INTRODUCING FLASK

YOU NEED TO KNOW PYTHON

Crash course in Python :

http://diveintopython3.problemsolving.io/index.html

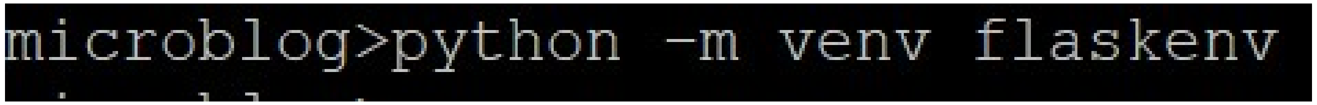
WHAT IS FLASK?

- Created by Armin Ronacher
- A micro-framework in Python
  - No database layer or ORM
  - No built-in authentication
  - No admin interface

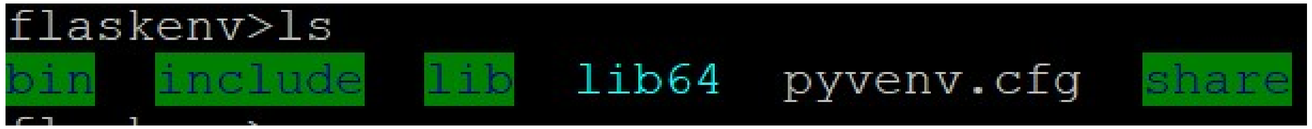
INSTALL A VENV (PYTHON 3.8+) [MAC/LINUX]

- Create a directory for our project and then create a virtual environment inside it

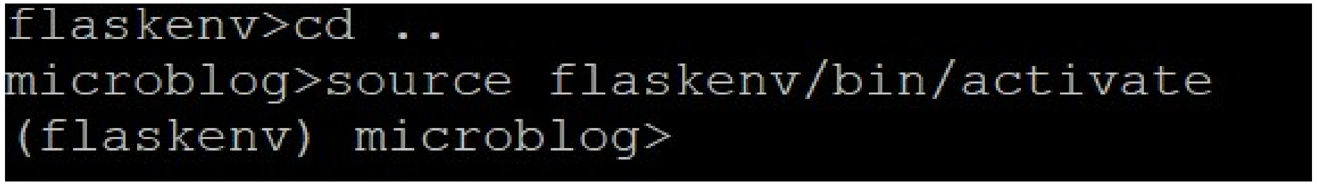
```
mkdir microblog

cd microblog
```



```
microblog>python -m venv flaskenv
```



```
flaskenv>ls
bin  include  lib  lib64  pyvenv.cfg  share
```



```
flaskenv>cd ..
microblog>source flaskenv/bin/activate
(flaskenv) microblog>
```

INSTALL A VENV (PYTHON 3.8+) [WINDOWS]

