p1-insta485-static

EECS485 P1: Templated Static Site Generator

Due 11:59pm ET January 21, 2023. This is an individual project.

Change Log

Initial Release for W24

Introduction

An Instagram clone implemented with a templated static site generator. This is the first of an EECS 485 three project sequence: a static site generator from templates, server-side dynamic pages, and client-side dynamic pages.

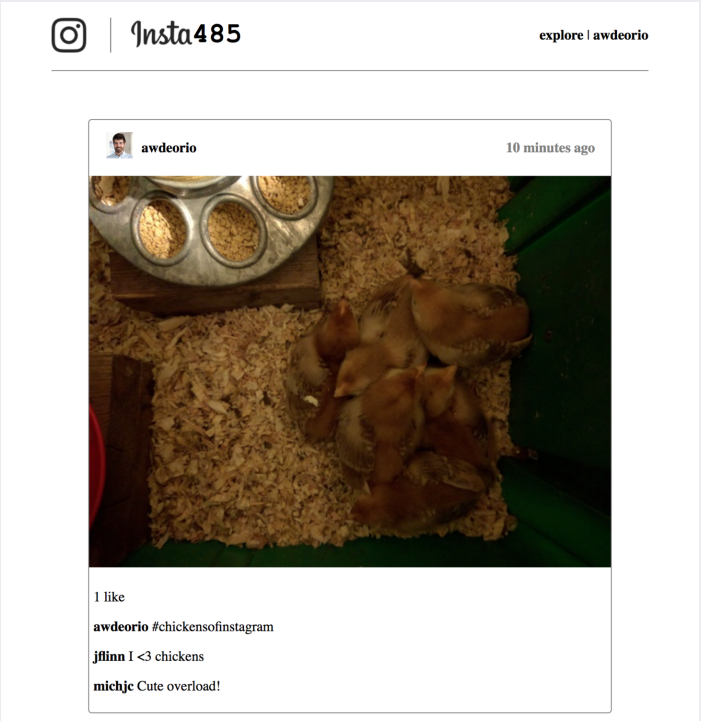
The learning goals of this project include HTML, CSS, templates, Python programming, and basic shell scripting. It is also a “readiness test” that will give you an idea of what EECS 485 will be like.

Write a Python program that takes as input HTML templates, JSON data and misc. static files (like images and CSS) and generates as output a web site of static content. Then, use your new tool to build a non-interactive website. Jekyll and Pelican are two examples of open source static site generators.

Here’s a preview of what your finished project will look like. `insta485generator` is the name of the Python program you will write. `insta485` is an input directory containing HTML templates, JSON data and misc. static files (like images and CSS). `insta485/html` is an output directory containing generated static HTML files.

```
$ insta485generator insta485
$ cd insta485/html/
$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

Then you will navigate to http://localhost:8000 and see the non-interactive website that you created.



If you're new to HTML, CSS and Python, here are some helpful resources:

- W3 Schools Beginner's Guide to HTML
- W3 Schools CSS
- Python 3 Tutorial

Setup

We'll walk you through setting up your operating system, Python virtual environment and version control.

Command line tools

The command line interface (CLI) lets us interact with the computer using the keyboard instead of the mouse. Select your operating system to install CLI tools.

macOS	Windows	Linux

Take a look at our text editor tips and tricks.

Project folder

Create a folder for this project. Your folder location might be different.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
```

⚠ **Pitfall:** Avoid paths that contain spaces. Spaces cause problems with some command line tools.

Bad Example	Good Example
`EECS 485/Project 1 Insta485 Static`	`eecs485/p1-insta485-static`

⚠ **WSL Pitfall:** Avoid project directories starting with `/mnt/c/`. This shared directory is slow.

Bad Example	Good Example
`/mnt/c/ ...`	`/home/awdeorio/ ...`

Version Control

Set up version control using the Version control tutorial.

After you're done, you should have a local repository with a "clean" status and your local repository should be connected to a remote GitHub repository.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ git status
On branch main
Your branch is up-to-date with 'origin/main'.

nothing to commit, working tree clean
$ git remote -v
origin  https://github.com/awdeorio/p1-insta485-static.git (fetch)
origin  https://github.com/awdeorio/p1-insta485-static.git (push)
```

You should have a `.gitignore` file (instructions).

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ head .gitignore
This is a sample .gitignore file that's useful for EECS 485 projects.
...
```

Python virtual environment

Create a Python virtual environment for project 1 using the Python Virtual Environment Tutorial.

You should now have Python tools and third party packages installed locally. Your versions and exact libraries might be different.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ ls
env
$ source env/bin/activate
$ which python
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin/python
$ which pip
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin/pip
$ pip list
Package            Version
------------------ ---------
astroid            2.4.2
...
zipp               3.1.0
```

Python debugger

Learn how to use the Python debugger, `pdb` using the Python Debugging Tutorial.

Browser tutorial

Learn about the developer tools built into your browser with the Browser Tutorial. Skip the sections on Cookies, Private Browsing, and JavaScript Debugging.

Starter files

Download and unpack the starter files.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ wget https://eecs485staff.github.io/p1-insta485-static/starter_files.tar.gz
$ tar -xvzf starter_files.tar.gz
```

Move the starter files to your project directory and remove the original `starter_files/` directory.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
```

```
$ mv starter_files/* .
$ rm -rf starter_files starter_files.tar.gz
```

You should see these files.

