file from your local machine to webserver to connect to a server
- ✓ Use ssh -I <pem file > username@<server IP> command to log in the server
- ✓ Run the below command to install and configure the database.

```
# wget http://repo.mysql.com/mysql-community-release-el7-5.noarch.rpm
# sudo rpm -ivh mysql-community-release-el7-5.noarch.rpm
# yum update
# sudo yum install mysql-server
# sudo systemctl start mysqld
```

- ✓
- ✓ Create a database
- ✓ Create a user and grant permission to access the database
- ✓ Now go to the webserver and try to access the page you will see the below screen.



- ✓ Fill the details and click on finish.
- ✓ After successful installation, you will see the below screen.



Lessons and observations

- ✓ Learnt the purpose VPC, Public and Private Subnet, Route tables, Nat instance, Security groups and traffic between the servers.
- ✓ Route tables are the ones that allow you to connect to instances or external sources at the subnet level, whereas the security groups work at the instance level.
- ✓ I observed that the default VPC always connected to the internet. So all the subnets in the default VPC are public by default.