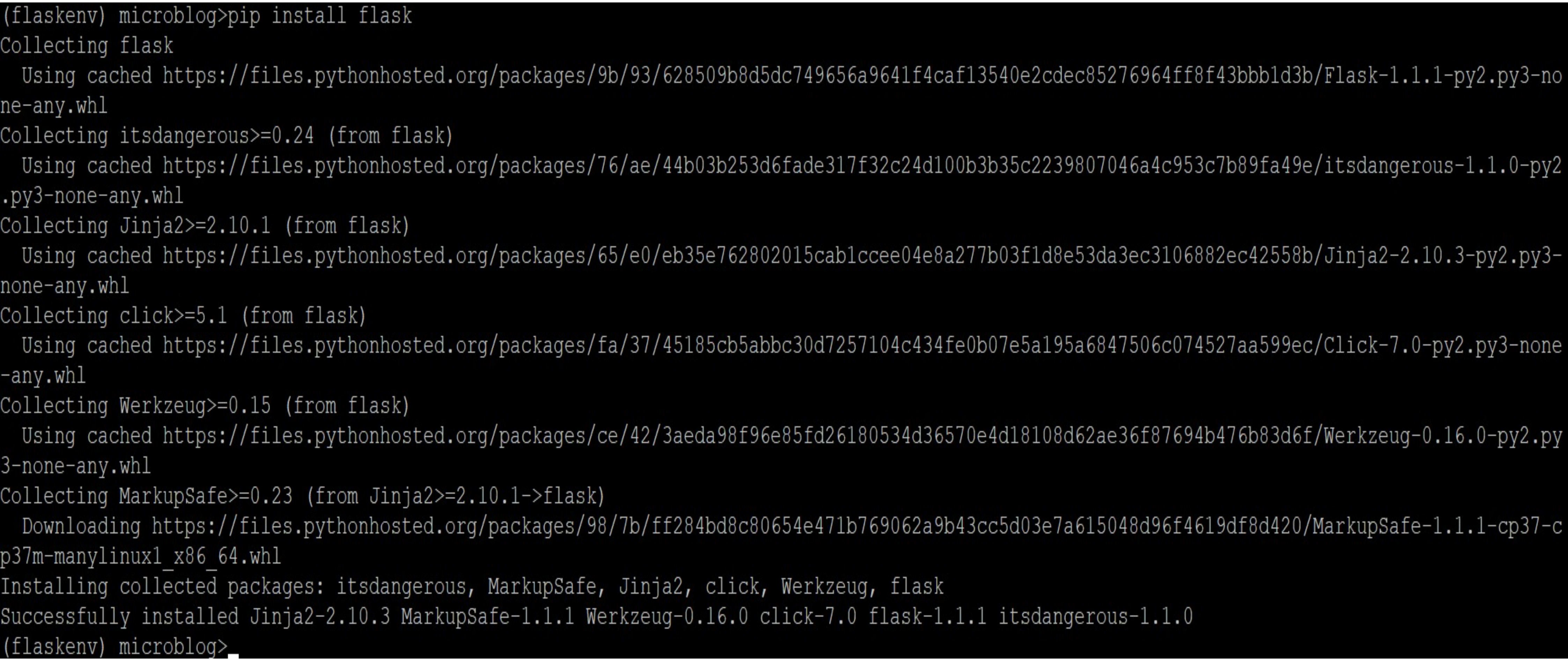
Create the virtual environment

- `> md microblog`
- `> cd microblog`
- `> py -3 –m venv flaskenv`

Activate the virtual environment

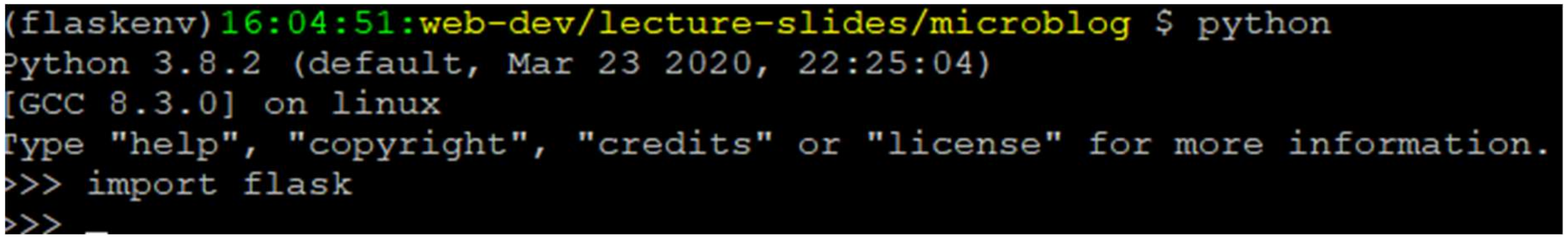
- `> flaskenv\Scripts\activate`

INSTALL FLASK



```
(flaskenv) microblog>pip install flask
Collecting flask
  Using cached https://files.pythonhosted.org/packages/9b/93/628509b8d5dc749656a9641f4caf13540e2cdec85276964ff8f43bbb1d3b/Flask-1.1.1-py2.py3-no
ne-any.whl
Collecting itsdangerous>=0.24 (from flask)
  Using cached https://files.pythonhosted.org/packages/76/ae/44b03b253d6fade317f32c24d100b3b35c2239807046a4c953c7b89fa49e/itsdangerous-1.1.0-py2
.py3-none-any.whl
Collecting Jinja2>=2.10.1 (from flask)
  Using cached https://files.pythonhosted.org/packages/65/e0/eb35e762802015cab1ccee04e8a277b03f1d8e53da3ec3106882ec42558b/Jinja2-2.10.3-py2.py3-
none-any.whl
Collecting click>=5.1 (from flask)
  Using cached https://files.pythonhosted.org/packages/fa/37/45185cb5abbc30d7257104c434fe0b07e5a195a6847506c074527aa599ec/Click-7.0-py2.py3-none
-any.whl
Collecting Werkzeug>=0.15 (from flask)
  Using cached https://files.pythonhosted.org/packages/ce/42/3aeda98f96e85fd26180534d36570e4d18108d62ae36f87694b476b83d6f/Werkzeug-0.16.0-py2.py
3-none-any.whl
Collecting MarkupSafe>=0.23 (from Jinja2>=2.10.1->flask)
  Downloading https://files.pythonhosted.org/packages/98/7b/ff284bd8c80654e471b769062a9b43cc5d03e7a615048d96f4619df8d420/MarkupSafe-1.1.1-cp37-c
p37m-manylinux1_x86_64.whl
Installing collected packages: itsdangerous, MarkupSafe, Jinja2, click, Werkzeug, flask
Successfully installed Jinja2-2.10.3 MarkupSafe-1.1.1 Werkzeug-0.16.0 click-7.0 flask-1.1.1 itsdangerous-1.1.0
(flaskenv) microblog>
```

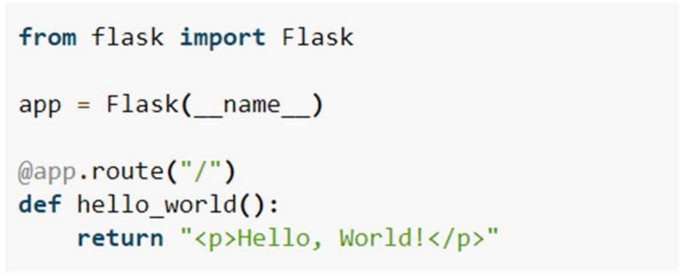
VERIFY FLASK



```
(flaskenv)16:04:51:web-dev/lecture-slides/microblog $ python
ython 3.8.2 (default, Mar 23 2020, 22:25:04)
[GCC 8.3.0] on linux
ype "help", "copyright", "credits" or "license" for more information.
>>> import flask
>>> _
```

