İSTANBUL TECHNICAL UNIVERSITY
Department of Computer Engineering
BIL103E – Introduction to Information Systems – Fall 2017
Assignment 3

ASSIGNMENT 3

Concept

This assignment is about making a web application – in other words, a *dynamic* (changing) *website* using Python 3 and the Bottle web application framework.

The website will be a *dynamic data presentation website* in which users "drill down" into a data-set, choose different views on the data, and request different analysees of it.

The assignment will be done by **individuals**.

High-level Instructions

✻ See page 2 for step-by-step instructions. ✻

- STEP 0 (**Week 14: 13 December 9:30am**):
  - Sign up to Heroku & join the ITUIS17 GitHub organization. .
  - Create your Assignment 3 GitHub repository from the link supplied below.
  - Create a Heroku web application from your respository & connect it to your GitHub repository.
  - Upload your Heroku web-app address to Ninova.
- STEP 1 (Week 14: 11 December approximately):
  - Clone the repository to your computer and visit the locally-hosted website with your browser.
  - Make a preliminary design for your website and make the initial CSS and HTML.
  - Add extra pages to your website using the bottle `route()` function.
- STEP 2 (Week 15: 18 December approximately):
  - Allow your website to display data and get inputs from the user.
- STEP 3 (Week 16: **25 December 9:30am**):
  - Improve information display, show statistics on inputs, improve the design, and add any other extra features that you have conceived of.
  - Push this all to your GitHub repository **by the due date and time** so that it gets downloaded and marked.
  - Sign up for your demonstration session.

Submission Notes

- All steps of this assignment will be evaluated only after the final submission time (25 December 9:30am) has passed. However, it is recommended that you get the earlier steps done by their respective due dates.
- You need to upload your Heroku web application address to Ninova so that your website is accessible from the internet. Instructions will be given below.
- Your assignment will be automatically downloaded for marking from GitHub at the due date and time. Ensure the correct GitHub repository and Heroku web application address have been recorded on Ninova. A link to these will be shared at least a week before submission time.
- There is a limit on the maximum size of your website, set by Heroku.

- **To have your assignment counted against your grades, attend your demonstration session**, which will be announced in a separate schedule and will be after the due date and time of the assignment. *Every member of your group will attend a demonstration session.*
- Check the separate evaluation form to see on what basis your markers will be grading you.
  - Use all of the advanced HTML and HTTP techniques shown in the evaluation form.
  - Use all of the Python techniques shown in the evaluation form.
- Have fun.

✻ Keep your eye on the separate evaluation form, for the marks. ✻

Step 0

Finish by 13 December 9:30am *(upload your Heroku web application address to Ninova).*

Sign up to Heroku

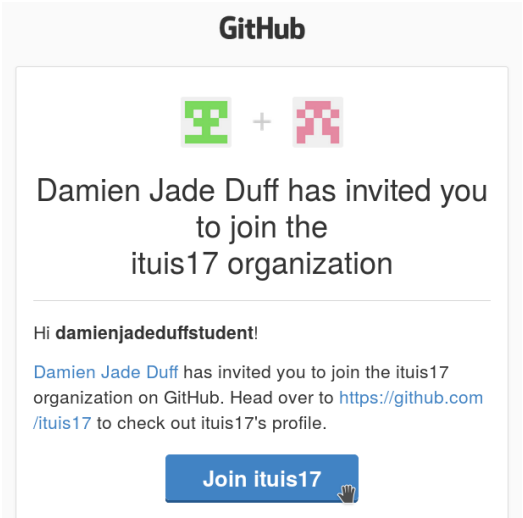
Go to https://www.heroku.com/ and create an account for yourself if you don't already have one.

The following steps will be easier if you are logged in to both Heroku and GitHub but if you are not you may be prompted to log in anyway.

Accept your invitation to our GitHub "organisation"

You should receive an invitation, sent to the email address that you used to join GitHub, to join our GitHub organisation "`ituis17`".

The email should resemble the image on the right.



Start the procedure to accept the invitation by clicking "Join ituis17" in the email.