```
$ tree
.
├── hello
│   ├── config.json
│   └── templates
│       └── index.html
├── hello_css
│   ├── config.json
│   ├── static
│   │   └── css
│   │       └── style.css
│   └── templates
│       └── index.html
├── insta485
│   ├── config.json
│   └── static
│       └── uploads
│           ...
│           └── e1a7c5c32973862ee15173b0259e3efdb6a391af.jpg
├── pyproject.toml
├── requirements.txt
└── tests
    ...
    └── util.py
```

`hello/`	Sample input for `insta485generator`
`hello_css/`	Sample input for `insta485generator`
`insta485/`	Static templated Insta485 goes here
`insta485/config.json`	Data for future Insta485 templates
`insta485/static/uploads/`	Sample images for Insta485
`pyproject.toml`	`insta485generator` Python package configuration
`requirements.txt`	Python package dependencies matching autograder
`tests/`	Public unit tests

Before making any changes to the clean starter files, it's a good idea to make a commit to your Git repository.

Hand coded HTML

Once you have your computer set up, you'll write two HTML files by hand: `html/index.html` and `html/users/awdeorio/index.html`. This will give you practice with HTML and CSS, which you'll later generate using Python code.

Setup

Navigate to your project's root directory. Also, remember to activate your Python virtual environment every time you begin a coding session or start a new shell.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ source env/bin/activate
```

Create a directory layout using `mkdir`. The image `logo.png` is optional; you can style your website however you like. Here are some commands to get you started.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ mkdir html/
$ mkdir html/css/
$ mkdir html/images/
$ mkdir html/users/
$ mkdir html/users/awdeorio/
$ mkdir html/uploads/
$ touch html/css/style.css  # touch creates empty files
$ touch html/index.html
$ touch html/users/awdeorio/index.html
$ cp insta485/static/uploads/* html/uploads/
```

Add the initial file structure to the git repo.

Here are the files you should have when you are done.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ tree html/
html/
├── css
│   └── style.css
```

```
├── images
├── index.html
├── users
│   └── awdeorio
│       └── index.html
└── uploads
    ├── 122a7d27ca1d7420a1072f695d9290fad4501a41.jpg
    ├── 2ec7cf8ae158b3b1f40065abfb33e81143707842.jpg
    ├── 505083b8b56c97429a728b68f31b0b2a089e5113.jpg
    ├── 5ecde7677b83304132cb2871516ea50032ff7a4f.jpg
    ├── 73ab33bd357c3fd42292487b825880958c595655.jpg
    ├── 9887e06812ef434d291e4936417d125cd594b38a.jpg
    ├── ad7790405c539894d25ab8dcf0b79eed3341e109.jpg
    └── e1a7c5c32973862ee15173b0259e3efdb6a391af.jpg
```

Start your two HTML files (`html/index.html` and `html/users/awdeorio/index.html`) like this. Edit HTML files with a text editor.

html/index.html

```
<!DOCTYPE html>
<html lang="en">
Hello world!
</html>
```

Run a test server and browse to http://localhost:8000/ where you will see “hello world”. Again, recall that this is a *static file server*, which serves copies of files from the server’s file system. In this example, the file is a plain text file containing HTML.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ cd html/
$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

⚠ **Pitfall:** Do not preview HTML files by opening them in your browser (e.g., double click an .html file). Always run a development HTTP server from the correct `html` directory.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static/html
$ python3 -m http.server 8000
```

Keep up your good `git` habits by committing files when you’ve completed each small task.

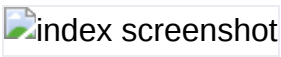
Index `/`

Continue working on `html/index.html`. When you're done, the page should have the following content, although yours might look different. For example, a logo is not required. To be clear: there are no autograder tests for your CSS layout. You can make it look however you want. What you must include is the text, images, and links shown in the screenshot below. It's okay if some links lead to nowhere for this hand-coded portion. Don't forget to `git add` and `git commit` when you're done.

- Include a link to `/` in the upper left hand corner. If you choose not to include a logo, include some text to make sure this link is clickable.
- Include a link to `/explore/` and `/users/awdeorio/` in the upper right hand corner.
- Include `<title>insta485</title>`. Nothing else should be in the `<title>` section
- Link to the post detail page by clicking on the timestamp.
  - The first post will be: `/posts/3/`
  - The second post will be: `/posts/2/`
  - The third post will be: `/posts/1/`
- Link to the post owner's page `/users/<POST OWNERS USERNAME >/` by clicking on their username or profile picture.
- Time since the post was created
- Number of likes
- Comments, with owner's username
  - Link to the comment owner's page `/users/<COMMENT OWNERS USERNAME>/` by clicking on their username.
- Actual image corresponding to the post.

⚠ **Pitfall:** Always use absolute paths, including links, images, and stylesheets. Absolute paths start with `/`.

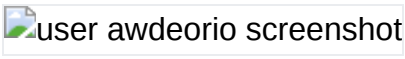
⚠ **Pitfall:** Always end paths to directories with a trailing `/`. For example: `/users/awdeorio/` instead of `/users/awdeorio`



User `/users/awdeorio/`

Next, code `html/users/awdeorio/index.html`. When you're done, the page should have the following content, although yours might have different styling. Again, we're not requiring any particular CSS styling. Don't forget to `git add` and `git commit` when you're done. The page must include the following elements:

- Include a link to `/` in the upper left hand corner.
- Include a link to `/explore/` and `/users/awdeorio/` in the upper right hand corner.
- Include `<title>insta485</title>`. Nothing else should be in the `<title>` section
- username
- Relationship
  - number of followers and following
- Number of posts
- Number of followers
  - Link to `/users/awdeorio/followers/`
- Number following
  - Link to `/users/awdeorio/following/`
- Name
- A small image for each post
  - Clicking on the first image links to `/posts/1/`
  - Clicking on the second image links to `/posts/3/`



All HTML should be W3C HTML5 compliant. Here's how to check yours at the command line.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ html5validator --root html/
```