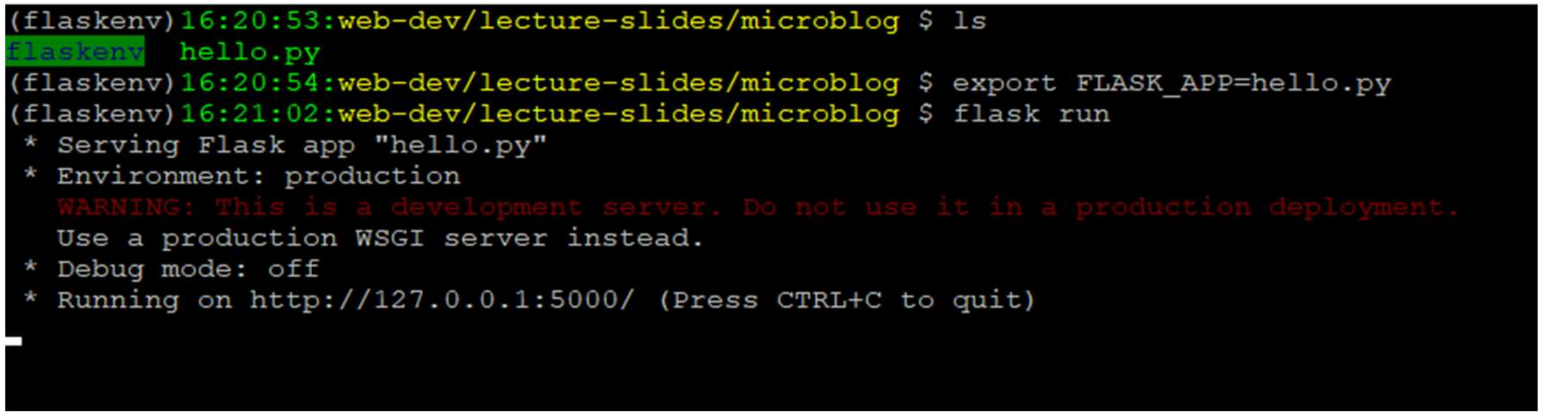
ON THE FLASK WEBSITE

- A minimal flask application looks like this. Create a file called 'hello.py' and save the following contents



```
from flask import Flask

app = Flask(__name__)

@app.route("/")
def hello_world():
    return "<p>Hello, World!</p>"
```

Tell your terminal what application to work with

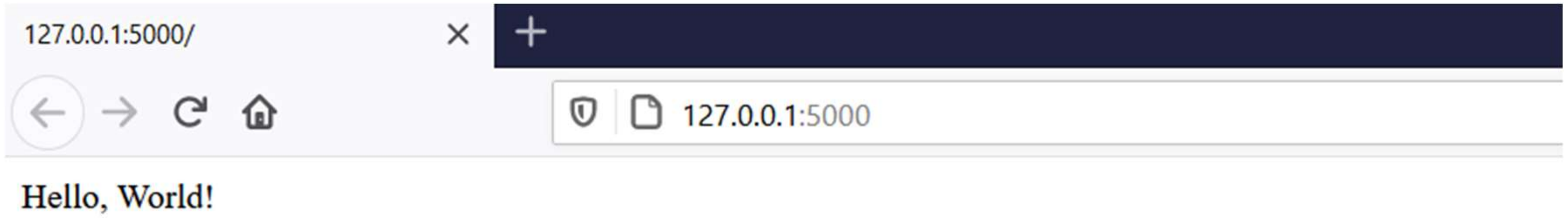


```
(flaskenv)16:20:53:web-dev/lecture-slides/microblog $ ls
flaskenv  hello.py
(flaskenv)16:20:54:web-dev/lecture-slides/microblog $ export FLASK_APP=hello.py
(flaskenv)16:21:02:web-dev/lecture-slides/microblog $ flask run
 * Serving Flask app "hello.py"
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

On Windows:

```
> Set FLASK_APP=hello.py
```

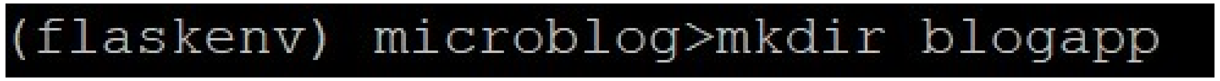
OPEN YOUR BROWSER



Hello, World!

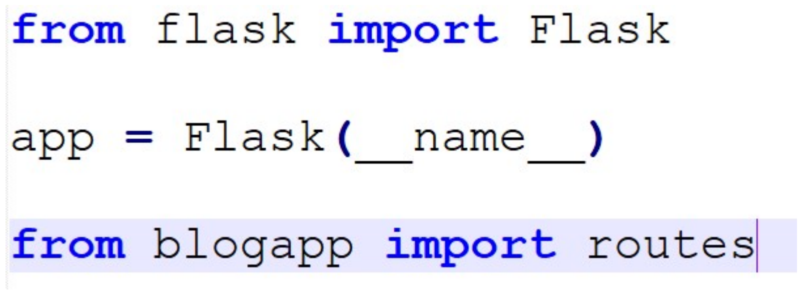
WE WILL TAKE MORE SYSTEMATIC APPROACH

- First, we create a package in which the web application lives
- In python, a directory that includes the file __init__.py is considered a package
- When you import the package, __init__.py executes and defines what symbols are exposed to the outside world



```
(flaskenv) microblog>mkdir blogapp
```

Inside the `blogapp` directory, create a file called `__init__.py`, and add the following code



```
from flask import Flask

app = Flask(__name__)

from blogapp import routes
```

EXPLANATION

- __name__ is a python predefined variable which is set to the module in which it is used.
- Flask uses this a starting point to load additional resources, such as templates or other additional resources
- The routes module is imported at the bottom, and not at the top (like usual Python import statements).
- This is to prevent circular imports [When we create 'routes' we shall see that it needs to use 'app' defined in this script]
- In routes.py, we will implement the *view functions*, also called application routes. These are the urls that the application will respond to

CREATE routes.py inside blogapp

