Web Development Lab 1 - Introduction To Streamlit

CS 1301 - Intro to Computing - Summer 2025

Important

- Due Date: **Friday July 18thth, 11:59 PM**.
- Early Due Date: Monday July 14th (see Extra Credit below)
- This is an individual assignment. High-level collaboration is encouraged, **but your submission must be uniquely yours.**
- Resources:
  - Installing Streamlit Handout
  - TA Helpdesk
  - Ed Discussion
- **This assignment is meant to be a self-guided exploration of web development. You are encouraged to search resources independently before seeking TA help.**

Purpose

In this lab, you will build a web app using the `streamlit` Python libary, which is a Python module that can easily transform Python code into interactive web applications, dashboards, or reports that can be hosted online. There are two phases to this project that will put both your creative and analytical skills to the test. Enjoy!

Submission Overview

When you finish this assignment, you will need to zip all of your files into a compressed folder and submit to Gradescope under the correct assignment before the deadline (See Submission Process for more information). **Please double check your submission by re-downloading your submission from Gradescope to ensure that it is correct.** Please un-zip your downloaded file (see Starter Files) before you double check, since your webpage may not properly load inside of a compressed folder.

CS 1301 is not responsible for incorrect or missing submissions to Gradescope past the deadline of this lab. An incorrect or missing submission will receive no credit and is not eligible for a regrade request. PLEASE double check!

Document Overview

Explanation

This lab is composed of two sections:

- In **Phase I**, you will create an online portfolio by following the steps outlined in a video tutorial.
- In **Phase II**, you will create your own page where you will utilize new streamlit functions and display data using interactive charts.

Lab Rules

You may **not** use any kind of generators or website/app builders other than streamlit itself.

All code written in this assignment must be written by you. Since all students will be following the same tutorial for Phase I, we anticipate that your code will be similar, however we do expect you to customize it. We are also expecting completely unique content for Phase II. While we encourage the use of Google to reference streamlit properties, any **large sections** of code taken from another source are not permitted (including the projects listed on Streamlit's website).

Submissions violating any of these rules will receive an automatic 0 and a report to the Office of Student Integrity.

Getting Started

To start this lab, you will need the starter files provided on Canvas as `Lab01.zip`. Since streamlit is a python library you can use IDLE or another editor of your choice to modify the template files and create your project.

Starter Files

To start this lab, download the `Lab01.zip` file from Canvas. Extract the files by right clicking the `.zip` and clicking "Extract All" (for Windows) or double-click the file on Mac. Once you extract the files, you should see the following file structure:

```
Lab01
    - info.py  # File for your information
    - Portfolio.py  # File for your portfolio
    - requirements.txt # File for all modules that have to be installed
    - images (folder) # Container for your Phase 1 images
    - PhaseII.py # File for your Phase 2 Project
    - Home_Page.py # File that will be the home page of your Streamlit app
    - data.json # File that you will use to store your data for Phase 2
```

Use these files as a base to start Phase 1 of your lab. Make sure that all images you add from your computer are inside the **images** folder shown above. **All files related to your lab must be in this Lab01 folder.**

Streamlit

What is Streamlit?

Streamlit is an open-source Python library that is used for creating web applications with minimal effort. It is specifically designed for data scientists, engineers, and developers to quickly turn data scripts into shareable web apps. Streamlit allows you to build interactive web applications using Python code, and you don't need extensive web development experience to get started.

Installing Streamlit

You should have already installed Streamlit at the beginning of the semester, but if you have not installed Streamlit yet, please refer to the installing Python handout on Canvas in Files > Handouts > 01 - Python Installation and Verification Handout.

Running Streamlit Scripts

To run your code on streamlit, you must execute your script directly from the command line using Command Prompt (Windows) or Terminal (Mac). Launch the Command Prompt/Terminal application on your computer.

Let's say your files are saved in your documents in the CS 1301 folder in your computer. First, you need to move command line into that folder (also called a directory) by typing the following line into your Command Prompt or Terminal:

- `cd Documents/CS 1301` (Or wherever your Lab01 files are located)

Run the script by typing the following line into the Command Prompt or Terminal and pressing `ENTER`, replacing `script_name.py` with the name of the file you want to execute, e.g. `portfolio.py`. Make sure your script name is in quotes.

- `streamlit run "script_name.py"`

To exit the `streamlit` appliation, click onto the Command Prompt or Terminal and type the following on your keyboard:

- `ctrl` + `c`

Additional Resources

Streamlit's official documentation is the most comprehensive and authoritative source for learning Streamlit. It provides in-depth guides, tutorials, and examples, making it the perfect starting point for beginners and advanced users. Documentation

Streamlit's official YouTube channel is a valuable resource for visual learners. It features video tutorials and demonstrations that help you understand how to create web apps with Streamlit. Channel

Additionally, the Lab Team have implemented an **EXAMPLE** of Lab02 to help inspire students. This is a starting place, and not something to copy. Additionally, do not use data about Spongebob or graphs about him so it is not too similar to our example! Check it out here Link: https://webdevlab1-summer.streamlit.app/

Phase 1: Tutorial

In this section, you will be creating an online portfolio. To do this, watch the video below. It contains a detailed explanation of what is expected for this portion of the lab.

Link to Tutorial Video: https://www.youtube.com/embed/EkRScpIv8RY?si=QQmUQU3n1QGnoX5f

You are expected to follow the tutorial video exactly so that your end result appears similar to the final result. It is expected that your code will be nearly identical to the code shown in the video. **However, we expect you to customize each section of the portfolio.**

Notes:

- If you don't have anything to fill a section with yet, you can fill it in with a future goal.
- If you are not comfortable with displaying your personal experience, you can customize it based on a fictional charcter of your choice (except for Spongebob).

