

Deploy flask/python web application using git, GitHub, Jenkins, in AWS cloud platform

❖ INTRODUCTION

what is Flask?

- flask is a small lightweight python web framework that provides useful tools and features that make creating web applications in python easier.
- it gives developers flexibility and is more accessible framework for new developers since you can build a web application quickly using only a single python file.

What is Python?

- python is a computer programming language often used to build websites and software, automate tasks, and conduct data analysis.

what is pip?

- PIP is a package manager for python packages or modules.
- Note: if you have python version 3.4 or later, PIP is included by default
- PIP-Package Installer for Python I

PRE-REQUISITES:

- AWS Account (Root Account)
- IAM User
- Terminal
- Basic understanding on Python/Flask

Services/tools used:

❖ AWS Services

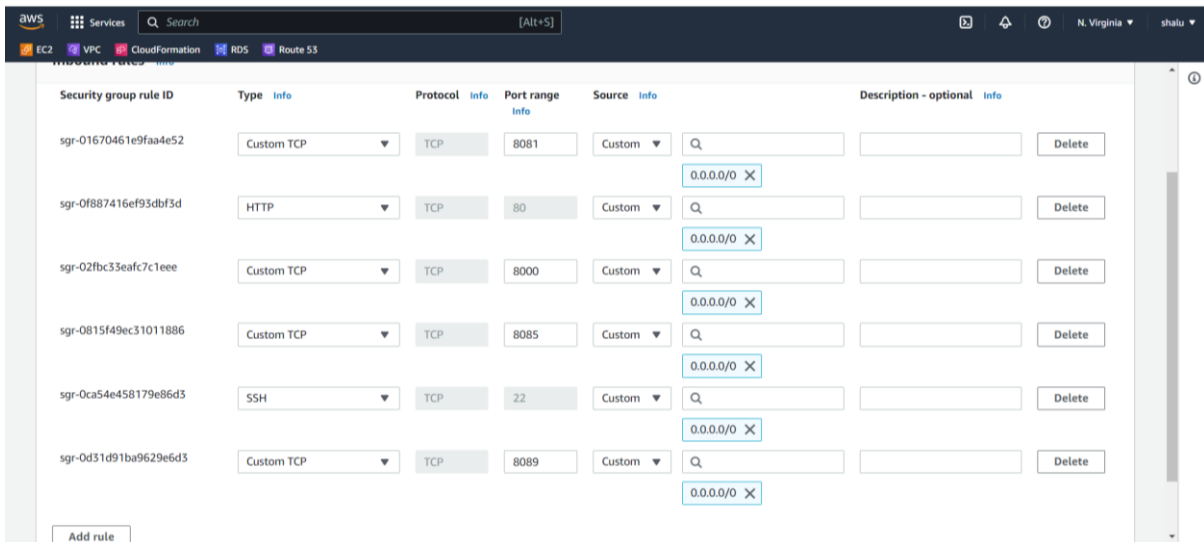
- ✓ IAM
- ✓ VPC
- ✓ EC2
- ✓ Route 53

❖ DEVOPS TOOLS

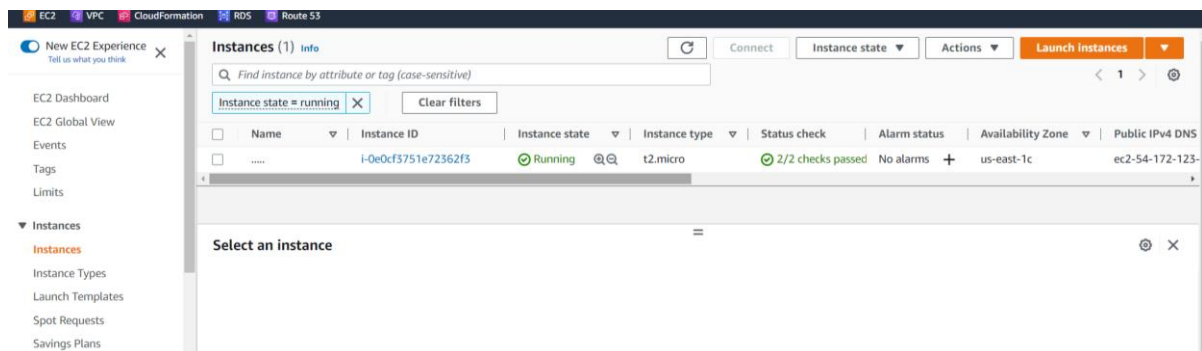
- ✓ Git
- ✓ GitHub
- ✓ Jenkins
- ✓ Terraform

STEP-BY-STEP PROCEDURE:

- Create and login to AWS Root account
- Create and login to IAM user from root account along with EC2 full access, administrator access, programmatic passwords
- Create a customised VPC network (192.168.0.0/16) along with Subnets, Route Tables, Internet Gateway, Security Group, Elastic IP, NACL
- Create 2 subnets with CIDR 192.168.144.0/24
- Create Security Group with respective ports
 - SSH 20
 - http 80
 - https 443
 - TCP 8000, 8085, 8081,8069.