```
from blogapp import app

@app.route('/')
@app.route('/index')
def index():
    return "Hello, World!"
```

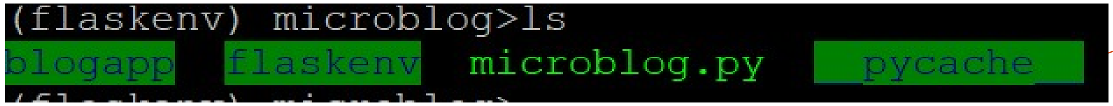
`@app.route` are decorators. A decorator creates an association between the URL given as argument and the function.

CREATE THE TOP-LEVEL SCRIPT

- This script defines the Flask application instance.
- Create a file called `microblog.py` and insert one line of code

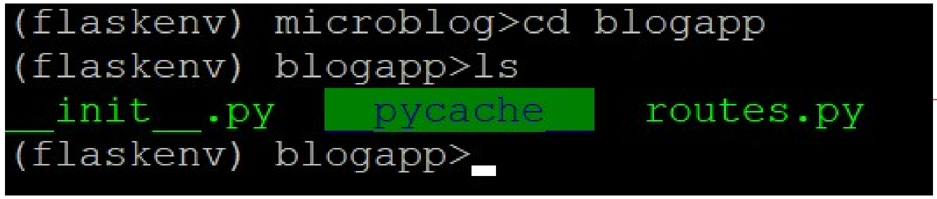
```python
from blogapp import app
```

- The project should now look like



```
(flaskenv) microblog>ls
blogapp  flaskenv  microblog.py  __pycache__
```

Top-level

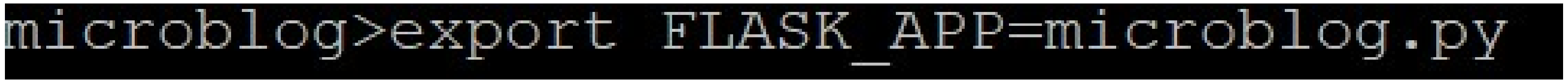


```
(flaskenv) microblog>cd blogapp
(flaskenv) blogapp>ls
__init__.py  __pycache__  routes.py
(flaskenv) blogapp>_
```

Inside `blogapp` directory

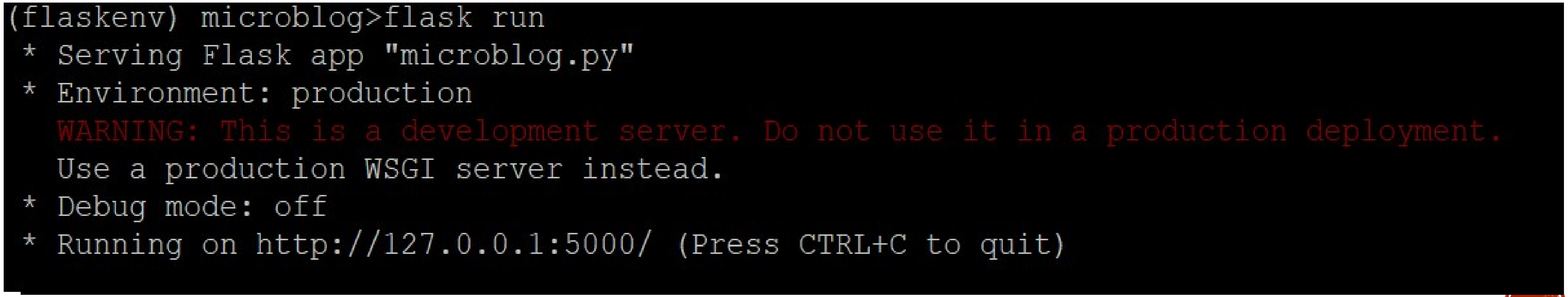
ALL DONE!

- Set the environment variable `FLASK_APP`, so that flask knows what your application is



```
microblog>export FLASK_APP=microblog.py
```

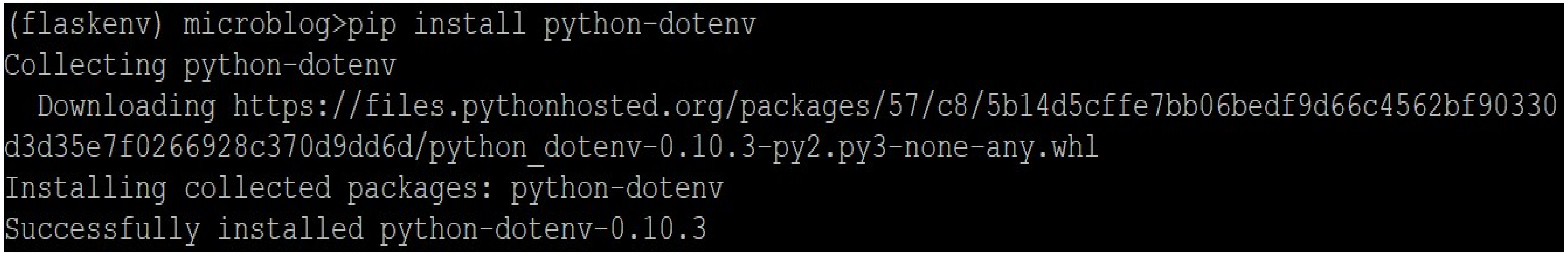
- Then run flask!



```
(flaskenv) microblog>flask run
 * Serving Flask app "microblog.py"
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

OPTIONAL STEP

- Register environment variables that you want automatically, whenever you run the `flask` command



```
(flaskenv) microblog>pip install python-dotenv
Collecting python-dotenv
  Downloading https://files.pythonhosted.org/packages/57/c8/5b14d5cffe7bb06bedf9d66c4562bf90330
d3d35e7f0266928c370d9dd6d/python_dotenv-0.10.3-py2.py3-none-any.whl
Installing collected packages: python-dotenv
Successfully installed python-dotenv-0.10.3
```

- Now, create a file called `.flaskenv` and add one line

```
FLASK_APP=microblog.py
```

MORE COMPLEX OUTPUT

- What if we wanted to return a more complex web-page?

```
from blogapp import app

@app.route('/')
@app.route('/index')
def index():
    user = {'username': 'Vivek'}
    return '''
    <html>
    <head>
        <title>Home Page - Microblog</title>
    </head>
    <body>
        <h1>Hello, ''' + user['username'] + '''!</h1>
    </body>
</html>'''
```