Test

Install libraries needed by the test suite. You only need to do this once. Make sure your virtual environment is activated first, the `pip` program should be `<project directory>/env/bin/pip`. You might have already done this. Doing it a second time won't hurt.

```
$ which pip
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin/pip
$ pip install -r requirements.txt
$ which pytest
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin/pytest
```

Run the public autograder testcases on your hand coded HTML.

```
$ pytest -v tests/test_handcoded_*
```

Submit to the autograder

You may want to submit to the autograder after completing just the handcoded part of P1 to check your progress. The below command will prepare a submission tarball containing everything you've worked on up to this point in the project. Include the `--disable-copyfile` flag only on macOS.

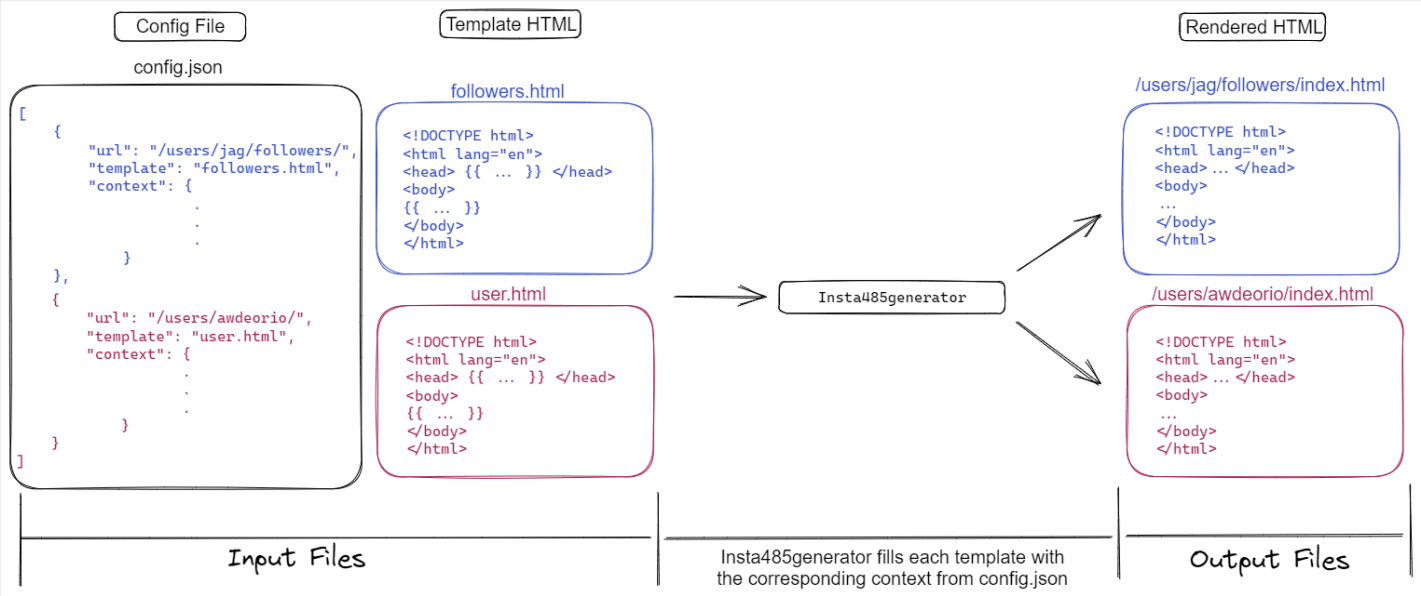
```
$ tar \
  --disable-copyfile \
  -czvf submit.tar.gz \
  html
```

Full submission instructions are in the Submission and grading section of this spec.

Static site generator

In this section, you'll implement a command line program, `insta485generator`, that creates web pages from templates. The inputs to `insta485generator` are templated HTML files and data in JSON format. The output is HTML files.

The execution of `insta485generator` on a `config.json` with two entries looks like this:



Setup

This section will help you get your Python files set up.

