Building a single page Flask App on Digital Ocean (./flask-app-on-digital-ocean.html)

Date Thu 02 August 2018 Tags python (./tag/python.html) / flask (./tag/flask.html) / thingspeak (./tag/thingspeak.html) / mobile (./tag/mobile.html) / IoT (./tag/iot.html)

In this post, we'll run through how to set up a single page **flask** (http://flask.pocoo.org/docs/1.0/) app that shows a temperature pulled from ThingSpeak.com (https://thingspeak.com/). ThingSpeak has nice looking graphs, but on ThingSpeak it is actually kind of hard to see the value of an individual data point. I want to be able to see the most recent temperature point recorded by my ESP8266 WiFi weather station project (./posts/micropython/micropython_upload_code.md) on a phone or tablet. By building a flask app and hosting it on Digital Ocean, I can now view the current temperature in a nice big font from anywhere.

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Set up a new Digital Ocean Droplet

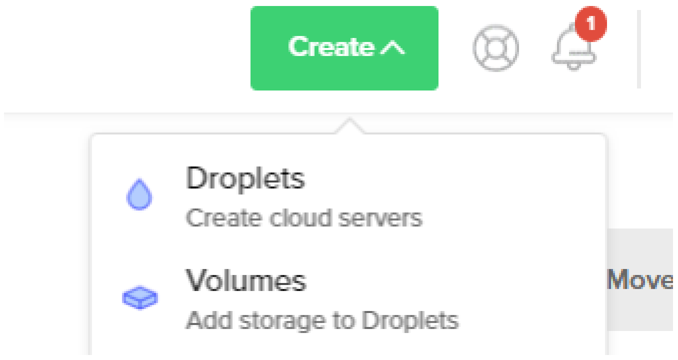
The flask app needs a server to run on. I choose Digital Ocean (https://www.digitalocean.com/) as my cloud server provider. Digital Ocean hosts virtual private servers that run in the cloud. Setting up a server on Digital Ocean is pretty cheap ($5/month) and quick. I host my **Jupyter Hub** server (./posts/jupyterhub/why_jupyter_hub.md) on Digital Ocean, so I am also more familiar with spinning up their servers compared to other cloud providers like Linode or AWS. I like their documentation. It is clear, concise and easy to follow.

To set up the server for the flask app, I created a new Droplet on Digital Ocean. After creating a new server, it is best practice to create a non-root sudo user.

Create a new Droplet

Our **flask** (http://flask.pocoo.org/docs/1.0/) single page web app built with Python will be hosted on Digital Ocean (https://www.digitalocean.com/).

To create a new cloud server, called a *Droplet* in DigitalOcean-speak, create an account on Digital Ocean. Once logged in select Create → Droplets in the upper right menu.



The Digital Ocean Droplet options I choose were:

- Ubuntu 18.04.1 x64
- Size: Memory 1G, SSD 25 GB, Transfer 1 TB, Price $5/mo
- Datacenter Region: San Fransisco 2
- Additional Options: None
- SSH keys: **Added all of my saved SSH keys (./posts/jupyterhub/PuTTYgen_ssh_key.md). You need this to log into the server with PuTTY!**

Create the server with the big green [**Create**] button.

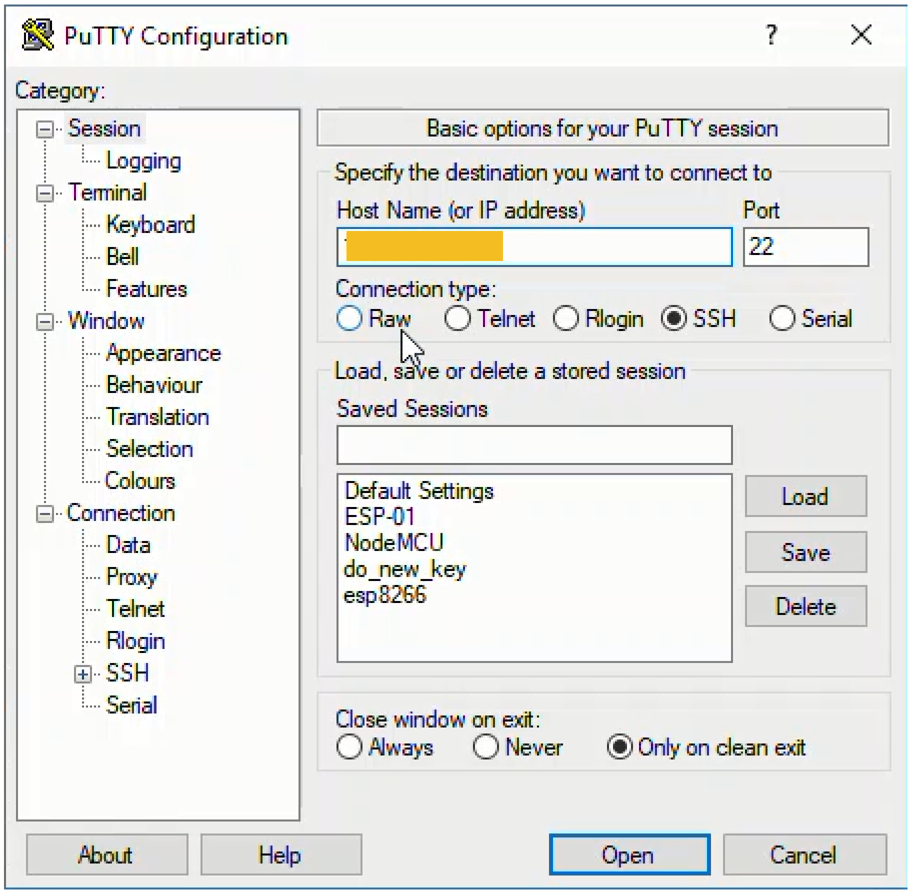
After the Droplet is created, note the IP address of the server. We'll need the IP address of the droplet for the next step.