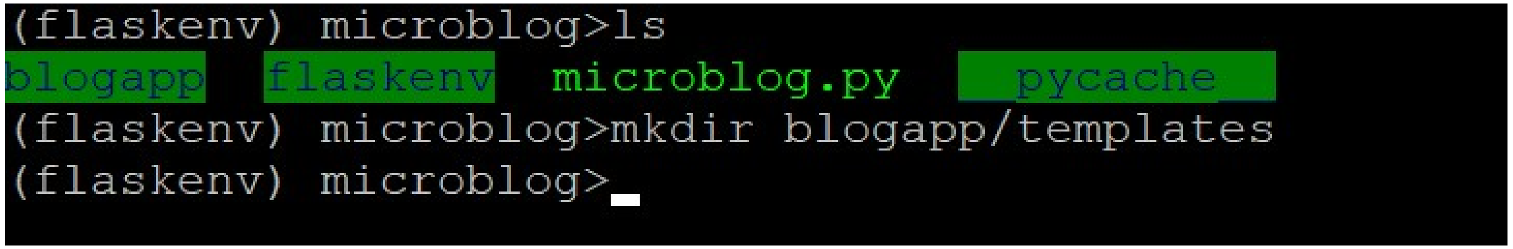
TEMPLATES

- Returning HTML strings is ugly!!
- If we wanted to change the style of the page, it would be extremely time-consuming and error-prone

- Flask comes with a templating engine called *`Jinja`*
- Templates allow us to separate business logic and presentation
- In flask, templates are written as separate files, stored in a *`templates`* directory inside the main app directory (in our example, `blogapp`)

CREATING A TEMPLATE

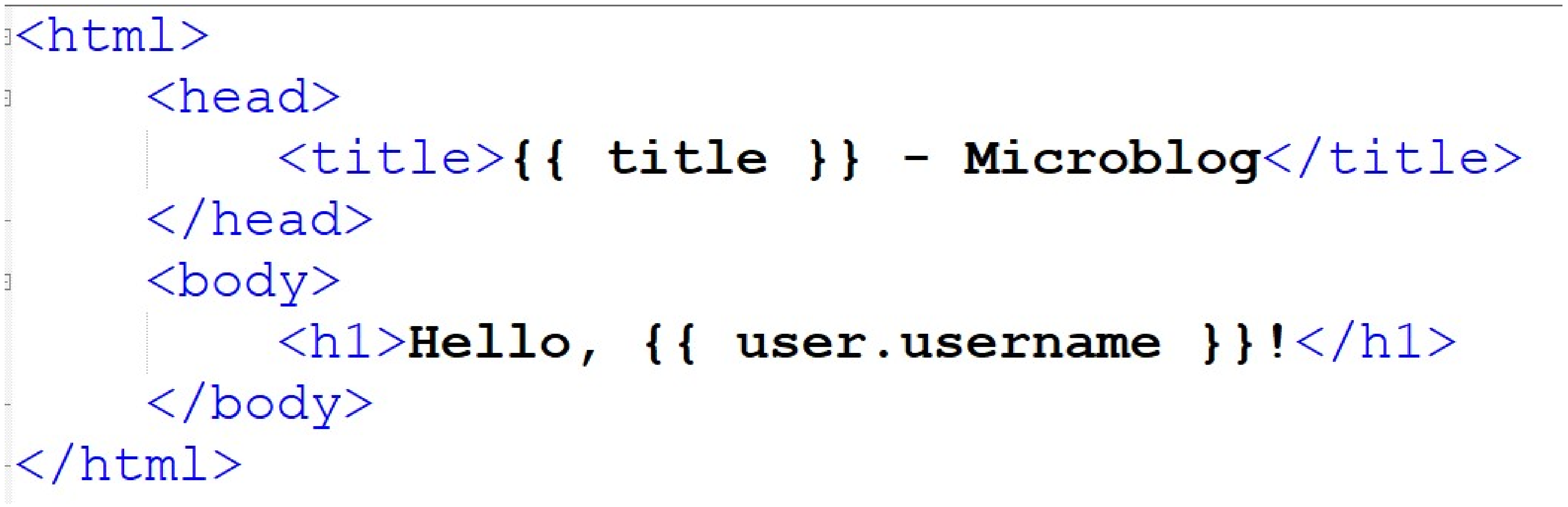
- First, create the *templates* directory



```
(flaskenv) microblog>ls
blogapp   flaskenv   microblog.py   __pycache__
(flaskenv) microblog>mkdir blogapp/templates
(flaskenv) microblog>
```

CREATING A TEMPLATE – II

Inside the *templates* directory, create an index.html file



```
<html>
    <head>
        <title>{{ title }} - Microblog</title>
    </head>
    <body>
        <h1>Hello, {{ user.username }}!</h1>
    </body>
</html>
```