- Create and launch EC2 instance with any one of the AMI's
 - amazon Linux 2
 - ubuntu
 - RHEL



- Connect the instance through SSH

```
ubuntu@ip-172-31-86-235: ~  
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows  
  
PS C:\Users\shalini sunny> cd .\downloads\  
PS C:\Users\shalini sunny\downloads> ssh -i "testing-key.pem" ubuntu@ec2-54-172-123-215.compute-1.amazonaws.com  
The authenticity of host 'ec2-54-172-123-215.compute-1.amazonaws.com (54.172.123.215)' can't be established.  
ED25519 key fingerprint is SHA256:vxanl7x69Up4WoiowKqJkz3WqLVYatgLSuCGvanyZc.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added 'ec2-54-172-123-215.compute-1.amazonaws.com' (ED25519) to the list of known hosts.  
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-1026-aws x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:       https://ubuntu.com/advantage  
  
System information disabled due to load higher than 1.0  
  
0 updates can be applied immediately.  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
ubuntu@ip-172-31-86-235:~$  
ubuntu@ip-172-31-86-235:~$  
ubuntu@ip-172-31-86-235:~$
```

- update your ubuntu machine
 - sudo apt update
 - sudo apt-get full-upgrade -y

```
ubuntu@ip-172-31-86-235: ~  
26 packages can be upgraded. Run 'apt list --upgradable' to see them.  
ubuntu@ip-172-31-86-235:~$ sudo apt-get full-upgrade -y  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
Calculating upgrade... Done  
The following packages will be upgraded:  
  apport binutils binutils-common binutils-x86-64-linux-gnu ca-certificates cloud-init inetransfs-tools  
  inetransfs-tools-bin inetransfs-tools-core libbinutils libbpf0 libctf-nobfd0 libctf0 libpython3.10  
  libpython3.10-minimal libpython3.10-stdlib libxml2 python3-apport python3-distupgrade python3-problem-report  
  python3-tz python3.10 python3.10-minimal taux tzdata ubuntu-release-upgrader-core  
26 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
Need to get 13.6 MB of archives.  
After this operation, 138 kB of additional disk space will be used.  
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10 amd64 3.10.6-1-22.04.2 [1955 kB]  
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3.10 amd64 3.10.6-1-22.04.2 [497 kB]  
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-stdlib amd64 3.10.6-1-22.04.2 [1832 kB]  
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3.10-minimal amd64 3.10.6-1-22.04.2 [2251 kB]  
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-minimal amd64 3.10.6-1-22.04.2 [810 kB]  
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ca-certificates all 20211016ubuntu0.22.04.1 [144 kB]  
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libbpf0 amd64 1:0.5.0-lubuntu22.04.1 [140 kB]  
Get:8 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libxml2 amd64 2.9.13+dfsg-lubuntu0.2 [764 kB]  
Get:9 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 tzdata all 2022g-0ubuntu0.22.04.1 [333 kB]  
Get:10 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ubuntu-release-upgrader-core all 1:22.04.15 [26.2 kB]  
Get:11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-distupgrade all 1:22.04.15 [107 kB]  
Get:12 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-problem-report all 2.20.11-0ubuntu0.22.04.1 [11.0 kB]  
Get:13 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-apport all 2.20.11-0ubuntu0.22.04.1 [88.0 kB]  
Get:14 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 apport all 2.20.11-0ubuntu0.22.04.1 [133 kB]  
Get:15 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libctf0 amd64 2.38-4ubuntu2.1 [103 kB]  
Get:16 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libctf-nobfd0 amd64 2.38-4ubuntu2.1 [107 kB]  
Get:17 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 binutils-x86-64-linux-gnu amd64 2.38-4ubuntu2.1 [2328 kB]  
Get:18 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libbinutils amd64 2.38-4ubuntu2.1 [661 kB]  
Get:19 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 binutils amd64 2.38-4ubuntu2.1 [3198 B]  
Get:20 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 binutils-common amd64 2.38-4ubuntu2.1 [221 kB]  
Get:21 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 inetransfs-tools all 0.140ubuntu13.1 [9034 B]  
Get:22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 inetransfs-tools-core all 0.140ubuntu13.1 [47.7 kB]  
Get:23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 inetransfs-tools-bin amd64 0.140ubuntu13.1 [9166 B]  
Get:24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-tz all 2022.1-1ubuntu0.22.04.0 [33.4 kB]  
Get:25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 taux amd64 3.2a-4ubuntu0.1 [428 kB]  
Get:26 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 cloud-init all 22.4.2-0ubuntu0-22.04.1 [526 kB]
```