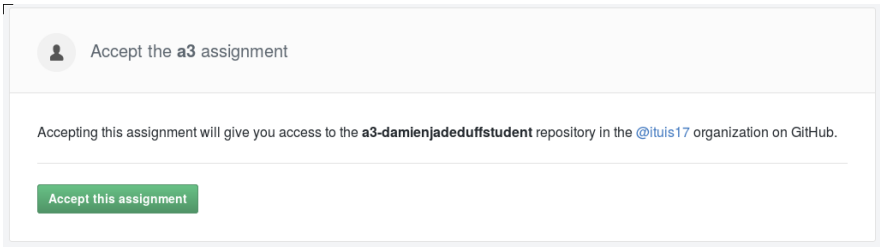
You should find yourself on a web-page where you should accept the invitation by again selecting "Join ituis17", as in the image below.

Make your Assignment 3 GitHub repository

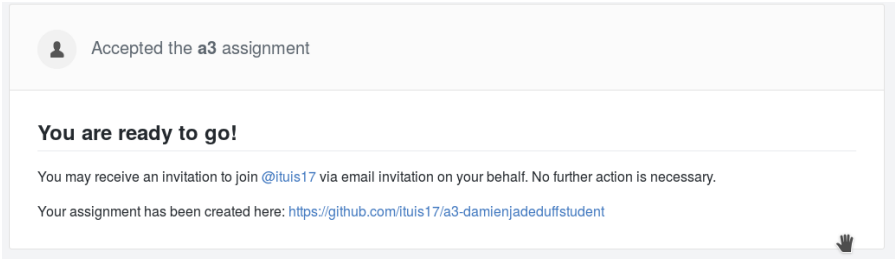
While logged in to GitHub (or by logging in after you click), navigate to the below link:

https://classroom.github.com/a/qYhrqcKE

On the resulting web page accept the assignment to create your new assignment 3 repository:



Your assignment 3 GitHub repository will be available at the link provided on the subsequent web page:



If you navigate to the repository you will find a **bottle** web application along with a README file and files necessary for deploying your bottle web application to the Heroku cloud service. The function of the files in this repository are as follows:

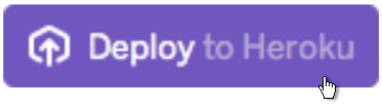
- **`bottle_app.py`**: this is the Python source file in which you will write your web application.
- **`README.md`**: A text file that should contain any information you might like to supply with other developers using your code.
- **`app.json`**: A configuration file that tells Heroku how to "deploy" (run) your web application. You do not need to edit this file.
- **`Procfile`**: A configuration file that tells Heroku what to run in your web application. You do not need to edit this file.
- **`requirements.txt`**: A configuration file that specifies what extra modules need to be installed by Heroku in order to run your web application.

You can add as many other files to the repository as you like, but it is not recommended you edit the `app.json`, `Procfile` or `requirements.txt`.

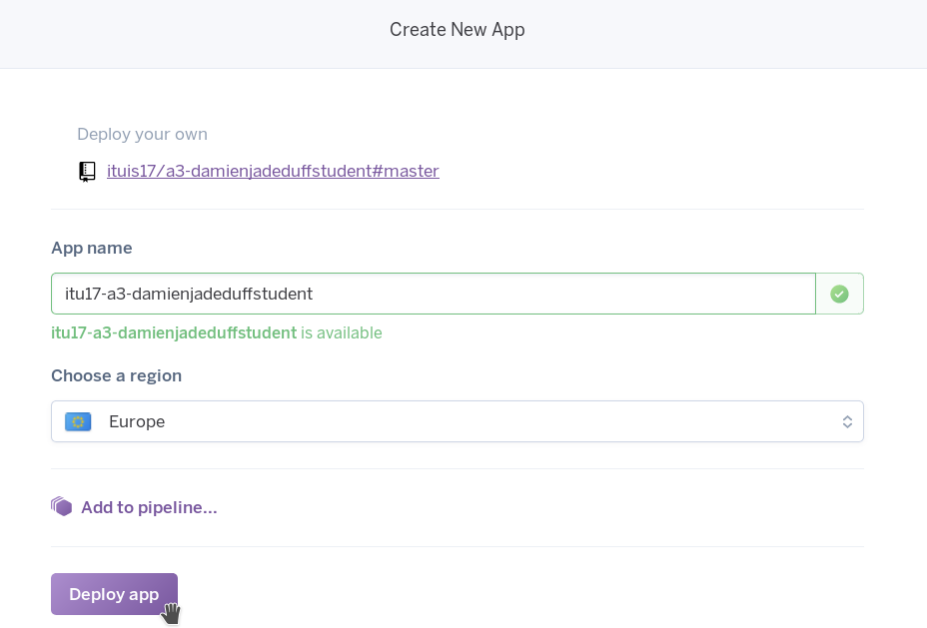
Create a Heroku web application from the resulting repository

