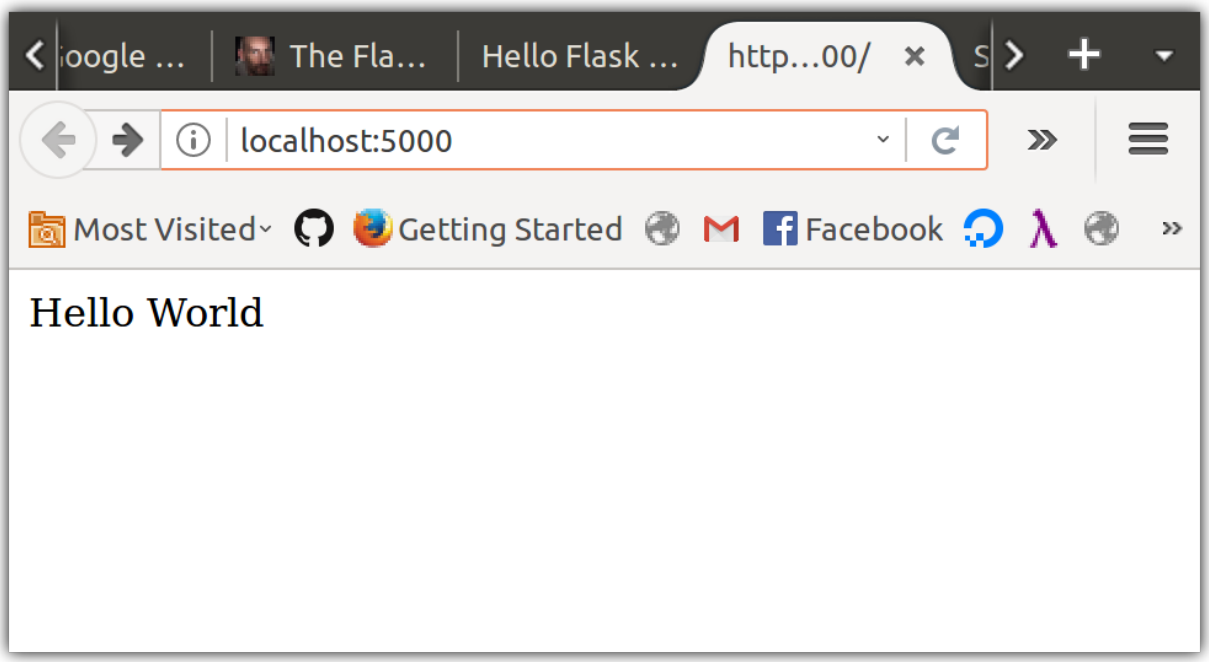
Hello Flask

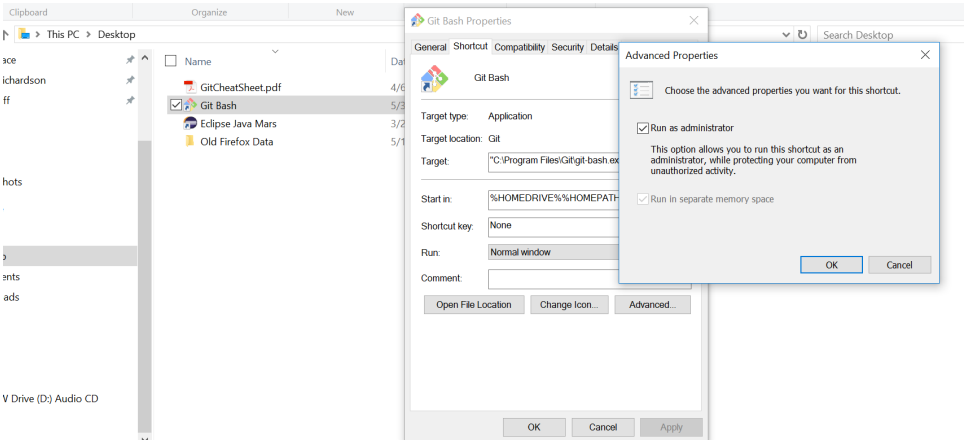
Build a Development Web Application

In this tutorial, we'll configure and build a web application. The configuration will be the hard part. When we're done, we'll be able to visit the server in our browser, and it will display this heartening message:



✶ **Note**

A special note for Windows users. You will want to make sure to open up Git Bash as an ***admin*** from now on when you are working with Flask and virtual environments. To do this, right click on the shortcut for Git Bash and select ***Run as administrator***. Then select ***Yes*** when you get a pop up box about allowing this app to make changes to your PC. You can also change the shortcut so that it defaults to ***Run as administrator*** by going to *Desktop->GitBash->Properties->Shortcut->Advanced* and then checking the box next to ***Run as administrator***.