Login to server with PuTTY

Our first interaction with the server is to log in as root. Then we'll create a non-root sudo user to interact with the server from then on out.

Open PuTTY and log onto the server as root. See a previous post (./posts/jupyterhub/new_DO_droplet.md) on how to set up PuTTY on Windows 10. To log into the server as root, set the following in PuTYY:

- Hostname (or IP Address): The IP address of the server
- Port: 22
- Connection Type: SSH
- Connection:
- Data:
  - Auto-login username: root
- Connection:
- SSH:
  - Auth:
  - Private keyfile for Authentication: your saved private SSH key



Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): [redacted]

Port: 22

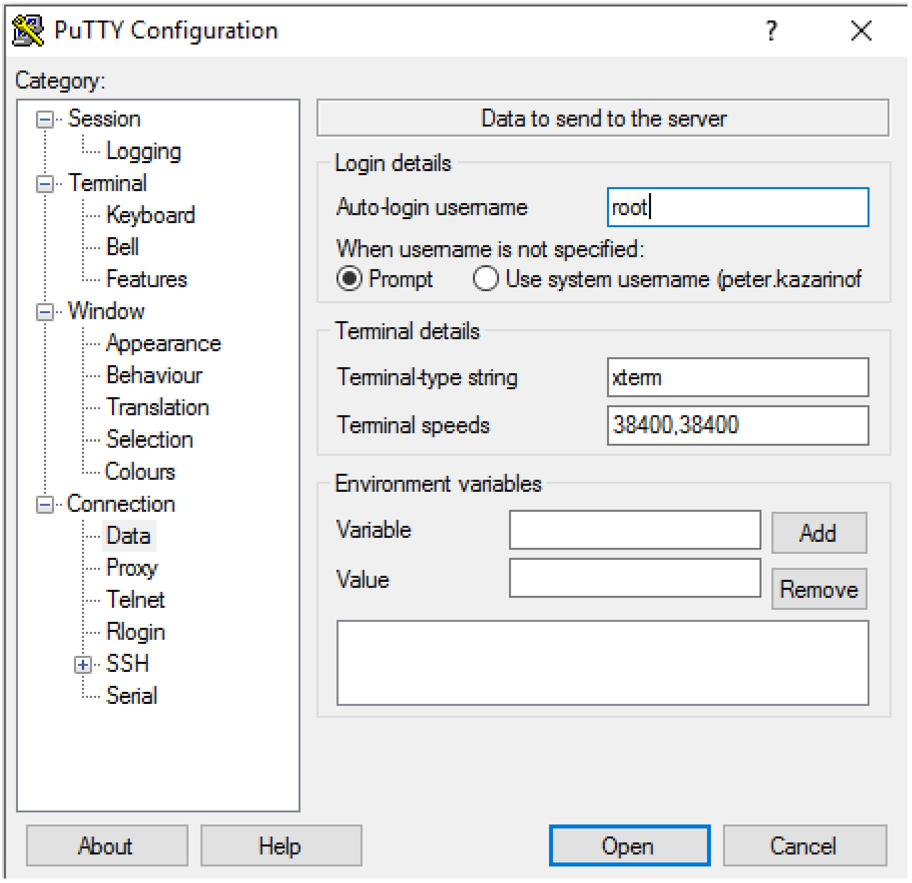
Connection type: Raw Telnet Rlogin [✓ SSH] Serial

Load, save or delete a stored session

Saved Sessions

Default Settings
ESP-01
NodeMCU
do_new_key
esp8266

Close window on exit: Always Never [✓ Only on clean exit]