Our program will be called `insta485generator`. The following steps will help you create a Python package. (More info in the Python documentation on modules, especially the section on packages.)

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ mkdir insta485generator/
$ cd insta485generator/
```

All Packages must have an `__init__.py` file. Our starter package is simple, so it won't do anything. Create the file `insta485generator/__init__.py` (be sure to include the 2 underscores before and after init) and add a comment like this to it:

insta485generator/__init__.py

```
"""A static site generator."""
```

Now within the insta485generator directory, create a new file called `__main__.py`. Our main function will go in `insta485generator/__main__.py`. We have given you the skeleton code below.

insta485generator/__main__.py

```
"""Build static HTML site from directory of HTML templates and plain files."""


def main():
    """Top level command line interface."""
    print("Hello world!")


if __name__ == "__main__":
    main()
```

Now, try running it:

```
$ python3 insta485generator/__main__.py
Hello world!
```

Next, we'll install our package into our development environment. Double-check that the development environment is still active. If it's not, then activate it with `source env/bin/activate`.

```
$ echo $VIRTUAL_ENV
/Users/awdeorio/src/eecs485/p1-insta485-static/env
```

The `pyproject.toml` file provided with the starter files describes how your package should be installed. It also includes linter configuration. We've included some libraries that will be helpful later. You are not allowed to add any additional dependencies other than the ones that we specify.

At this point, we've got these files (excluding `env`, `__pycache__` and `html`):

```
$ tree insta485generator -I __pycache__
insta485generator
├── __init__.py
└── __main__.py
```

We can now use `pip` to install `insta485generator` package using `pyproject.toml`. We'll install in editable mode so that we won't have to reinstall when we make changes to our Python source code. Again, be sure that your virtual envirnment is active.

```
$ echo $VIRTUAL_ENV
/Users/awdeorio/src/eecs485/p1-insta485-static/env
$ pip install -r requirements.txt
$ pip install -e .
```

Because of the entry point in `pyproject.toml` (`'insta485generator = insta485generator.__main__:main'`), there's now an executable that calls our `insta485generator` package's `main()` function!

```
$ insta485generator
Hello world!
```

How did it do that? When you activate your virtual environment with `source env/bin/activate`, your shell's `PATH` environment variable is temporarily modified to include programs installed to `./env/bin/`. Prove it to yourself:

```
$ echo $PATH
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin:/usr/local/bin:/usr/local/sbin:/usr/bin:/usr/sbin:/bin:/sbin
$ which insta485generator
/Users/awdeorio/src/eecs485/p1-insta485-static/env/bin/insta485generator
```

When you get this working, it may be a good point to commit to git

Now you can continue developing `insta485generator` by adding code to `insta485generator/__main__.py`. You're also welcome to add more files to the `insta485generator` package directory to organize your source code however you please.

Arguments and options

The `insta485generator` command line utility supports the following options.

```
$ insta485generator --help
Usage: insta485generator [OPTIONS] INPUT_DIR

  Templated static website generator.

Options:
  -o, --output PATH  Output directory.
  -v, --verbose      Print more output.
  --help             Show this message and exit.
```

If the help message auto-generated by the click library exactly matches the output above, you can be confident you have correctly configured click.

> **Pro-tip:** Use the Click library to parse command line options and arguments, and automatically generate a help message. Use click.Path() for the input and output directory.

We'll help get you started with this code snippet. Open `__main__.py` and add this to your `main()` function.

```
@click.command()
@click.argument("input_dir", nargs=1, type=click.Path(exists=True))
def main(input_dir):
    input_dir = pathlib.Path(input_dir)
    print(f"DEBUG input_dir={input_dir}")
```

The check `exists=True` enforces that the input directory exists.

Print the argument.

```
$ insta485generator hello
DEBUG input_dir=hello
```

Click automatically generates error messages.

```
$ insta485generator
Usage: insta485generator [OPTIONS] INPUT_DIR
Try 'insta485generator --help' for help.

Error: Missing argument 'INPUT_DIR'.
```

Render templates

The process to render templates looks like this:

1. Read configuration file (e.g., `hello/config.json`)
2. Render templates
    i. Read template (e.g., `hello/templates/index.html`)
    ii. Render template with context
    iii. Write the rendered template to an output file (e.g., `hello/html/index.html`)
3. Copy static directory

Read configuration file

Read the configuration file `config.json` in the input directory using the JSON library.

The input directory contains a configuration file `config.json`, a `templates/` directory and an optional `static/` directory. We've provide a `hello/` example input directory.

```
$ tree hello/
.
├── config.json
└── templates
    └── index.html
```

A configuration file (e.g., `hello/config.json`) is a JSON string with a list of dictionaries. Each dictionary contains a `url`, the name of a `template` file and a `context` dictionary. The `template` file is rendered using the `context` dictionary.

hello/config.json

```
[
    {
        "url": "/",
        "template": "index.html",
        "context": {
            "words": [
                "hello",
                "world"
            ]
        }
    }
]
```

Pro-tip: It's best practice to use a context manager when opening files. This guarantees that the file is automatically and properly closed after the block ends.