CREATING A TEMPLATE – III

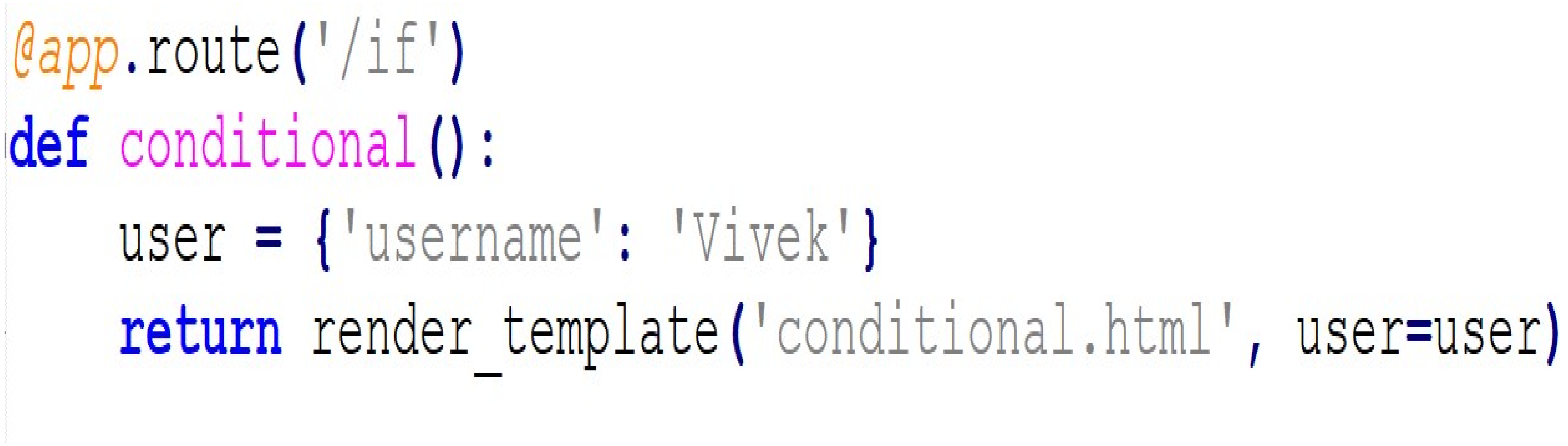
- Modify the `routes.py` to use the template

```python
from blogapp import app

@app.route('/')
@app.route('/index')
def index():
    user = {'username': 'Vivek'}
    return render_template('index.html', title='Home', user=user)
```

CONDITIONAL STATEMENTS

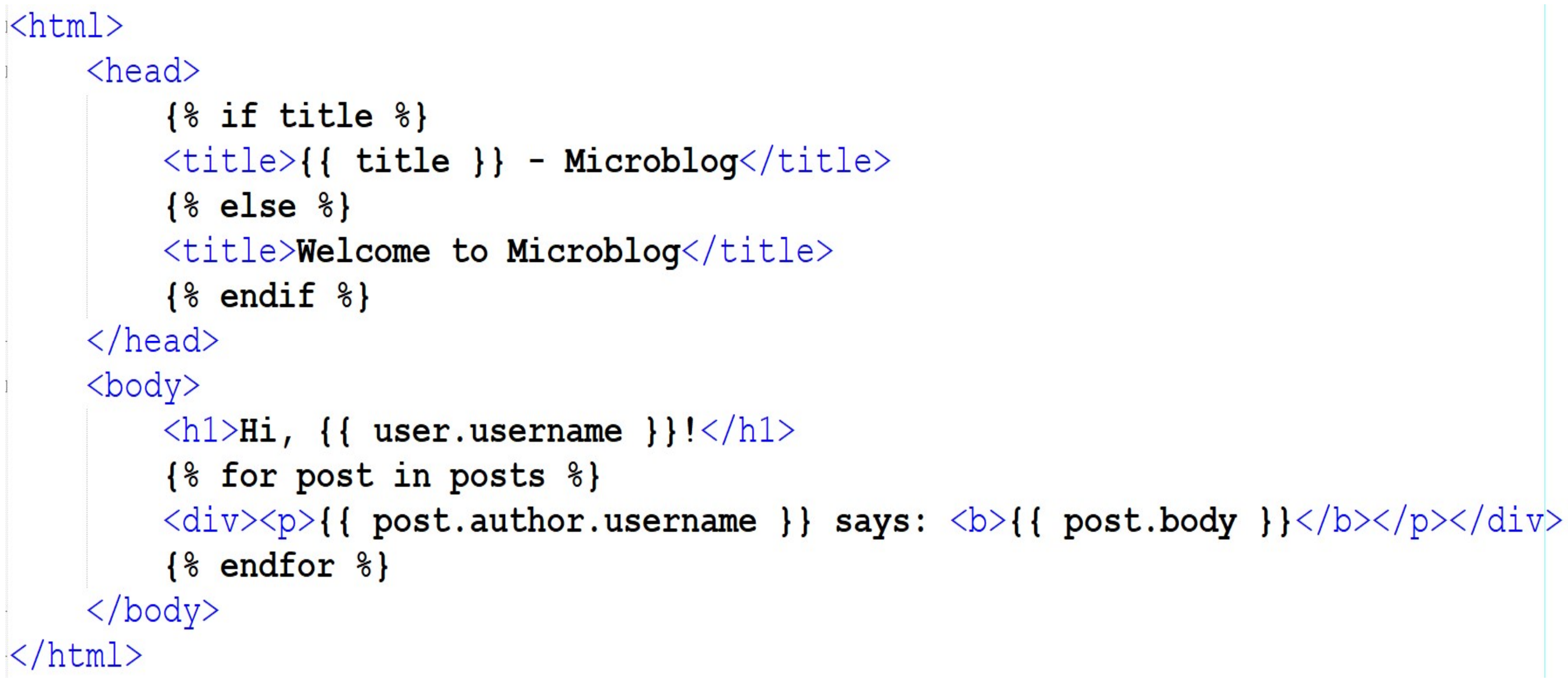
```
<html>
    <head>
        {% if title %}
        <title>{{ title }} - Microblog</title>
        {% else %}
        <title>No title was set! Stop being lazy!</title>
        {% endif %}
    </head>
    <body>
        <h1>Hello, {{ user.username }}!</h1>
    </body>
</html>
```