Data to send to the server

Login details

Auto-login username: root

When username is not specified: [✓ Prompt] Use system username (peter.kazarinof

Terminal details

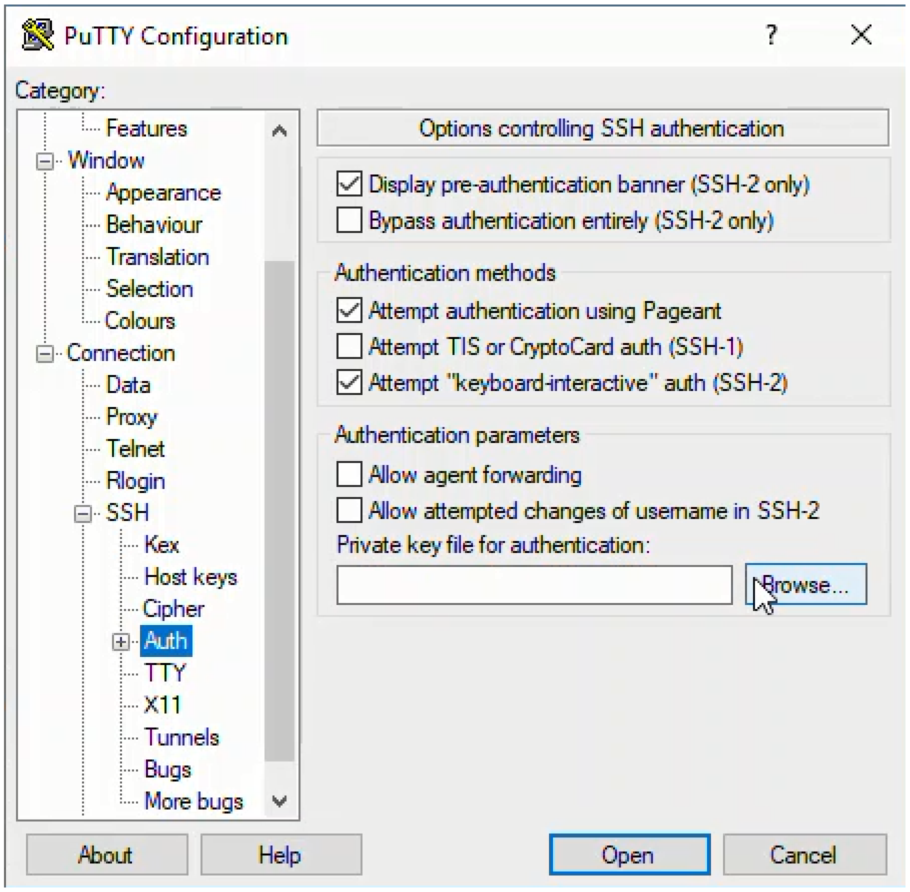
Terminal-type string: xterm

Terminal speeds: 38400,38400

Environment variables

Variable:

Value:


PuTTY Configuration

Category:

Options controlling SSH authentication

- [x] Display pre-authentication banner (SSH-2 only)
- [ ] Bypass authentication entirely (SSH-2 only)

Authentication methods

- [x] Attempt authentication using Pageant
- [ ] Attempt TIS or CryptoCard auth (SSH-1)
- [x] Attempt "keyboard-interactive" auth (SSH-2)

Authentication parameters

- [ ] Allow agent forwarding
- [ ] Allow attempted changes of username in SSH-2

Private key file for authentication:

Create a non-root sudo user

I followed the Digital Ocean Initial Server Setup Tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04) to create a non-root sudo user. The commands entered into the PuTTY SSH terminal are below. Note you should change the username to something other than `peter`. Here and in the Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04), a hash symbol `#` is shown before the commands. The hash `#` symbol should not be typed, it just represents the fact we are operating as root.

```
# adduser peter
# usermod -aG sudo peter
# ufw allow OpenSSH
# ufw enable
```

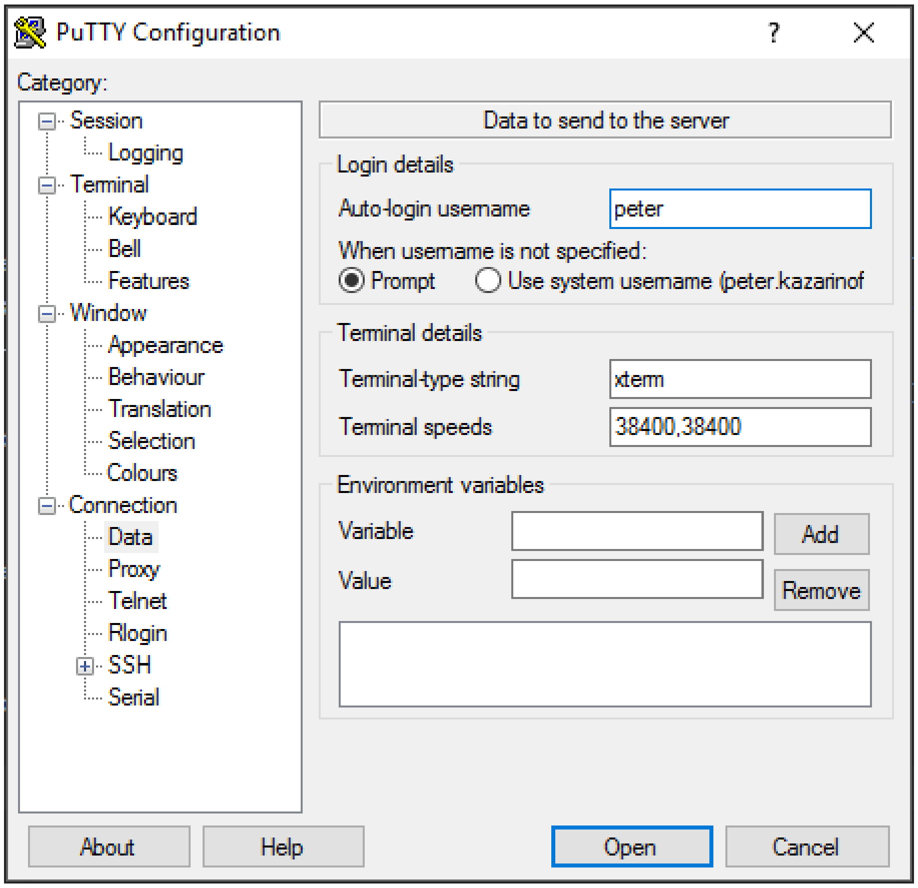
Copy SSH keys to the non-root sudo user

Next we'll move the SSH keys stored in the root user's profile to the new sudo user's profile (in my case `peter`). I've had trouble moving SSH key files and setting permissions correctly in Linux. A Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04) has a great line that copies the SSH Keys and sets the permissions correctly in one step. If you skip this step, you won't be able to log into the server as the new non-root sudo user you just created. Note you should change the user name from `peter` to whatever username you picked in the previous step.

```
# rsync --archive --chown=peter:peter ~/.ssh /home/peter
```

Now let's check if we can log into the server as the new user.

Exit the PuTTY window by typing `exit` at the prompt. Open up a new SSH session in PuTTY. Set Connection → Data → Auto-login username as the non-root sudo user. (I put `peter` in the Auto-login username box).



Login details
Auto-login username: peter
When username is not specified:
[✓ Prompt] Use system username (peter.kazarinof
Terminal details
Terminal-type string: xterm
Terminal speeds: 38400,38400
Environment variables

When the terminal window opens, you should see your username listed before the prompt. At the prompt, try the following command. Note the dollar sign `$` does not need to be typed. The dollar sign `$` is there to indicate the command prompt.

```
$ sudo -l
User peter may run the following commands on flask-app-server:
    (ALL : ALL) ALL
```

You can type the command `exit` to close the PuTTY terminal.