```
config_filename = pathlib.Path(config_filename)
```

```
    with config_filename.open() as config_file:
        # config_filename is open within this code block
        return json.load(config_file)
    # config_filename is automatically closed
```

Render templates

For each configuration in the list read from `config.json`, render a template.

Our `hello` example contains one configuration object, also called a context.

```
{'words': ['hello', 'world']}
```

Read the template file, for example `hello/templates/index.html`.

hello/templates/index.html

```
<!DOCTYPE html>
<html lang="en">
<head><title>Hello world</title></head>
<body>
{% for word in words %}
{{word}}
{% endfor %}
</body>
</html>
```

Render the template with the context using the Jinja2 library.

We'd like to save you a bit of frustration getting the `jinja2` library working the same way our instruction solution works. First, in order to make template inheritance work correctly, you'll need to use the `FileSystemLoader`. Second, we're going to enable auto escaping for security reasons.

Here's how we configured our template environment in our instructor solution:

```
template_env = jinja2.Environment(
    loader=jinja2.FileSystemLoader(str(template_dir)),
    autoescape=jinja2.select_autoescape(['html', 'xml']),
)
```

Write output

Write the rendered template output to a file called `index.html` in the output directory.

In our `hello` example, the default output directory is `hello/html` and the corresponding output file is `hello/html/index.html`.

The output of a rendered template no longer contains any template code, for example `hello/html/index.html`.

hello/html/index.html

```
<!DOCTYPE html>
<html lang="en">
<head><title>Hello world</title></head>
<body>

hello

world

</body>
</html>
```

The default output directory is `${INPUT_DIR}/html`, where `${INPUT_DIR}` is the command line argument `INPUT_DIR`.

If the input directory does not exist, exit with an error message. Click handles this error for you. Create the output directory, exiting with an error message if the output directory already exists.

Pro-tip: Use the Pathlib library for file manipulation. Avoid using strings for filenames in Python!

Test

The entire `hello` example directory now looks like this. Notice the newly created `hello/html` output directory.

```
$ tree hello
hello
├── config.json
├── html
│   └── index.html
└── templates
    └── index.html
```

Serve up the newly created site and browse to http://localhost:8000/.

```
$ cd hello/html/
$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

We've published the `test_hello` autograder testcase. After copying the `test` directory from the starter files to your working directory, you can run it yourself like this:

```
$ pytest -v tests/test_insta485generator_public.py::test_hello
```

Copy `static/` directory

If the input directory contains a `static/` subdirectory, copy the contents of the `static/` directory to the output directory. Copy what's inside `static/`, not the `static/` directory itself.

> **Pro-tip:** The `shutil.copytree()` function is a great way to copy a directory.

The `hello_css/` example input directory is provided with the starter files. It contains a `static/` directory.

```
$ tree hello_css
hello_css
├── config.json
├── static
│   └── css
│       └── style.css
└── templates
    └── index.html
```

This is the config file `hello_css/config.json`:

hello_css/config.json

```
[
    {
        "url": "/",
        "template": "index.html",
        "context": {
            "words": [
                "hello",
                "world"
            ]
        }
    }
```

```
]
```

Here's `hello_css/templates/index.html`:

hello_css/templates/index.html

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Hello world</title>
    <link rel="stylesheet" type="text/css" href="/css/style.css">
  </head>
  <body>
    {% for word in words %}
    <div class="important">{{word}}</div>
    {% endfor %}
  </body>
</html>
```

And `hello_css/static/css/style.css`:

hello_css/static/css/style.css

```
body {
    background: pink;
}


div.important {
    font-weight: bold;
    font-size: 1000%;
}
```

Build and list output files. Notice that everything inside `hello_css/static/` was copied to `hello_css/html/`.

```
$ tree hello_css
hello_css
├── config.json
├── static
│   └── css
│       └── style.css
└── templates
    └── index.html
$ insta485generator hello_css
$ tree hello_css
```

```
hello_css
├── config.json
├── html
│   ├── css
│   │   └── style.css
│   └── index.html
├── static
│   └── css
│       └── style.css
└── templates
    └── index.html
```

We've published the `test_hello_css` autograder testcase. You can run it yourself like this:

```
$ pytest -v tests/test_insta485generator_public.py::test_hello_css
```

Output

By default, render templates to `INPUT_DIR/html`. For example:

```
$ insta485generator hello
$ tree hello/html
hello/html
└── index.html
```

If the `--output` option is supplied, render templates directly to `OUTPUT_DIR`. For example:

```
$ insta485generator hello --output myout
$ tree myout/
myout/
└── index.html
```

Hint: Compute an output filename (e.g., `hello/html/index.html`) like this. `input_dir` is the command line argument `INPUT_DIR` and `url` is the URL read from the `config.json` file.

```
url = url.lstrip("/")  # remove leading slash
input_dir = pathlib.Path(input_dir)  # convert str to Path object
output_dir = input_dir/"html"  # default, can be changed with --output option
output_path = output_dir/url/"index.html"
```

Verbose

Here's an example of the `--verbose` (`-v`) option with the `hello` input.