Beforehand, ensure you are logged into your Heroku account (or log in when prompted).

After you navigate to the new GitHub repository, on the landing page, or when viewing the `README.md` file, find the "Deploy to Heroku" button and click it:



You will reach a web page prompting you to make a new web application on Heroku from your repository, as below:

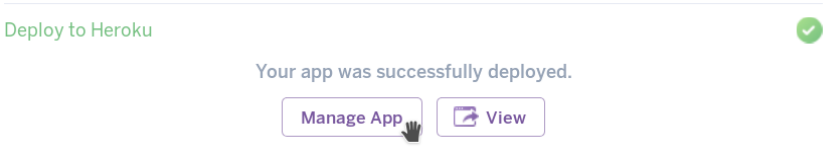


If possible, call the application `itu17-a3-YOURUSERNAME` (but you will upload the application name that you choose to Ninova).

Click "Deploy app".

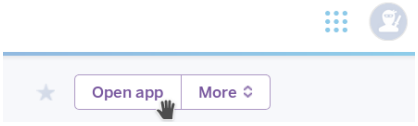
You will need to wait a small amount of time.

Soon, the deployment will be finished. You can view the running application in your browser by clicking on "View". Click on "Manage App" (as below) to continue.



If you do not click this link at this time you can manage your application by going to the Heroku https://dashboard.heroku.com/apps (logging in if necessary) and choosing your application from the list of applications in your Heroku "dashboard".

You can, at any time, view your running application with your browser by clicking "Open App" from the top right of the Heroku dashboard:



Connect your Heroku web application to your GitHub repository

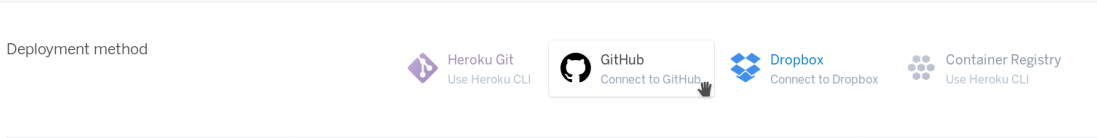
⚠ The following step should be attempted only after you have accepted your invitation to the ITUIS17 GitHub organisation (see above). ⚠

So far you have deployed your GitHub code and made it run on Heroku. However, this is a one-off operation and in order to see changes to your code reflected in your Heroku web application as further changes are made, you need to "connect" your Heroku application to GitHub.