- install required package/tools related for deploy the project
 - sudo apt-get install python3-pip -y

```
ubuntu@ip-172-31-86-235:~$ sudo apt-get install python3-pip3
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package python3-pip3
ubuntu@ip-172-31-86-235:~$ python
Command 'python' not found, did you mean:
  command 'python3' from deb python3
  command 'python' from deb python-is-python3
ubuntu@ip-172-31-86-235:~$ sudo apt-get install python3-pip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  build-essential cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-dejavu-core g++ g++-11 gcc gcc-11 gcc-11-base
  javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan6 libatomic1
  libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev libdeflate0 libdpkg-perl libexpat1-dev libfakeroot
  libfile-fcntllock-perl libfontconfig1 libgcc-11-dev libgd3 libgomp1 libisl23 libitm1 libjbig0 libjpeg-turbo8
  libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblsan0 libmpc3 libnsl-dev libpython3-dev libpython3.10-dev
  libquadmath0 libstdc++-11-dev libtiff5 libtirpc-dev libtsan0 libubsan1 libwebp7 libxpm4 linux-libc-dev
  lto-disabled-list make manpages-dev python3-dev python3-wheel python3.10-dev rpcsvc-proto zlib1g-dev
Suggested packages:
  cpp-doc gcc-11-locales debian-keyring g++-multilib g++-11-multilib gcc-11-doc gcc-multilib autoconf automake libtool
  flex bison gdb gcc-doc gcc-11-multilib glibc-doc bzip libgd-tools libstdc++-11-doc make-doc
The following NEW packages will be installed:
  build-essential cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-dejavu-core g++ g++-11 gcc gcc-11 gcc-11-base
  javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan6 libatomic1
  libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev libdeflate0 libdpkg-perl libexpat1-dev libfakeroot
  libfile-fcntllock-perl libfontconfig1 libgcc-11-dev libgd3 libgomp1 libisl23 libitm1 libjbig0 libjpeg-turbo8
  libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblsan0 libmpc3 libnsl-dev libpython3-dev libpython3.10-dev
  libquadmath0 libstdc++-11-dev libtiff5 libtirpc-dev libtsan0 libubsan1 libwebp7 libxpm4 linux-libc-dev
  lto-disabled-list make manpages-dev python3-dev python3-wheel python3.10-dev rpcsvc-proto zlib1g-dev
0 upgraded, 63 newly installed, 0 to remove and 0 not upgraded.
Need to get 71.2 MB of archives.
After this operation, 238 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libc-dev-bin amd64 2.35-0ubuntu3.1 [20.4 kB]
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 linux-libc-dev amd64 5.15.0-56.62 [1333 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy/main amd64 libcrypt-dev amd64 1:4.4.27-1 [112 kB]
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu jammy/main amd64 rpcsvc-proto amd64 1.4.2-0ubuntu6 [68.5 kB]
```