```
$ rm -rf hello/html
$ insta485generator hello --verbose
Rendered index.html -> hello/html/index.html
```

This example uses the `hello_css` input.

```
$ rm -rf hello_css/html
$ insta485generator -v hello_css
Rendered index.html -> hello_css/html/index.html
Copied hello_css/static -> hello_css/html
```

You can find a more complicated example of the verbose option in the Static Templated Insta485 Section. The more complicated example won't work yet because you haven't written the Insta485 templates, however it will give you and idea of what the output should look like.

Error messages

Catch all `FileNotFoundError` exceptions, as well as any exception raised by the `jinja` or `json` libraries. You should also produce an error when the output directory already exists.

Print a sensible error message beginning with `insta485generator error:` and exit with a non-zero value. This message is optional when the input directory does not exist because you may let Click handle this error.

The instructor solution has Click handle the input directory check. Also note that `echo $?` prints the exit code (return value) of the previous command.

```
$ insta485generator input-does-not-exist
Usage: insta485generator [OPTIONS] INPUT_DIR
Try 'insta485generator --help' for help.

Error: Invalid value for 'INPUT_DIR': Path 'input-does-not-exist' does not
exist.
$ echo $?
2
```

```
$ insta485generator hello --output myout
$ insta485generator hello --output myout
insta485generator error: 'myout' already exists
$ echo $?
1
```

```
$ insta485generator input-missing-config
```

```
insta485generator error: 'input-missing-config/config.json' not found
$ echo $?
1
```

```
$ insta485generator input-invalid-json
insta485generator error: 'input-invalid-json/config.json'
Expecting value: line 12 column 1 (char 186)
$ echo $?
1
```

```
$ insta485generator input-invalid-template
insta485generator error: 'test.html'
Unexpected end of template. Jinja was looking for the following tags: 'endfor'
or 'else'. The innermost block that needs to be closed is 'for'.
$ echo $?
1
```

Pro-tip: Search for the top level exception in a library and catch that. For example, Google "python json exception" and you'll find https://docs.python.org/3/library/json.html#exceptions.

Test

Run the public autograder testcases on your `insta485generator`.

```
$ pytest -v tests/test_insta485generator_public.py
```

Pro-tip: Learn how to use the Python `pytest` unit test utility using the `pytest` Tutorial.

Code style

Verify that your Python code conforms the PEP 8 Style Guide for Python. Check for common Python errors and additional style guidelines using Pylint. Confirm that internal documentation (comments) conforms to the PEP 257 Docstring Conventions.

```
$ pip install pycodestyle pydocstyle pylint
$ pycodestyle insta485generator
$ pylint insta485generator

--------------------------------------------------------------------
Your code has been rated at 10.00/10 (previous run: 10.00/10, +0.00)

```

```
$ pydocstyle insta485generator
```

> Test style frequently because it's hard to fix many errors.

Submit to the autograder

You may want to submit to the autograder after completing the project up to this point to check your progress. The below command will prepare a submission tarball containing everything you've worked on up to this point in the project. Include the `--disable-copyfile` flag only on macOS.

```
$ tar \
  --disable-copyfile \
  --exclude '*__pycache__*' \
  -czvf submit.tar.gz \
  html \
  insta485generator \
  pyproject.toml
```

Full submission instructions are in the Submission and grading section of this spec.

Static Templated Insta485

In this part of the project, you will write HTML template files that you can render using `insta485generator` to create a non-interactive Instagram clone. First, this section will help you create skeleton files. Then, in the URLs section, we'll describe each page in detail and provide a screen shot.

First, copy your hand-coded HTML files as a starting point.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ mkdir -p insta485/templates/
$ cp html/index.html insta485/templates/index.html
$ cp html/users/awdeorio/index.html insta485/templates/user.html
$ cp -R html/css insta485/static/
$ cp -R html/images insta485/static/
```

Create blank files for additional templates.

```
$ touch insta485/templates/followers.html
$ touch insta485/templates/following.html
$ touch insta485/templates/post.html
```

```
$ touch insta485/templates/explore.html
```

Your `insta485` directory should look like this. Note that `images/logo.png` is optional. You are welcome to create any logo you want, or to omit it and use plain text. `config.json` is from the starter code.

```
$ tree insta485
insta485/
├── config.json
├── static
│   ├── css
│   │   └── style.css
│   ├── images
│   │   └── logo.png
│   └── uploads
│       ├── 122a7d27ca1d7420a1072f695d9290fad4501a41.jpg
│       ├── 2ec7cf8ae158b3b1f40065abfb33e81143707842.jpg
│       ├── 505083b8b56c97429a728b68f31b0b2a089e5113.jpg
│       ├── 5ecde7677b83304132cb2871516ea50032ff7a4f.jpg
│       ├── 73ab33bd357c3fd42292487b825880958c595655.jpg
│       ├── 9887e06812ef434d291e4936417d125cd594b38a.jpg
│       ├── ad7790405c539894d25ab8dcf0b79eed3341e109.jpg
│       └── e1a7c5c32973862ee15173b0259e3efdb6a391af.jpg
└── templates
    ├── explore.html
    ├── followers.html
    ├── following.html
    ├── index.html
    ├── post.html
    └── user.html
```

