To deploy a **Flask application** on **RHEL 9** using **Apache (httpd) as a web server**, follow these steps:

Step 1: Install Required Packages

First, update the system and install necessary packages.

```
dnf update -y
dnf install -y python3 python3-pip httpd mod_ssl
dnf install -y mod_wsgi
```

Step 2: Create a Virtual Environment for Flask

It is best practice to use a virtual environment for Python applications.

```
git clone https://github.com/sunilkumar0633/flask_app.git
mkdir -p /var/www/flaskapp
cp –rf flask_app/* /var/www/flaskapp
cd /var/www/flaskapp
python3 -m venv venv
source venv/bin/activate
```

Step 3: Install Flask

```
pip install flask
```

Step 4: Create a WSGI Entry Point

Create a WSGI file for the Flask app:

```
vim /var/www/flaskapp/flaskapp.wsgi
```

Add the following content:

```
import sys
import site

# Activate virtual environment
site.addsitedir('/var/www/flaskapp/venv/lib/python3.9/site-packages')
sys.path.insert(0, "/var/www/flaskapp")

from app import app as application
```

Save and exit.

Step 5: Configure Apache for Flask

Create a new Apache configuration file:

```
vim /etc/httpd/conf.d/flaskapp.conf
```

Add the following content:

```
<VirtualHost *:80>
    ServerName www.akaay.online #either use server public ip

    WSGIDaemonProcess flaskapp user=apache group=apache threads=5
home=/var/www/flaskapp
    WSGIScriptAlias / /var/www/flaskapp/flaskapp.wsgi

    <Directory /var/www/flaskapp>
        Require all granted
    </Directory>

    Alias /static /var/www/flaskapp/static
    <Directory /var/www/flaskapp/static/>
```

```
        Require all granted
    </Directory>

    ErrorLog /var/log/httpd/flaskapp_error.log
    CustomLog /var/log/httpd/flaskapp_access.log combined
</VirtualHost>
```

Step 6: Adjust Permissions and Ownership

Set correct ownership and permissions:

```
chown -R apache:apache /var/www/flaskapp
chmod -R 755 /var/www/flaskapp
```

Step 8: Enable and Restart Apache

```
systemctl enable httpd
systemctl restart httpd
```

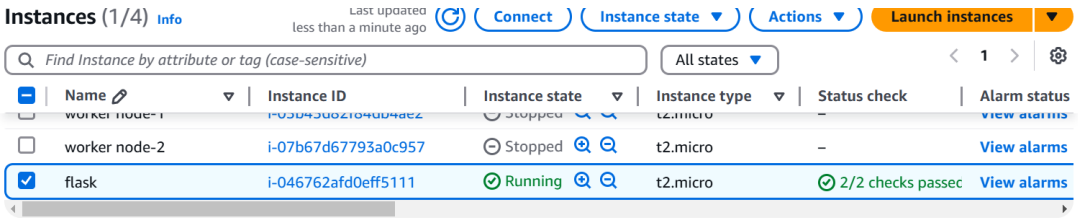
Step 9: Open Firewall Ports

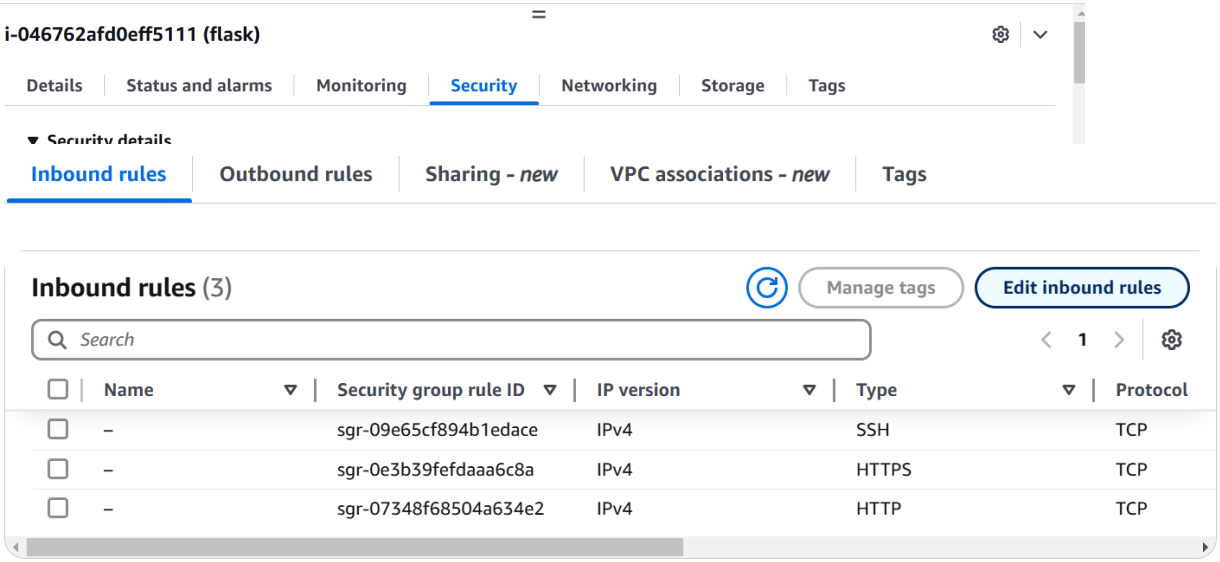
Allow HTTP and HTTPS traffic:

```
firewall-cmd --add-service=http --permanent
firewall-cmd --add-service=https --permanent
firewall-cmd --reload
```