Acquire and configure a domain name

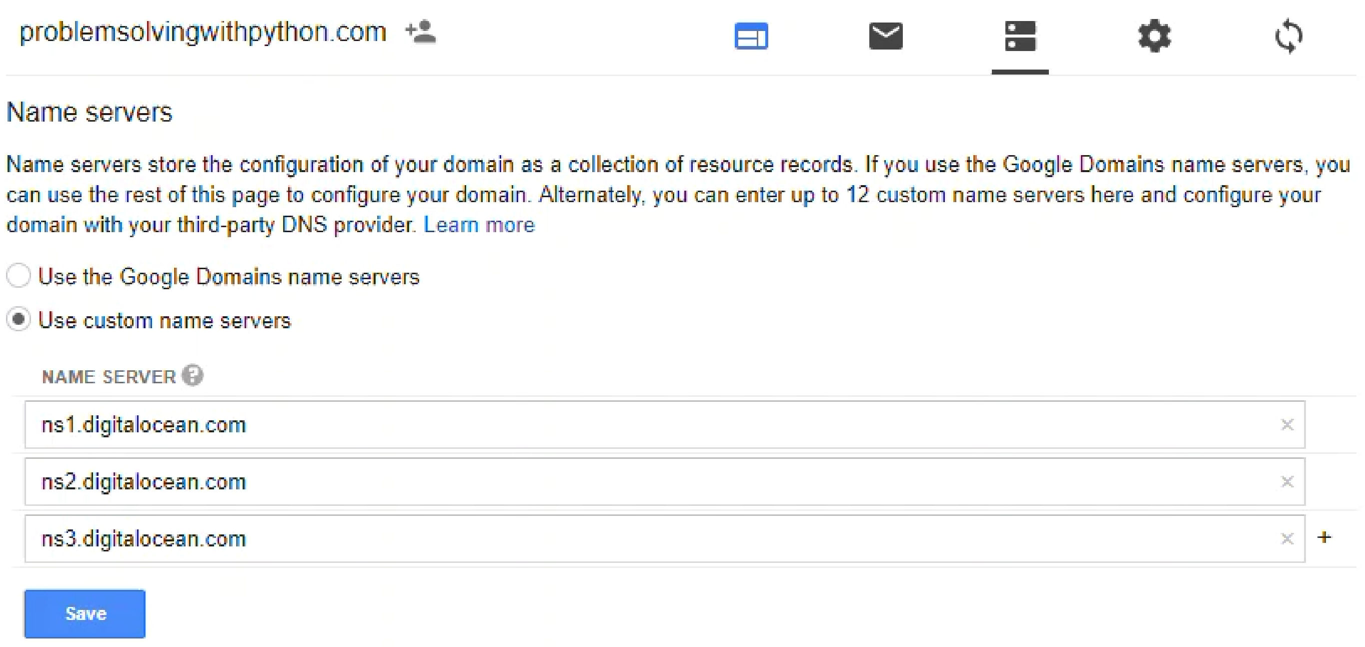
To use secure SSL connections and https with our flask single page app, we need a real domain name.

Purchase a domain name

I bought my domain name at Google Domains (https://domains.google/) for $12/year. The price seems reasonable and Digital Ocean has a tutorial that shows how to connect a google domains to Digital Ocean DNS servers.

Point DNS severs at Digital Ocean

Once the domain is purchased, the domain's Name Server needs to be pointed at Digital Ocean.


problemsolvingwithpython.com

Name servers

Name servers store the configuration of your domain as a collection of resource records. If you use the Google Domains name servers, you can use the rest of this page to configure your domain. Alternately, you can enter up to 12 custom name servers here and configure your domain with your third-party DNS provider. Learn more