⚠ Warning

A special note for Mac users. Make sure that your terminal is using bash. If it is using zsh, tcsh, or any other shell script, switch it to bash in order for the instructions below to work properly. You can see what kind of shell you are using by looking at the title bar of your terminal. Visit **this link (http://osxdaily.com/2012/03/21/change-shell-mac-os-x)** for guidance on changing your shell.

Founding your project and installing software

Navigate to your `lc101` directory, make a directory for your project, and `cd` (change directory) into it:

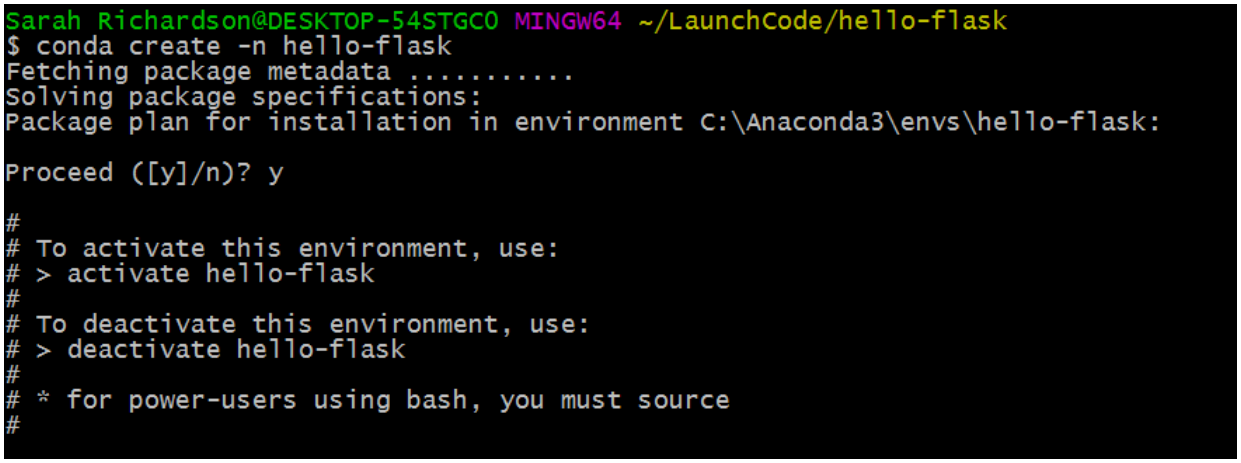
```
$ mkdir hello-flask
$ cd hello-flask
```

To download the flask library, we're going to need a way to store libraries. So that this doesn't cause version mismatch issues with other versions of Python on your system - including system libraries which might be using Python - we'll install a virtual environment and host all our libraries within it.

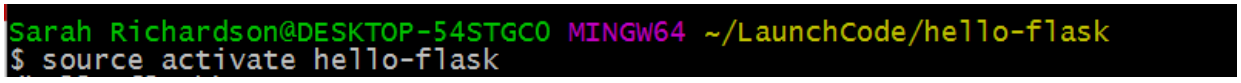
> ✶ **Note**
>
> Here, we're using the term "virtual environment" loosely. Rather than starting a full virtual machine, we're really just changing the PATH environment variable, which controls the order of directories that bash searches for programs.
>
> ```
> (hello-flask) $ echo $PATH
> /home/dm/hello-flask/flask/bin:/home/dm/.rbenv/plugins/ruby-bu
> ild/bin:/home/dm/.rbenv/shims:/home/dm/.rbenv/bin:/home/dm/bi
> n:/home/dm/.local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbi
> n:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/u
> sr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bi
> n:/usr/lib/jvm/java-8-oracle/jre/bin
> ```

To create a virtual environment with Conda, we'll do the following:

1. In your `hello-flask/` directory, create a virtual environment named `hello-flask` like so: `conda create -n hello-flask`



2. Activate the virtual environment using `source activate hello-flask`



3. Install flask into your virtual environment with the command `conda install flask`

```
(hello-flask)
Sarah Richardson@DESKTOP-54STGC0 MINGW64 ~/LaunchCode/hello-flask
$ conda install flask
Fetching package metadata ...........
Solving package specifications: .

Package plan for installation in environment C:\Anaconda3\envs\hello-flask:

The following NEW packages will be INSTALLED:

    click:          6.7-py36_0
    flask:          0.12.1-py36_0
    itsdangerous:   0.24-py36_0
    jinja2:         2.9.6-py36_0
    markupsafe:     0.23-py36_2
    pip:            9.0.1-py36_1
    python:         3.6.1-0
    setuptools:     27.2.0-py36_1
    vs2015_runtime: 14.0.25123-0
    werkzeug:       0.12.1-py36_0
    wheel:          0.29.0-py36_0

Proceed ([y]/n)? y
```

Tip: If you need to deactivate the virtual environment, use the command `source deactivate`.

```
(hello-flask)
Sarah Richardson@DESKTOP-54STGC0 MINGW64 ~/LaunchCode/hello-flask
$ source deactivate

Sarah Richardson@DESKTOP-54STGC0 MINGW64 ~/LaunchCode/hello-flask
$
```

✶ Note

The above pictures show how these commands will look in Git Bash. Mac Terminal will look slightly different.

⚠ Warning

Windows Git Bash doesn't always play nice with Conda installs. It is recommended that you close and re-open your Git Bash terminal after doing any Conda install. In this case, after you re-open the terminal, navigate to your `hello-flask/` directory, activate the virtual environment again with `source activate hello-flask` and proceed with the instructions below. Closing and reopening Git Bash will solve many problems you may encounter (and following all of our instructions step by step and to the letter will prevent many problems, too).

Now we're ready to build our web application!

Building a web application line by line

First, let's initialize this project as a Git repository.

```
$ git init
```

From your `~/lc101/hello-flask/` directory, create a new file named `main.py` and then open up the project in Visual Studio Code.

```
$ touch main.py
$ code .
```

✶ Note

> The name `main` isn't special, we just picked it. Since this will be the "main" file that will need to be run for our application to start up, it makes sense.

Open `main.py` in the code editor. Then type this in, considering each line as you do:

```python
from flask import Flask

app = Flask(__name__)
app.config['DEBUG'] = True

@app.route("/")
def index():
    return "Hello World"

app.run()
```

What's all this do?