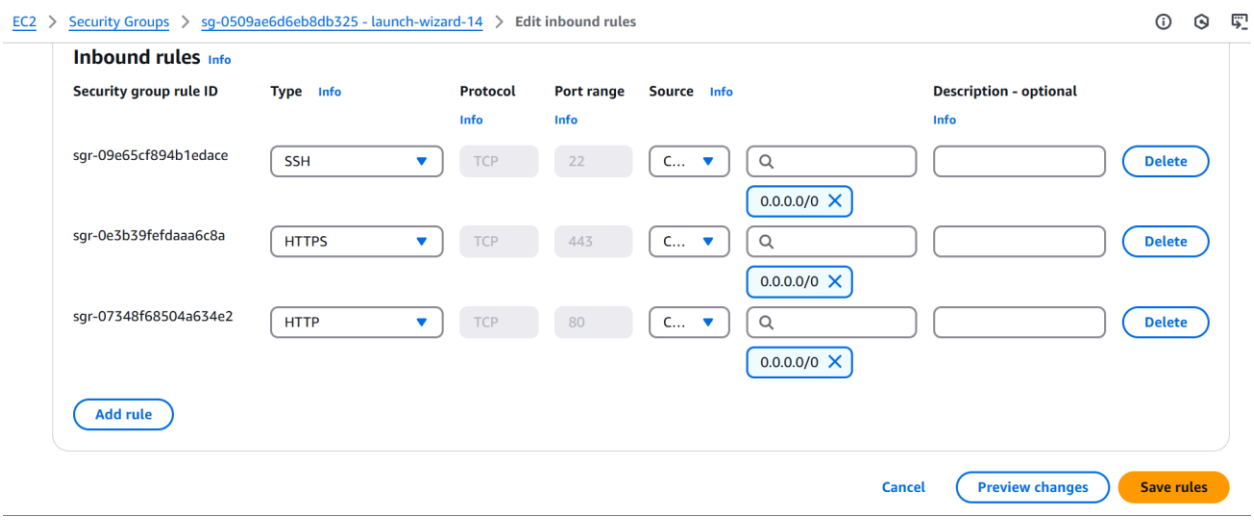
OR

If using aws ec2 instance then Add 80/tcp and 443/tcp port in security group.





Edit inbound rules.



Step 10: Test the Deployment

Now, open your browser and visit:

http://your_server_ip/

To secure your **Flask application** running on **Apache** with an **SSL certificate** using **Certbot** on **RHEL 9**, follow these steps:

Step 1: Install Certbot and mod_ssl

First, install **Certbot** and **mod_ssl** (for HTTPS support in Apache).

```
dnf install -y certbot python3-certbot-apache mod_ssl
```

Step 2: Obtain an SSL Certificate

Run the following command to generate and install an SSL certificate for your domain (replace www.akaay.online with your actual domain):

```
certbot --apache -d www.akaay.online ( replace with your domain )
```

- It will **auto-detect your Apache configuration** and request a certificate from **Let's Encrypt**.
- During installation, Certbot will ask:
  - **"Would you like to redirect HTTP to HTTPS?"**
  - Choose **"2: Redirect"** to force all traffic to HTTPS.

Step 3: Verify the SSL Certificate

After installation, verify that your SSL certificate is active:

```
rm –f /etc/httpd/conf.d/ssl.conf
certbot certificates
```

You should see details about your SSL certificate.

Step 4: Restart Apache

Now restart Apache to apply changes:

```
systemctl restart httpd
```

Map your ip address with domain on domain panel

```
Go to browser and search
https://www.domain.com
```