○ Use the Google Domains name servers

● Use custom name servers

NAME SERVER

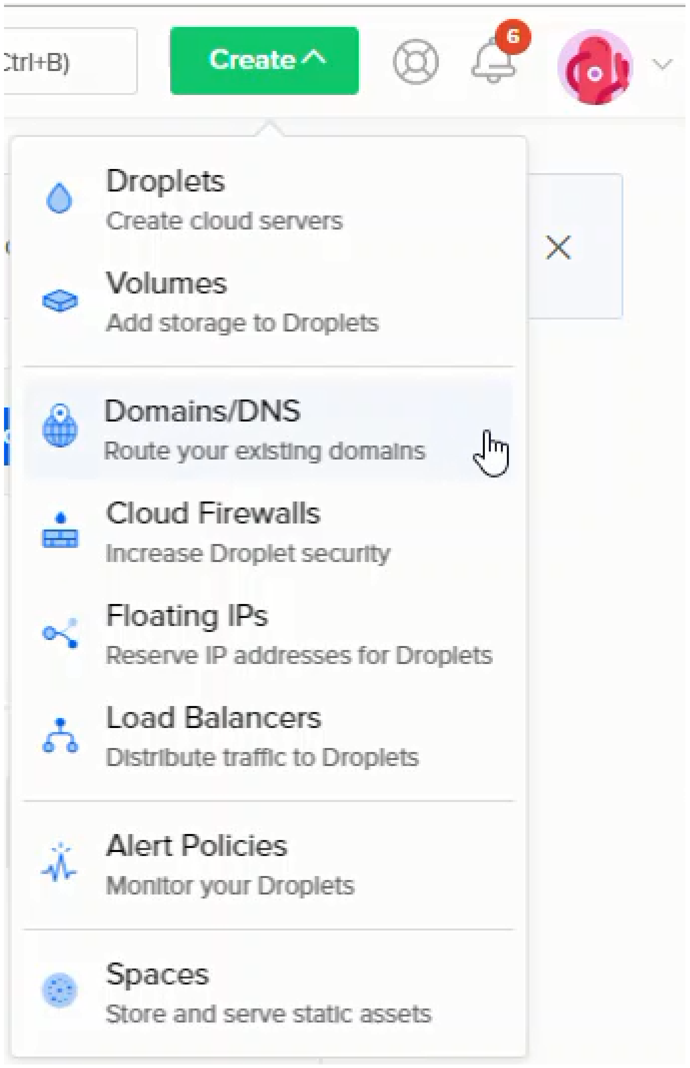
ns1.digitalocean.com

ns2.digitalocean.com

ns3.digitalocean.com

Link the domain name to the server IP address

On Digital Ocean, login and click [Create] → [Domains/DNS]. Type in the newly purchased domain name in the box and click [Add Domain].



Link the new Domain to the Digital Ocean Droplet by typing in the `@` symbol in the [HOSTNAME] box and selecting the new Droplet name in the [WILL DIRECT TO] drop down box. Click [Create Record] to link the domain name to the server. You can also link `www` in the [HOSTNAME] box and select the new Droplet in the [WILL DIRECT TO] dropdown box to link `www.yourdomain.com` to the server.

Build the Flask App

Now that the server is set up and the domain name is routed to the server, it's time to actually build the flask single page web app.

Install packages

Before the single page flask app can be built, a number of packages need to be installed on the server. I followed along with this tutorial (https://www.digitalocean.com/community/tutorials/how-to-serve-flask-applications-with-uswgi-and-nginx-on-ubuntu-18-04) from Digital Ocean.

Log onto the server with PuTTY and type the following commands:

```
$ sudo apt-get update
$ sudo apt-get upgrade
$ sudo apt-get install python3-pip
$ sudo apt-get install python3-dev
$ sudo apt-get install python3-setuptools
$ sudo apt-get install python3-venv
$ sudo apt-get install build-essential libssl-dev libffi-dev
```

Create a virtual environment and install **flask**

Once the necessary libraries are installed, I created a virtual environment to run the flask app. I usually use **conda** to create virtual environments (see this post (./posts/virtual_environments/new_virtualenv_conda.md)), but since I'm not using the Anaconda distribution of Python for this flask app, **venv** will have to do instead.

```
$ cd ~
$ mkdir flaskapp
$ cd flaskapp
$ python3.6 -m venv flaskappenv
$ source flaskappenv/bin/activate
```

With the virtual environment created and activated, install **wheel**, **flask**, **uwsgi** and **requests** with **pip**. We'll use **requests** a little later to pull down temperature data from ThingSpeak.com. Note that `(flaskappenv)` is shown before the command prompt when the virtual environment is active. Make sure to only `pip install` within the `(flaskappenv)` virtual environment.

```
(flaskappenv)$ pip install wheel
(flaskappenv)$ pip install flask
(flaskappenv)$ pip install uwsgi
(flaskappenv)$ pip install requests
```

Build the first simple **flask** app

With the Python packages installed, next we'll build a very simple version of the flask app and viewed it in a web browser.

```
(flaskappenv)$ pwd
# ~/flaskapp
(flaskappenv)$ nano flaskapp.py
```

In the ***flaskapp.py*** file, I included the bare minimum flask app to test the server:

```
# flaskapp.py

from flask import Flask
app = Flask(__name__)

@app.route("/")
def index():
    return "<h1>The temperature is 91.2 F</h1>"

if __name__ == "__main__":
    app.run(host='0.0.0.0')
```

A note about editing code in the **nano** text editor thru PuTTY: You can paste into a PuTTY terminal window using the right mouse button. Selecting text in PuTTY copies the text to the clip board. Don't use [ctrl-c] or [ctrl-v] to copy and paste in PuTTY. Exit the nano text editor with [ctrl-x].

Testing the first simple flask app

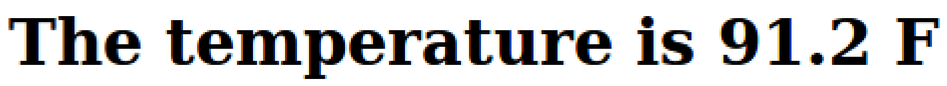
With the first version of ***flaskapp.py*** complete, Let's run the **flask** app for the first time to test that everything is working properly.

To run the **flask** app, I had to make sure I was in the virtual environment built earlier. I also needed to allow port 5000 open on the **ufw** firewall. Port 5000 is the default port **flask** runs on.

```
(flaskappenv)$ sudo ufw allow 5000
(flaskappenv)$ python flaskapp.py
```

It works! By pointing a browser to the Droplet IP address followed by `:5000` , I can see the simple message: "The temperature is 91.2 F".

> 124.822.76.209:5000


The temperature is 91.2 F

Set up uWSGI and systemctl

There are going to be two layers between the flask app and the outside internet. Get requests from web browsers will first come into **NGINX** then go to **uWSGI** before being passed to **flask**.

Configuring uWSGI

We installed **uWSGI** earlier when we `pip` installed **flask**. Now **uWSGI** needs to be configured and tested. I followed the Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04) closely for this step.

```
(flaskappenv)$ pwd
# ~/flaskapp
(flaskappenv)$ nano wsgi.py
```

In the ***wsgi.py*** file, include:

```
# wsgi.py

from flaskapp import app

if __name__ == "__main__":
    app.run()
```

Testing uWSGI

Next, let's test the configuration. **uWSGI** can be run from the command line with a couple flags:

```
(flaskappenv)$ uwsgi --socket 0.0.0.0:5000 --protocol=http -w wsgi:app
```

When I point a browser to the droplet IP address followed by `:5000`, I see the simple message again: "The temperature is 91.2 F". The flask app still seems to be working!