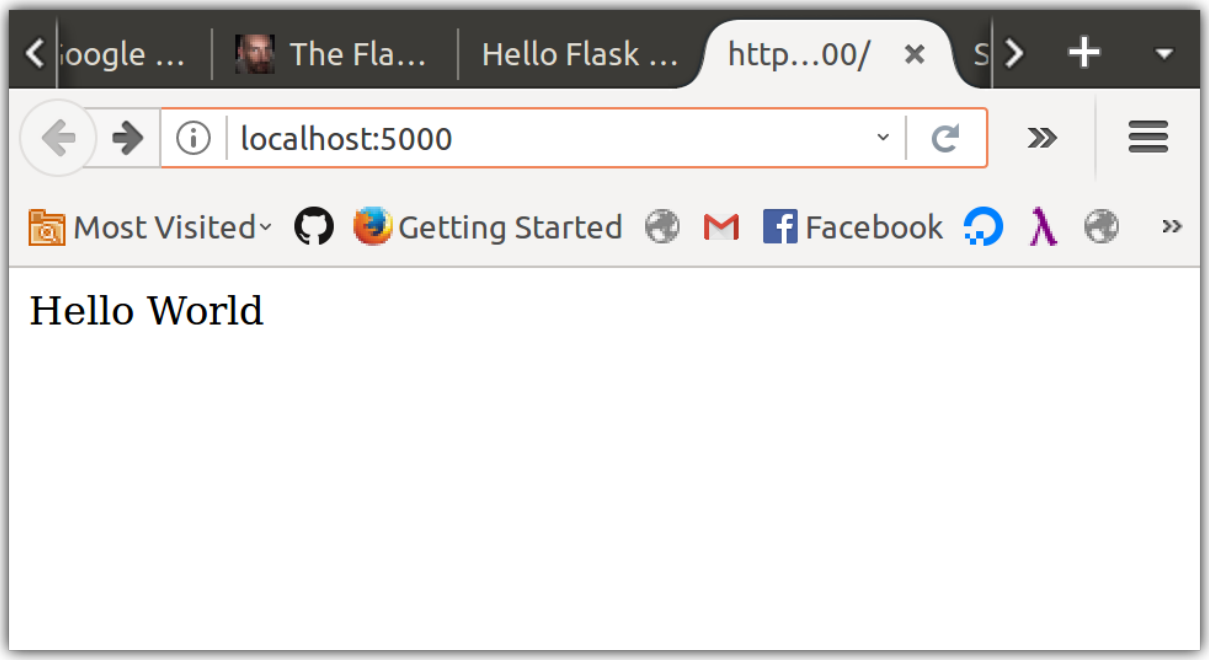
- `from flask import Flask` : this imports the `Flask` class from the `flask` module.
- `app = Flask(__name__)` : app will be the object created by the constructor `Flask` . `__name__` is a variable controlled by Python that tells code what module it's in.
- `app.config['DEBUG'] = True` : the `DEBUG` configuration setting for the Flask application will be enabled. This enables some behaviors that are helpful when developing Flask apps, such as displaying errors in the browser, and ensuring file changes are reloaded while the server is running (aka "host swapping")
- `@app.route("/")` : this is a decorator that creates a mapping between the path - in this case the root, or "/", and the function that we're about to define
- `def index():` : Ah, familiar ground! We define `index` , a function of zero variables
- `return "Hello World"` : Our function returns a string literal.

- `app.run()` : Pass control to the Flask object. The run function loops forever and never returns, so put it last. It carries out the responsibilities of a web server, listening for requests and sending responses over a network connection.

Here goes. Go to your terminal and start things up. The output should look like:

```
$ python main.py
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

From the computer running this process, point your browser at **http://localhost:5000/ (http://localhost:5000/)** and see what's up. Maybe this?!



If so: congrats! You've built a dynamic web app!

✶ **Note**

If that didn't work for you, refer to some common errors and fixes below, and carefully retrace the steps.

Go back to the terminal and note that there's an extra line now:

```
$ python main.py
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
127.0.0.1 - - [10/Apr/2017 17:02:19] "GET / HTTP/1.1" 200 -
```

The HTTP request you made to the Flask application server has been logged. In particular, notice the request line, `GET / HTTP/1.1` , and response code of 200. Neat, huh?

To stop the application, do as suggested in the terminal output and press `CTRL+C`

Committing Our File

Let's wrap up by putting our file in the local Git repository. If you run `git status` you'll see that we have a directory that was created by Visual Studio Code.

```
$ git status
On branch master

Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

    .vscode/
    main.py

nothing added to commit but untracked files present (use "git add" to track)
```

We don't want to put this in our repository, so let's create a `.gitignore` file so we can, well, tell Git to ignore it.

```
$ touch .gitignore
```

Back in VS Code, add this line to `.gitignore`:

```
.vscode/
```

Then run `git status` again to see what's changed.

```
$ git status
On branch master

Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

    .gitignore
    main.py

nothing added to commit but untracked files present (use "git add" to track)
```

Great! Now, add and commit the files.

```
$ git add .
$ git commit -m "Create Hello World app"
[master (root-commit) 05bc1ae] Create Hello World app
 2 files changed, 10 insertions(+)
 create mode 100644 .gitignore
 create mode 100644 main.py
```

COMMON ERRORS

Virtual environment not activated

If you see this error:

```
Traceback (most recent call last):
  File "main.py", line 1, in <module>
    from flask import Flask
ImportError: No module named flask
```

This means your virtual environment was not activated. Enter this command to start it: `source activate hello-flask` and then try again.

Trying to run the app from the wrong directory

If you see this error:

```
$ python main.py
python: can't open file 'main.py': [Errno 2] No such file or directory
```

Then your working directory is something other than where you put the `main.py` file (which is most likely `~/lc101/hello-flask/`). Use `pwd` to figure out where you are, and adjust accordingly.