CONDITIONS – MODIFIED routes.py



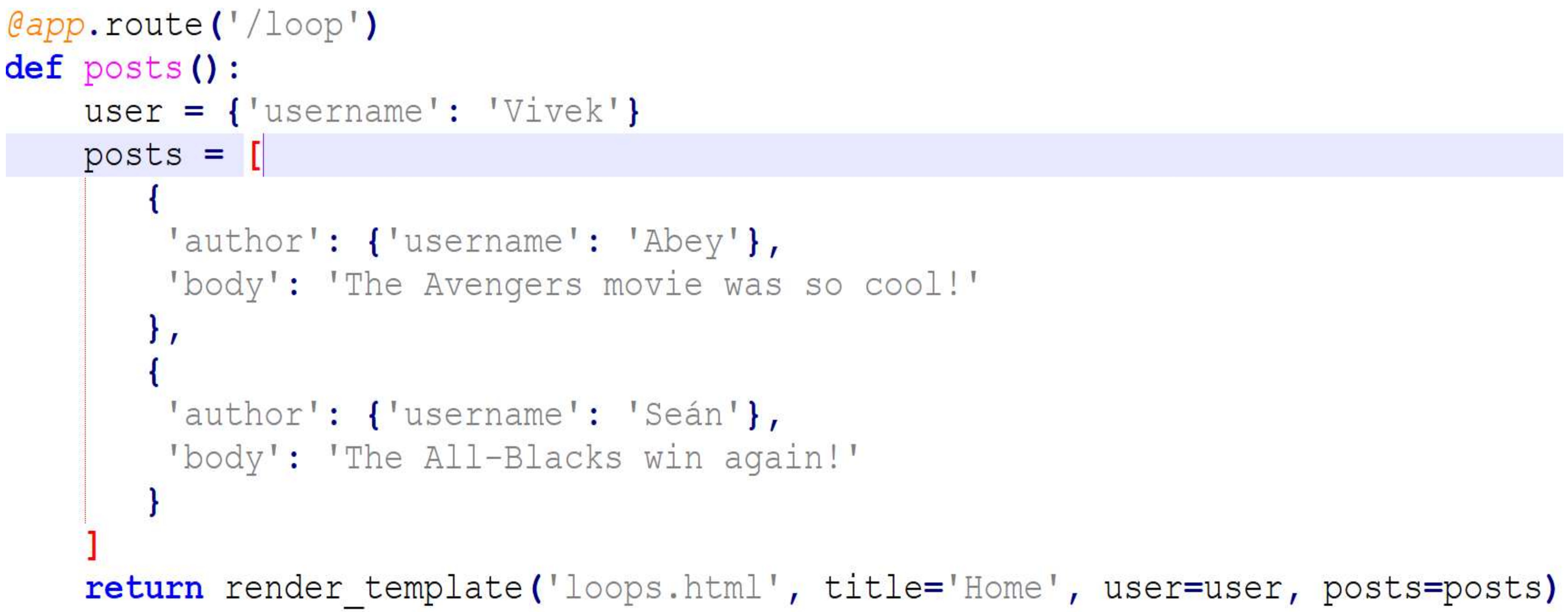
```
@app.route('/if')
def conditional():
    user = {'username': 'Vivek'}
    return render_template('conditional.html', user=user)
```

LOOPS



```
<html>
    <head>
        {% if title %}
        <title>{{ title }} - Microblog</title>
        {% else %}
        <title>Welcome to Microblog</title>
        {% endif %}
    </head>
    <body>
        <h1>Hi, {{ user.username }}!</h1>
        {% for post in posts %}
        <div><p>{{ post.author.username }} says: <b>{{ post.body }}</b></p></div>
        {% endfor %}
    </body>
</html>
```

LOOPS – MODIFIED `routes.py`

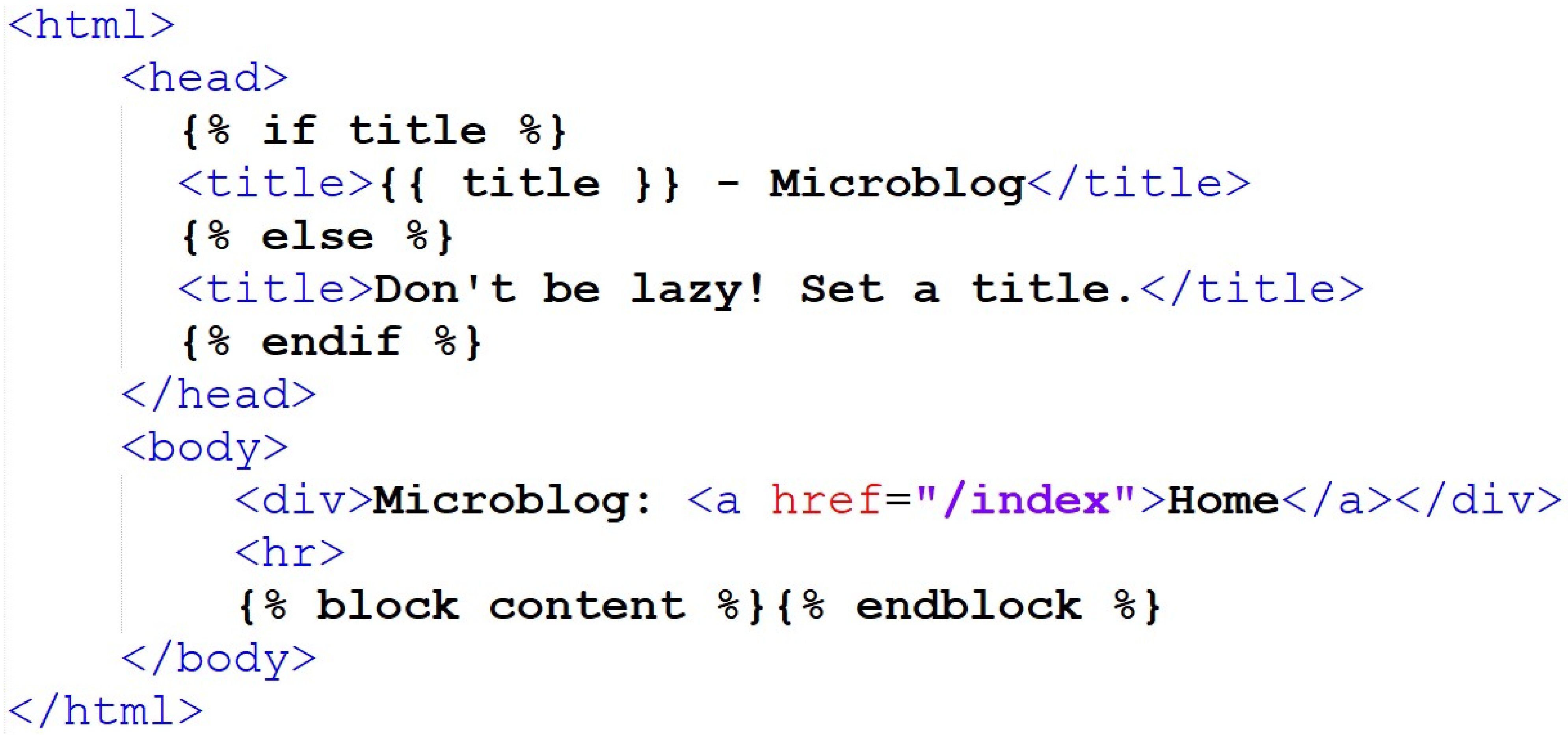


```python
@app.route('/loop')
def posts():
    user = {'username': 'Vivek'}
    posts = [
        {
         'author': {'username': 'Abey'},
         'body': 'The Avengers movie was so cool!'
        },
        {
         'author': {'username': 'Seán'},
         'body': 'The All-Blacks win again!'
        }
    ]
    return render_template('loops.html', title='Home', user=user, posts=posts)
```