Run `insta485generator`, cleaning up the automatically generated `insta485/html/` directory first. Start a development server and you'll see the rendered templates, which at this point are just copies of your hand coded HTML files or blank files.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ rm -rf insta485/html  # remove auto generated files
$ insta485generator insta485 -v
Rendered index.html -> insta485/html/index.html
Rendered user.html -> insta485/html/users/awdeorio/index.html
Rendered following.html -> insta485/html/users/awdeorio/following/index.html
Rendered followers.html -> insta485/html/users/awdeorio/followers/index.html
Rendered user.html -> insta485/html/users/jflinn/index.html
```

```
Rendered following.html -> insta485/html/users/jflinn/following/index.html
Rendered followers.html -> insta485/html/users/jflinn/followers/index.html
Rendered user.html -> insta485/html/users/jag/index.html
Rendered following.html -> insta485/html/users/jag/following/index.html
Rendered followers.html -> insta485/html/users/jag/followers/index.html
Rendered user.html -> insta485/html/users/michjc/index.html
Rendered following.html -> insta485/html/users/michjc/following/index.html
Rendered followers.html -> insta485/html/users/michjc/followers/index.html
Rendered post.html -> insta485/html/posts/1/index.html
Rendered post.html -> insta485/html/posts/2/index.html
Rendered post.html -> insta485/html/posts/3/index.html
Rendered post.html -> insta485/html/posts/4/index.html
Rendered explore.html -> insta485/html/explore/index.html
Copied insta485/static -> insta485/html
$ cd insta485/html/
$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
...
$ cd ../../
```

⚠ **Pitfall:** Don't forget to `cd` into your `insta485/html/` directory before starting up your HTTP server. The server's present working directory is the root directory for absolute paths in HTML links, etc.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static/insta485/html/
$ python3 -m http.server 8000
```

Check your files

Here's a complete list of project files up to this point, excluding automatically generated files like `env` and `__pycache__`. The files in `bin` will be created later.

```
$ pwd
/Users/awdeorio/src/eecs485/p1-insta485-static
$ tree -I 'env|__pycache__|*.egg-info'
.
├── bin
│   ├── insta485run
│   └── insta485test
├── hello
│   ├── config.json
```

```
│   └── templates
│       └── index.html
├── hello_css
│   ├── config.json
│   ├── static
│   │   └── css
│   │       └── style.css
│   └── templates
│       └── index.html
├── html
│   ├── css
│   │   └── style.css
│   ├── images
│   │   └── logo.png
│   ├── index.html
│   ├── uploads
│   │   ├── 122a7d27ca1d7420a1072f695d9290fad4501a41.jpg
            ...
│   │   └── e1a7c5c32973862ee15173b0259e3efdb6a391af.jpg
│   └── users
│       └── awdeorio
│           └── index.html
├── insta485
│   ├── config.json
│   ├── static
│   │   ├── css
│   │   │   └── style.css
│   │   ├── images
│   │   │   └── logo.png
│   │   └── uploads
│   │       ├── 122a7d27ca1d7420a1072f695d9290fad4501a41.jpg
                ...
│   │       └── e1a7c5c32973862ee15173b0259e3efdb6a391af.jpg
│   └── templates
│       ├── base.html
│       ├── explore.html
│       ├── followers.html
│       ├── following.html
│       ├── index.html
│       ├── post.html
│       └── user.html
├── insta485generator
│   ├── __init__.py
│   └── __main__.py
```

```
├── pyproject.toml
├── requirements.txt
└── tests
    ├── test_handcoded_html.py
        ...
    └── utils.py
```

Utility scripts

Web developers often use short shell scripts to make their lives easier.

First, complete the Shell Scripting Tutorial.

`insta485run` script

Write a script to:

1. Clean up the automatically generated `insta485/html/` directory
2. Build the static site using `insta485generator`
3. Start a development server on port 8000

We'll give you the solution here for `bin/insta485run`. Create a folder called `bin` and copy the following code into a file called `insta485run` (note no file extension). Don't forget to make the script executable.

insta485run

```
#!/bin/bash
#
# insta485run
#
# Clean, build and start server
#
# Andrew DeOrio <awdeorio@umich.edu>


# Stop on errors, print commands
# See https://vaneyckt.io/posts/safer_bash_scripts_with_set_euxo_pipefail/
set -Eeuo pipefail
set -x

# Clean
rm -rf insta485/html

```

```
# Build
insta485generator insta485

# Serve
cd insta485/html
python3 -m http.server 8000
```

⚠ Check for shell script pitfalls.