The temperature is 91.2 F

Construct the uWSGI configuration file

Now for another layer of **uWSGI** goodness- building a uWSGI ***.ini*** configuration file.

```
(flaskappenv)$ deactivate
$ pwd
# ~/flaskapp
$ nano flaskapp.ini
```

Inside the ***flaskapp.ini*** file, include the following:

```
[uwsgi]
module = wsgi:app

master = true
processes = 5

socket = flaskapp.sock
chmod-socket = 660
vacuum = true

die-on-term = true
```

Construct a **systemd** file

Because we want to have the flask app running all the time, let's create a **systemd** control file to get the flask app running as a system service on the server.

```
$ sudo nano /etc/systemd/system/flaskapp.service
```

In the ***flaskapp.service*** file, I included the following as described in the Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04). Note the username `peter` should be replaced with your non-root sudo user.

```
[Unit]
Description=uWSGI instance to serve flaskapp
After=network.target

[Service]
User=peter
Group=www-data
WorkingDirectory=/home/peter/flaskapp
Environment="PATH=/home/peter/flaskapp/flaskappenv/bin"
ExecStart=/home/peter/flaskapp/flaskappenv/bin/uwsgi --ini flaskapp.ini

[Install]
WantedBy=multi-user.target
```

Test with systemctl

After the ***flaskapp.service*** file is created, we need to reload the systemctl daemon before starting the `flaskapp` service.

```
$ sudo systemctl daemon-reload
$ sudo systemctl start flaskapp
$ sudo systemctl status flaskapp
```

The `status` call should show the service as `active (running)`. Something like the message below.

```
flaskapp.service - uWSGI instance to serve flaskapp
   Loaded: loaded (/etc/systemd/system/flaskapp.service; disabled; vendor preset
   Active: active (running) since Wed 2018-09-12 18:09:15 UTC; 7s ago
```

Use [ctrl-c] to exit the status screen. [ctrl-c] will not stop the service.

Configure NGINX and apply SSL security

We'll use NGINX as a proxy server to work with uWSGI and the flask app. The general control flow resulting from GET request will be:

GET request → NGINX → uWSGI → flaskapp

Install NGINX

Before we can use NGINX, NGINX needs to be installed on the server. Installation is a simple `apt-get` command. Note that NGINX starts running as soon as it is installed.

```
$ sudo apt-get install nginx
```

Configure NGINX

To use NGINX as part of the web stack, we need to create a configuration file in the `/etc/nginx/sites-available/` directory. The Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04) was really helpful for this step. NGINX configuration was something I struggled with when I built my **Jupyter Hub** server (./posts/jupyterhub/why_jupyter_hub.md) .

```
$ sudo nano /etc/nginx/sites-available/flaskapp
```

Edit the ***flaskapp*** NGINX config file the `/sites-available` directory to include the following. Make sure to change the `your_domain` and `www.your_domain` fields:

```
server {
    listen 80;
    server_name your_domain wwww.your_domain;

    location / {
        include uwsgi_params;
        uwsgi_pass unix:/home/peter/flaskapp/flaskapp.sock;
    }
}
```

Now we'll link the NGINX config file to the `/etc/nginx/sites-enabled` directory and restart NGINX with the new configuration. If something doesn't look right on the systemctl status screen, you can check for problems with the command `sudo nginx -t`.

```
$ sudo ln -s /etc/nginx/sites-available/flaskapp /etc/nginx/sites-enabled
$ sudo systemctl restart nginx
$ sudo systemctl status nginx
#ctrl-c to exit
```

Now that NGINX and uWSGI are running, let's also shut off the `:5000` development port.

```
$ sudo ufw delete allow 5000
$ sudo ufw allow 'Nginx Full'
```

Browse to the web address of the server. This time you won't need to append the address with `:5000`. Also the web address can be your domain name, not just the server IP address You should see the message: "The temperature is 91.2 F".

> http://mydomain.com/

The temperature is 91.2 F

Apply SSL Security

One of the reasons for getting a real domain name is so the server can run with SSL security and https. Adding SSL can be done with **certbot**, a Python program that assists with generating SSL certificates. I followed the Digital Ocean tutorial (https://www.digitalocean.com/community/tutorials/initial-server-setup-with-ubuntu-18-04) steps to acquire the certificate. Make sure to replace `your_domain` with your actual domain name.

```
$ sudo add-apt-repository ppa:certbot/certbot
$ sudo apt install python-certbot-nginx
$ sudo certbot --nginx -d mydomain.com -d www.mydomain.com
```

As part of the **certbot** setup, I selected option `2`.

```
2: Redirect - Make all requests redirect to secure HTTPS access. Choose this for
new sites, or if you're confident your site works on HTTPS. You can undo this
change by editing your web server's configuration.
```

If certbot is successful, you will see a message similar to this:

~~~
IMPORTANT NOTES:
 - Congratulations! Your certificate and chain have been saved at:
   /etc/letsencrypt/live/mydomain.com/fullchain.pem
   Your key file has been saved at:
   /etc/letsencrypt/live/mydomain.com/privkey.pem
 ```


Now we no longer need to run NGINX with HTTP, since we can now run NGINX with HTT

```bash
$ sudo ufw delete allow 'Nginx Full'
$ sudo ufw allow 'Nginx HTTPS'
~~~

Add Bootstrap styling

The single page app is pretty basic right now. It also isn't designed to look good on phones or tablets. I plan on using my phone to view the flask app most of the time, so I decided to use bootstrap styling and the jumbotron component from bootstrap in the flask app.