TEMPLATES CAN BE INHERITED

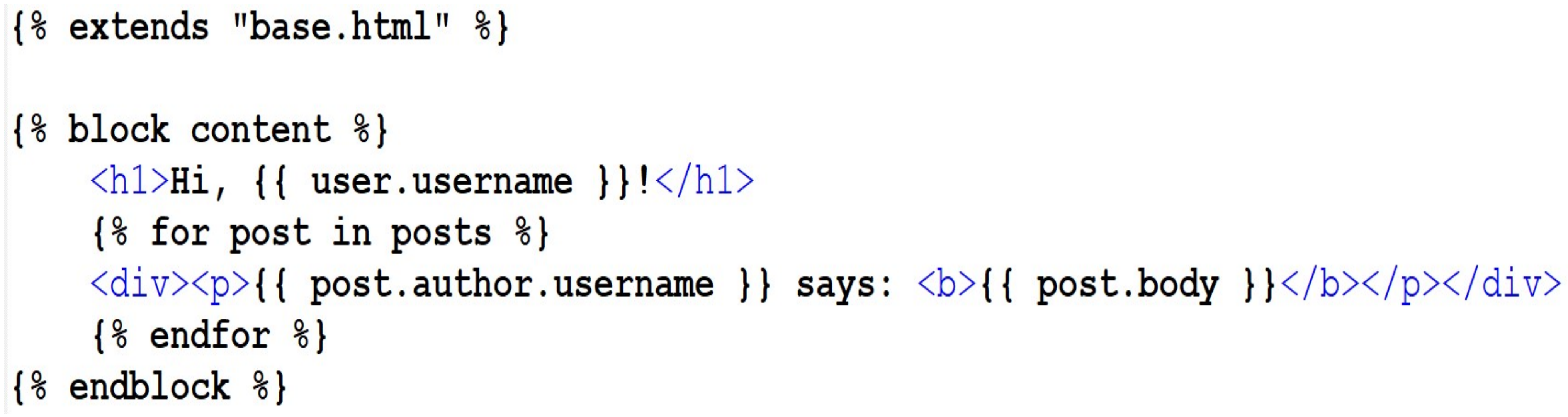
- Can move parts of the template that are common to multiple pages into a base template
- Allows for consistency across pages
- Less code to write

CREATE A base.html



```
<html>
    <head>
      {% if title %}
      <title>{{ title }} - Microblog</title>
      {% else %}
      <title>Don't be lazy! Set a title.</title>
      {% endif %}
    </head>
    <body>
        <div>Microblog: <a href="/index">Home</a></div>
        <hr>
        {% block content %}{% endblock %}
    </body>
</html>
```

EXTEND THE TEMPLATE



```
{% extends "base.html" %}

{% block content %}
    <h1>Hi, {{ user.username }}!</h1>
    {% for post in posts %}
    <div><p>{{ post.author.username }} says: <b>{{ post.body }}</b></p></div>
    {% endfor %}
{% endblock %}
```

TO-DO – I

- Create a venv;
- Activate the venv;
- Install Flask
- Create routes (‘`index`’ and ‘`sayings`’)
- Create a base template (`base.html`)
- Create two templates that inherit from base called ‘`index.html`’ and ‘`sayings.html`’
- The `base.html` should look like the code shown in class
- The `index.html` should have a welcome message, customized to the user [as shown in class]

TO-DO – II

- The `sayings.html` **should iterate through** ***two*** **lists of strings and join them with the phrase "said:" .**

E.g., `list = [“John”, “Mary”, “Abey”]`

```
list2 = [“Good Morning”, “Good Riddance”, “I hate python”]
```

The output should be an HTML list like:

```
1. John said Good Morning

2. Mary said Good Riddance

3. Abey said I hate Python
```