`insta485test` script

Write another script called `bin/insta485test`:

1. Stops on errors and prints commands
2. Runs all unit tests using `pytest tests/`
3. Runs `pycodestyle insta485generator`
4. Runs `pydocstyle insta485generator`
5. Runs `pylint insta485generator`
6. Cleans up a previous `insta485/html` directory
7. Builds a new `insta485/html` directory using `insta485generator`
8. Validates hand-coded HTML in `html/` using `html5validator` (`html5validator --ignore JAVA_TOOL_OPTIONS --root html`)
9. Validates generated HTML in `insta485/html/` using `html5validator` (`html5validator --ignore JAVA_TOOL_OPTIONS --root insta485/html`)

You should now have a `bin` directory with two scripts:

```
$ tree bin/
bin/
├── insta485run
└── insta485test
```

URLs

Now, write templates for each type of URL. You are welcome to add extra files, for example, if you'd like to use template inheritance. Style the pages any way you like.

List of URLs and templates:

- `/` -> `index.html`

- `/users/<user_url_slug>/` -> `user.html`
- `/users/<user_url_slug>/followers/` -> `followers.html`
- `/users/<user_url_slug>/following/` -> `following.html`
- `/posts/<postid_slug>/` -> `post.html`
- `/explore/` -> `explore.html`

All pages

Include a link to `/` in the upper left hand corner.

Include a link to `/explore/` in the upper right hand corner.

Include the text `<logged_in_user>` with a link to `/users/<logged_in_user>/` in the upper right hand corner.

Include `<title>insta485</title>`. Nothing else should be in the `<title>` section

Index `/`

screenshot

All posts from other users that the logged in user is following (including their own). The logged in user is specified by `logname` in `config.json`. The posts are in the order that they appear in the JSON config file. For each post:

- Link to the post detail page `/posts/<postid_slug>/` by clicking on the timestamp.
- Link to the post owner's page `/users/<user_url_slug>/` by clicking on their username or profile picture.
- Time since the post was created
- Number of likes, using correct English
- Comments, with owner's username, in the order that they appear in the JSON config file.
  - Link to the comment owner's page `/users/<user_url_slug>/` by clicking on their username.
- Actual image corresponding to the post.

Here's an example of correct English for number of likes "0 likes", "1 like", "2 likes". The same plural rules apply to number of posts, likes, and followers. Following is always the same "0 following", "1 following", "2 following".

`/users/<user_url_slug>/`

screenshot 1, screenshot 2, screenshot 3, screenshot 4

Be sure to include

- username (`user_url_slug`)
- Relationship
  - “following” if the logged in user is following `user_url_slug`
  - “not following” if the logged in user is not following `user_url_slug`
  - Blank if logged in user == `user_url_slug`
- Number of posts, with correct English
- Number of followers, with correct English
  - Link to `/users/<user_url_slug/followers/`
- Number following
  - Link to `/users/<user_url_slug/following/`
- Name
- A small image for each post
  - Clicking on the image links to `/posts/<postid_url_slug>/`

`/users/<user_url_slug>/followers/`

screenshot

List the users that are following `user_url_slug`. For each, include:

- Icon
- Username, with link to `/users/<username>/`
- Relationship to logged in user
  - “following” if logged in user is following username
  - “not following” if logged in user is not following username
  - Blank if logged in user == username

`/users/<user_url_slug>/following/`

screenshot

List the users that `user_url_slug` is following. For each, include:

- Icon
- Username, with link to `/users/<username>/`
- Relationship to logged in user
  - “following” if logged in user is following username
  - “not following” if logged in user is not following username

- Blank if logged in user == username

`/explore/`

screenshot

This page lists all users that the logged in user is not following and includes:

- Icon
- Username with link to `/users/<user_url_slug/`

`/posts/<postid_url_slug>/`

screenshot 1, screenshot 2, screenshot 3, screenshot 4

This page shows one post. Include the same information for this one post as is shown on the main page `/`.

Test

Run the public autograder testcases on your `insta485`.

```
$ pytest -v tests/test_template_*
```

Submitting and grading

Run the published autograder test cases locally.

```
$ pytest -v
```

Submit a tarball to the autograder. Only use the direct link to the autograder for this project, below. Include the `--disable-copyfile` flag only on macOS. If you have not yet completed the project, you may see an error that looks like `tar: bin: Cannot stat: No such file or directory`, which is safe to ignore.

```
$ tar \
  --disable-copyfile \
  --exclude '*__pycache__*' \
  --exclude 'insta485/html' \
  -czvf submit.tar.gz \
  bin \
  html \
  insta485 \
  insta485generator
```

The autograder will run `pip install -e YOUR_SOLUTION`. The exact library versions in the `requirements.txt` provided with the starter files is cached on the autograder, so be sure not to add extra library dependencies to `requirements.txt` or `pyproject.toml`.

Avoid adding any large images to the tarball. The Autograder may throw an error in case the size of the tarball is greater than 5MB. Use the following command to verify the size of the tarball:

```
$ du -h submit.tar.gz
2.1M    submit.tar.gz
```

Direct link to the Winter 2024 Project 1 autograder: https://autograder.io/web/project/2389

Rubric

This is an approximate rubric. Note than we cannot give additional information about what the private testcases do. To maximize points, make sure that you are following all directions in the spec. Note that the public tests cases do not test everything that your program must do.

Test	Value
Public unit tests	50%
Public Python and HTML style	10%
Hidden unit tests run after the deadline	40%

Acknowledgments

Original project written by Andrew DeOrio awdeorio@umich.edu, fall 2017.