- clone the project source code from GitHub to your machine (ubuntu EC2 instance)
 - git clone <https://github.com/kallasrikanth1999/fish.git>

```
</html>
ubuntu@ip-172-31-86-235:~$ git clone https://github.com/kallasrikanth1999/fish.git
Cloning into 'fish'...
remote: Enumerating objects: 10765, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (9/9), done.
remote: Total 10765 (delta 2), reused 0 (delta 0), pack-reused 10755
Receiving objects: 100% (10765/10765), 81.40 MiB | 19.56 MiB/s, done.
Resolving deltas: 100% (804/804), done.
Updating files: 100% (10267/10267), done.
ubuntu@ip-172-31-86-235:~$ cd fish/
ubuntu@ip-172-31-86-235:~/fish$ pip3 install -r requirements.txt
Defaulting to user installation because normal site-packages is not writeable
Collecting click==8.1.3
  Downloading click-8.1.3-py3-none-any.whl (96 kB)
    90.6/96.6 KB 2.5 MB/s eta 0:00:00
Collecting colorama==0.4.5
  Downloading colorama-0.4.5-py2.py3-none-any.whl (16 kB)
Collecting Flask==2.2.2
  Downloading Flask-2.2.2-py3-none-any.whl (101 kB)
    101.5/101.5 KB 7.5 MB/s eta 0:00:00
Collecting importlib-metadata==4.12.0
  Downloading importlib_metadata-4.12.0-py3-none-any.whl (21 kB)
Collecting itsdangerous==2.1.2
  Downloading itsdangerous-2.1.2-py3-none-any.whl (15 kB)
Collecting Jinja2==3.1.2
  Downloading Jinja2-3.1.2-py3-none-any.whl (133 kB)
    133.1/133.1 KB 19.9 MB/s eta 0:00:00
Collecting joblib==1.1.0
  Downloading joblib-1.1.0-py2.py3-none-any.whl (306 kB)
    307.0/307.0 KB 31.3 MB/s eta 0:00:00
Collecting MarkupSafe==2.1.1
  Downloading MarkupSafe-2.1.1-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (25 kB)
Collecting numpy==1.23.3
  Downloading numpy-1.23.3-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (17.1 MB)
    17.1/17.1 MB 44.1 MB/s eta 0:00:00
Collecting pandas==1.4.4
  Downloading pandas-1.4.4-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (11.6 MB)
    11.6/11.6 MB 57.9 MB/s eta 0:00:00
Collecting python-dateutil==2.8.2
```

- now go to the source code directory
 - cd <directory>
- now install requirements packages
 - pip3 install -r requirements.txt
- run flask server

- python3 app.py

```

ubuntu@ip-172-31-86-235: ~$ sudo vi app.py
WARNING: The script gunicorn is installed in '/home/ubuntu/.local/bin' which is not on PATH.
Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
WARNING: The script flask is installed in '/home/ubuntu/.local/bin' which is not on PATH.
Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed Flask-2.2.2 Jinja2-3.1.2 MarkupSafe-2.1.1 Werkzeug-2.2.2 click-8.1.3 colorama-0.4.5 gunicorn-20.0.4 importlib-metadata-4.12.0 itsdangerous-2.1.2 joblib-1.1.0 numpy-1.23.3 pandas-1.4.4 python-dateutil-2.8.2 pytz-2022.2.1 scikit-learn-1.1.2 scipy-1.9.1 sklearn-0.0 threadpoolctl-3.1.0 zipp-3.8.1
ubuntu@ip-172-31-86-235:~/fish$ python3 app.py
42L, 1019B written
ubuntu@ip-172-31-86-235:~/fish$ python3 app.py
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator DecisionTreeRegressor from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator RandomForestRegressor from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator OneHotEncoder from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
* Serving Flask app 'app'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:8000
* Running on http://172.31.86.235:8000
Press CTRL+C to quit
* Restarting with stat
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator DecisionTreeRegressor from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator RandomForestRegressor from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/base.py:329: UserWarning: Trying to unpickle estimator OneHotEncoder from version 1.1.1 when using version 1.1.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to: https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(

```

➤ here after running python3 app.py, it will generate localhost address. we can't access web app with that Ip address, then here we want to edit the file app.py with some details