To keep things simple, I used the bootstrap CDN instead of installing the whole bootstrap package to the server. On the bootstrap3 install page (https://getbootstrap.com/docs/3.3/getting-started/) is the content we need to add to the top of our ***.html*** template.

To make the temperature display look nicer, I utilized the bootstrap jumbotron component (https://github.com/heimrichhannot/bootstrap/blob/master/docs/4.0/examples/jumbotron/index.html). If you follow the link, you will see a couple lines of html that need to be included first in the `<header>` portion of the template.

To add the bootstrap styling I created a jinga template called ***index.html*** and placed a modified version of the html for the jumbotron component and bootstrap CDN inside. On the server, we need to create a `templates` directory to store the jinja template. `<main_app>/templates` is the default location for jinga templates when running **flask**.

```
$ cd ~/flaskapp
$ mkdir templates
$ cd templates
$ nano index.html
```

The ***index.html*** template contains a `<header>` with the bootstrap3 CDN and a `<body>` which contains the jumbotron component.

```
<!-- index.html -->
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1">
<title>show temp</title>

<!-- Latest compiled and minified CSS -->
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/

<!-- Optional theme -->
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/

<!-- Latest compiled and minified JavaScript -->
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"

</head>

<body>

<div class="container-fluid">
    <div class="jumbotron">
        <hr class="my-4">
        <h1 class="display-4"> 91.4 F</h1>
        <p class="lead">temperature inside</p>
        <hr class="my-4">
    </div>
</div>

</body>
</html>
```

Now we need to modify the ***flaskapp.py*** file to point to our ***index.html*** template. A new **flask** function, `render_template()` is used. `render_template` must be included in the imports and is used as the `return` action of the `@app.route("/")` `index()` function.

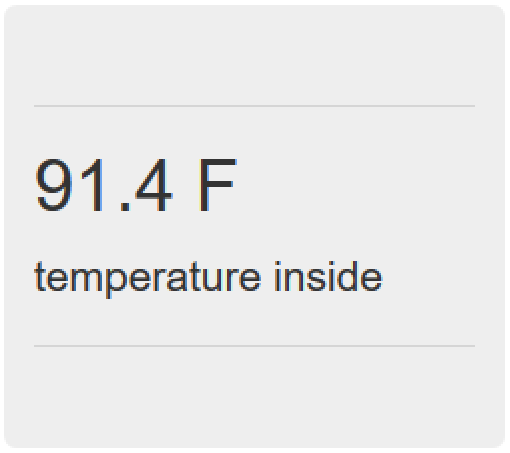
```
$ nano ~/flaskapp/flaskapp.py
```

The revised ***flaskapp.py*** file is below.

```
# flaskapp.py

from flask import Flask, render_template
app = Flask(__name__)

@app.route("/")
def index():
    return render_template("index.html")

if __name__ == "__main__":
    app.run(host='0.0.0.0')
```

We can view our changes by reloading the flaskapp system service and browsing to the server domain's main page.

```
$ sudo systemctl stop flaskapp
$ sudo systemctl start flaskapp
$ sudo systemctl status flaskapp
# [ctrl-c] to exit
```



Pull the temperature from ThingSpeak.com with **requests**

The final step of this flask single page app project is to dynamically pull the temperature from ThingSpeak.com and show it as a web page.

Right now the flask app only shows the static temperature `91.4 F`. However, the whole point of the app is to see the current temperatures the WiFi weather stations measure.

To grab the temperatures off of ThingSpeak.com, we'll use the **requests** package. According to the ThingSpeak.com web API documentation (https://www.mathworks.com/help/thingspeak/rest-api.html), the format of our GET request needs to be:

```
https://api.thingspeak.com/channels/<channel_id>/fields/<field_id>/last.<format>
```

`<channel_id>` corresponds to the channel number on ThingSpeak.com. My WiFi weather stations are on a public channel. `<field_id>` is the field number held by the ThingSpeak channel. Each ThingSpeak channel can have multiple fields. The temperature we care about is in field `1`. The `<format>` we want is `.txt`. We could grab `.json` or a `.csv` off of ThingSpeak, but since we only need one temperature reading at a time, `.txt` is the easiest.

Let's try out the ThingSpeak web API using the Python REPL. Make sure **requests** is installed in the virtual environment before importing it. On the server try:

```
$ source ~/flaskapp/flaskappenv/bin/activate
(flaskappenv)$ python

>>> import requests
>>> r = requests.get('https://api.thingspeak.com/channels/266256/fields/2/last.tx
>>> print(r.text)
-1
>>> exit()

(flaskappenv)$ deactivate
$
```

Now we need to use this same web API call shown above in the flask app. Modify ***flaskapp.py*** to include the **requests** package and include the web API request as a line the `index()` function. I also included a line to convert the temperature from °F to °C. When the temperature value comes in from ThingSpeak, it is a string. The temperature value needs to be converted to a float before the °C to °F conversion can be accomplished. After the conversion, the temperature in °F needs to be converted back to a string. A string is needed because the temperature in °F is passed to the `render_template()` function as the parameter `temp` will be used in a revised version of our jinja template ***index.html***. The extra argument in the `render_template()` function transfers the variable `temp_f` from the ***flaskapp.py*** file to the jinja template ***index.html***.

```
$ nano ~/flaskapp/flaskapp.py
```

The modified ***flaskapp.py*** script is below:

```
# flaskapp.py

from flask import Flask, render_template
import requests
app = Flask(__name__)

@app.route("/")
def index():
    r = requests.get('https://api.thingspeak.com/channels/254616/fields/1/last.tx
    temp_c_in = r.text
    temp_f = str(round(((9.0 / 5.0) * float(temp_c_in) + 32), 1)) + ' F'
    return render_template("index.html", temp=temp_f)

if __name__ == "__main__":
    app.run(host='0.0.0.0')
```