All work for Phase 1 will be within `info.py` which will contain all the information about you and your experience and `portfolio.py` where you will be scripting your webapp.

Phase 1b: Multi-Page Application Set Up

Now that you have completed (and tested) your portfolio page, set up your file structure to seamlessly integrate multiple `.py` pages into one, cohesive web application. In Phase II of this lab you will be working on a new `.py` file which displays data. In order to be able to switch from your portfolio page to this new page all within one web app, you must set up your files in a particular way.

In order to allow for this navigation, we will be making one home page (titled `Home_Page.py`), and then moving around our files so streamlit can understand that we want to have multiple pages in our web app. In order to complete this portion of the lab, **Visit the Canvas page "Phase 1b: Multi-Page Streamlit App"** in the Web Development Lab01 Module for a tutorial on setting up the multi-page file structure.

`Home_Page.py` is given to you in the Web Development Lab01 starter files, but you must customize the page with the following requirements:

1. Display your Full Name and the name of the course (CS 1301).
2. Write a quick description for your two pages, in the form:

```
1. **Page Name**: Description
```

```
2. **Page Name**: Description
```

Other than these requirements, feel free to customize your home page with anything you like! Be sure to test your multi-page web app (which just includes your home page and portfolio for now) before moving on.

Phase II: Exploration

In Phase 2 of this lab, you will be building your own page by displaying data about you (or your fictional character). You have full creative freedom to make your project content about whatever you want, as long as the content is school appropriate. Your goal for this part of the lab should be to create a **functional** page that serves the purpose of your choice. Your page must meet the following requirements:

- Must be written in a different file than your portfolio page.
  Note: `PhaseII.py` is provided for you to work on this portion of the lab, but you are able to change the name of this file if you would like.
- Must have a clear and meaningful topic or purpose (This can just be data about yourself).
- Must use at least 3 streamlit functions that weren't used in Section 1 **with a `#NEW` comment next to each of them**.
- Must allow at least 2 user input or interaction that **affects the app's behavior** (e.g., text input, sliders, select boxes, etc.). Buttons, sliders, etc. with no purpose will not be counted.
- There must be *3* uses of Data Visualization. One of them can be static (something simple like a graph), but *2* of them must be dynamic. A Dynamic Graph must be able to be changed somehow by the user.
- A description of the app must be included in the project section of **your portfolio**
- If you use modules that are not part of the Python Standard Library (`math` , `random` , etc.), you **must** list out all of the modules that must be installed for your app to work in `requirements.txt` , one module per line. Streamlit and Pandas are already included in the `requirements.txt` file that is provided.
- You must make use of Streamlit Session States. This is so data can be changed without refreshing the entire website. Check the Canvas Modules as well for more information. This shuld not be trivial. (In the example given, session states are used to allow the graphs to be changed repeatedly)
- Data must be plotted from a `.json` File. (check canvas modules for more information)

Just to reiterate, in Phase 2 of this lab, you must design and implement a new page that is **separate** from `Profile.py` (which you implemented in Phase 1)

Phase 2b: App Deployment

Before we submit the lab, deploy your web app to streamlit's website so it can be viewed online. Previously, you had all of your code on your personal computer. Now, you can host your web application online so you can share it with others (including recruiters, friends, and family).

Visit the Canvas page "Phase 2b: Deploying Your Web App" for a tutorial on how to deploy your web app.

At the end of the lab, you will submit a link to your deployed web application *and* a zipped folder of your code to Gradescope.

Extra Credit - Early Submission + Meaningful Customization

You may receive up to **10 bonus points** on this lab (allowing for a max grade of 110/100 on Lab02) for the following separate requirements:

Requirement 1: Early Submission (5 points)

You will receive 5 points of extra credit if you submit your completed lab before **Monsday July 14th at 11:59 PM**. To receive extra credit, submit to the same Web Development Lab02 assignment on Gradescope before the early deadline. You will be disqualified from earning the 5 points of extra credit if you re-submit after this date.

Requirement 2: Meaningful customization (5 points)

You will receive 5 points of extra credit for *meaningful* customization. This will be awarded by the TA. This is up to their discretion, so be sure to justify what you did. To get these points, you should add things not in the requirements, new streamlit functions, and overall creativity.

Submission Process

Lab01 will be submitted through Gradescope. You will need to submit all files used in Lab01 (all images and python files) as well as a link to your deployed. To do this, compress the entire Lab02 folder that you are working in into a `.zip` file. Follow the instructions below:

1. Right click your Lab01 folder:
    - On Windows, click **Send To > Compressed (zip) folder**
    - On Mac, click **Compress "Lab01"**
2. This will create a zip folder on your computer. Rename the zip folder so that it has the following format (replace the below with your first and last name):

    ```
    George-Burdell.zip
    ```

3. Upload this `.zip` file to the Lab01 assignment on **Gradescope.** After that, **you will also need to upload a link to your deployed website**, so make sure to submit a link to your website as well. To double check that you did this correctly, please download your submission and run your app to ensure everything works and looks correct.

Please put all images that you used in your website in this Lab02 folder. Otherwise, your grader will not be able to see images that you included.

Grading Rubric

Requirement	Points
Demo: Home Page	5
Demo: Portfolio	25
Demo: PhaseII	60
Demo Questions	10
Extra Credit	10
Total	**110/100**

Final Total (with extra credit): 110/100 points