- sudo vi app.py

```

import joblib
import pickle

app = Flask(__name__)

model = joblib.load('Random.pkl')
onehot = joblib.load('one_joblib')

@app.route('/')
@app.route('/main')
def main():
    return render_template('main.html')

@app.route('/predict', methods=['POST'])
def predict():
    int_features = [[x for x in request.form.values()]]
    print(int_features)
    c = ['Species', 'Length1', 'Length2', 'Length3', 'Height', 'Width']
    df = pd.DataFrame(int_features, columns=c)
    l = onehot.transform(df.iloc[:, :])
    c = onehot.get_feature_names_out()
    t = pd.DataFrame(l, columns=c)
    l2 = df.iloc[:, 1:]
    final = pd.concat([t, l2], axis=1)
    result = model.predict(final)
    print("The Result is :", result)

    print(int_features)

    return render_template("main.html", prediction_text=" The Estimated Fish Weight is {} in gms.".format(result))

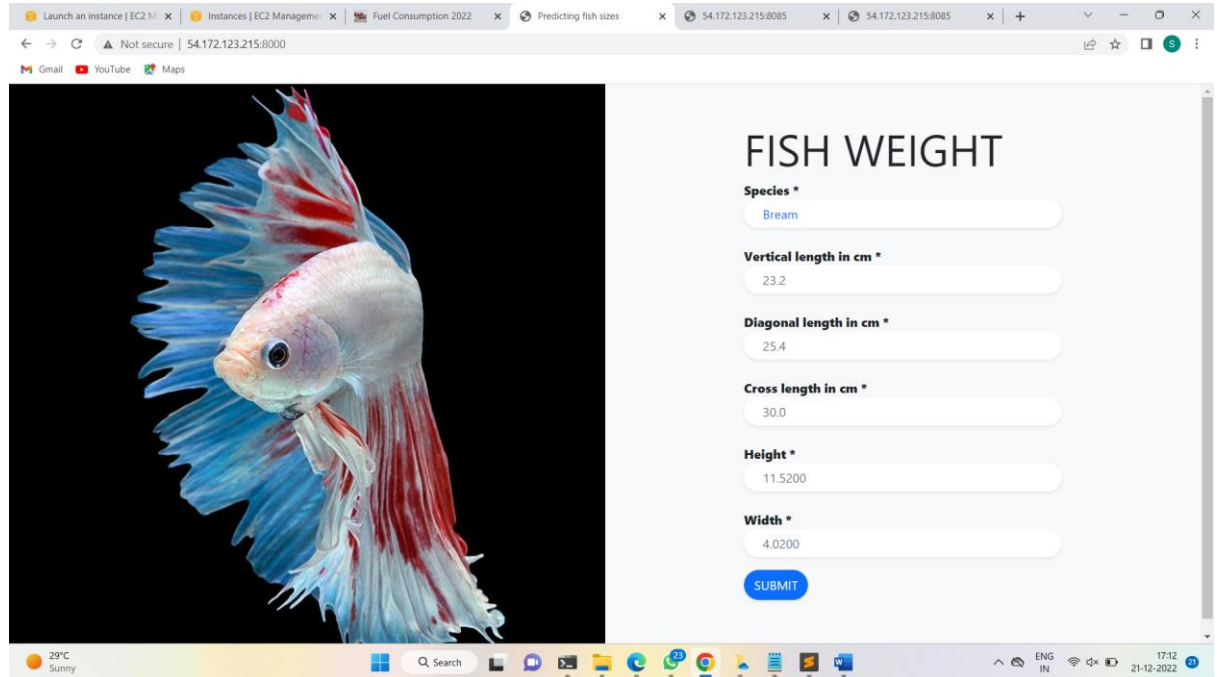
if __name__ == "__main__":
    app.debug=True
    app.run(host='0.0.0.0', port=8000, debug=True)
"app.py" 42L, 1019B

```

➤ go to very bottom of the file and paste this text and save the file.

- app.run(host='0.0.0.0', port=8000, debug=True)

- now again run the flask server by using below command
 - `python3 app.py`
- now copy your EC2 instance IP and give port number and searchh in web browser
 - `<ip adress>:8000`



After deploying this new project on same instance press ctrl+ to end the last process and enter the following command to keep the fish server running in background

- `Screen -m -d python3 app.py`

Follow the same procedure to deploy another project

Launch an instance | EC2 M x

Instances | EC2 Managem x

Fuel Consumption 2022 x

Predicting fish sizes x

54.172.123.215:8085 x

54.172.123.215:8085 x

+ -

Not secure | 54.172.123.215:8085

Gmail YouTube Maps

LIVER PATIENT

Gender *
Female

Age *

TB *

DB *

Alkphos *

Sgpt *

Sgot *

TP *

ALB *

AG *

Submit!

29°C Sunny

Search

ENG IN

17:15 21-12-2022

Launch an instance | EC2 M x

Instances | EC2 Managem x

Fuel Consumption 2022 x

Predicting fish sizes x

54.172.123.215:8085 x

54.172.123.215:8085 x

+ -

Not secure | 54.172.123.215:8085

Gmail YouTube Maps

Fuel Consumption

Make
Acura

Model

Vechile Class
Compact

Transmission
AM8

Fuel Type
Z

Engine Size


Cylinders

CO2 emission

CO2 Rating

SmokeRate

Predict Now!



29°C Sunny

Search

ENG IN

17:16 21-12-2022