Finally, we need to modify the ***index.html*** template and test the whole flask app. We passed a parameter `temp` from ***flaskapp.py*** to this template. The `temp` parameter can be used programmatically in the jinja ***index.html*** template. The value stored in `temp` will end up displayed on the working web page. Jinja templates use code blocks that start and end with double curly brackets `{{ }}`. Our `temp` parameter goes into one of these blocks.

```
$ cd ~/flaskapp/templates
$ nano index.html
```

The revised ***index.html*** file is below:

```
<!-- index.html -->
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1">
<title>show temp</title>

<!-- Latest compiled and minified CSS -->
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/

<!-- Optional theme -->
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/

<!-- Latest compiled and minified JavaScript -->
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"

</head>

<body>

<div class="container-fluid">
    <div class="jumbotron">
        <hr class="my-4">
        <h1 class="display-4"> {{ temp }} </h1>
        <p class="lead">temperature inside</p>
        <hr class="my-4">
    </div>
</div>

</body>
</html>
```

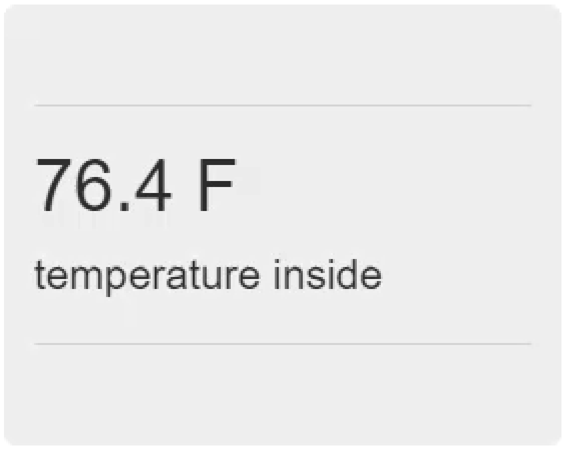
View the final flask app online

With the changes to ***readtemp.py*** and ***index.html*** complete, we can restart the flask app system service and view our app with a web browser.

```
$ sudo systemctl stop flaskapp
$ sudo systemctl start flaskapp
$ sudo systemctl status flaskapp
# [ctrl-c] to exit
```

The final single page flask web app is complete!

If everything is working correctly, you should see the working app running on your domain looks like this.


76.4 F

temperature inside

Summary

It was a long process to construct this **flask** single page webapp project. A lot for technologies and languages were used.

An incomplete list is below:

- cloud servers
- DNS Servers
- Linux
- SSH and SSH keys
- PuTTY
- Python
- Flask
- systemd
- uWSGI
- NGINX
- SSL and certbot
- web API's
- jinja templates
- html
- bootstrap

That's a lot of stuff to go in one project.

The next thing I'm thinking about is building a **flask** IoT (internet of things) server that accepts GET requests from ESP8266 weather stations (./posts/micropython/micropython_upload_code.md). ThingSpeak.com works great as an IoT sever, but there are limits to how often data can be posted and how often data can be accessed. I think writing my own IoT server in **flask** would be fun too!

Related Posts:

- Building an IoT Server with flask and Python - Part 4 Validation and Timestamps (./flask-iot-server-validation-time-stamps.html)
- Building an IoT Server with flask and Python - Part 2 Set Up (./flask-iot-server-setup.html)
- Building an IoT Server with Flask and Python - Part 1 Motivation (./flask-iot-server-motivation.html)
- Building an IoT Server with flask and Python - Part 6 - upload code to ESP8266-based WiFi weather stations (./flask-iot-server-upload-code-to-esp8266.html)
- Building an IoT Server with flask and Python - Part 5 Adding a Database (./flask-iot-server-database.html)

About Peter Kazarinoff
I teach engineering at a community college in the Pacific Northwest. I am interested in programming and how to help students. Here I mostly blog about Python, and how programing can be incorporated into engineering education.

Recent Posts

My first Twitch Stream: S01-E01 JupyterHub Intro and Tools (./stream-S01-E01-jupyter-hub-intro.html)

Hear my story about deploying JupyterHub on the Running in Production Podcast (./jupyterhub-deployment-on-running-in-production.html)

Deploy a Jupyter Notebook Online with Voila and Heroku (./deploy-jupyter-notebook-voila-heroku.html)

Tags

(./)

engineering (./tag/engineering.html) esp8266 (./tag/esp8266.html) flask (./tag/flask.html) jupyter (./tag/jupyter.html) jupyter notebook (./tag/jupyter-notebook.html) matplotlib (./tag/matplotlib.html) micropython (./tag/micropython.html) pelican (./tag/pelican.html) python (./tag/python.html) sensor (./tag/sensor.html)

GitHub Repos

cpx-simulator (https://github.com/ProfessorKazarinoff/cpx-simulator)

A repo of code for testing out the circuit playground express VS Code extension

ansible-jupyterhub-digitalocean (https://github.com/ProfessorKazarinoff/ansible-jupyter-hub-digitalocean)

A repo of Ansible playbooks to install JupyterHub on a Digital Ocean Server using Ansible

ansible-django (https://github.com/ProfessorKazarinoff/ansible-django)

A repo of Ansible playbooks to deploy Django on AWS

django-blog (https://github.com/ProfessorKazarinoff/django-blog)

Repo for the code to a Django blog for my daughter. Follows Will Vincent's book Django for Beginners and Corey Schafer's Django Blog video series

ansible-jupyterhub (https://github.com/ProfessorKazarinoff/ansible-jupyterhub)

A JupyterHub deployment using Ansible

@professorkazarinoff (https://github.com/professorkazarinoff) on GitHub

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