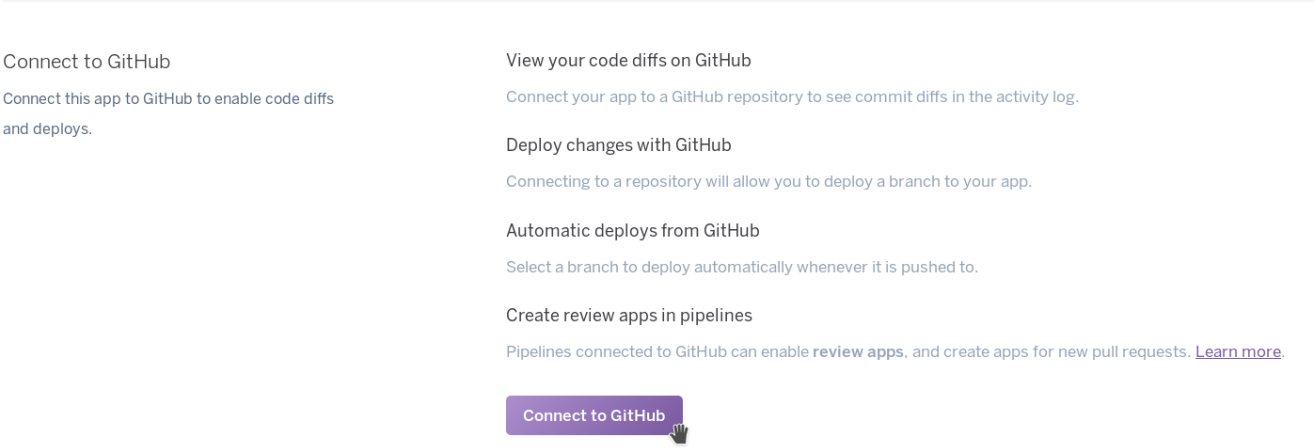
Once you have done this, any changes made to your repository on GitHub (for example, by "pushing" new "commits") will be deployed in a matter of seconds or minutes to Heroku.

To connect, navigate to your repository's dashboard (you can get there from the Heroku home page). Choose the "Deploy" tab as below:

Choose "GitHub" as your "deployment method" as below:



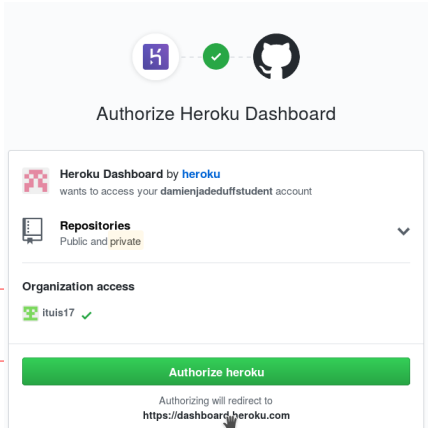
Click on "Connect to GitHub" as below:



A pop-up window should appear asking to authorize Heroku to access your GitHub account as shown on the right.

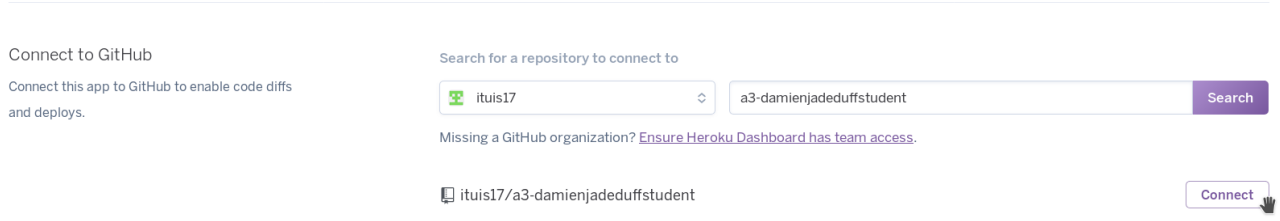
Ensure that "Organization Access" is selected.

Authorize Heroku to access your GitHub account by clicking "Authorize heroku".

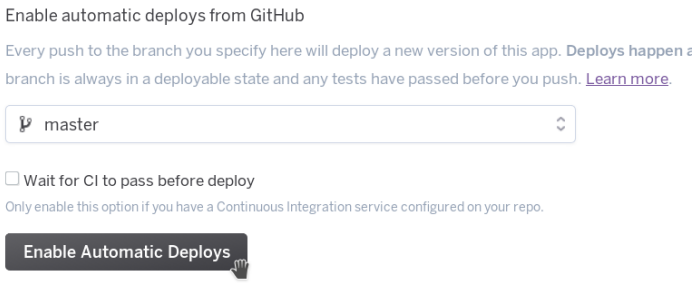


⚠ If you do not grant organisation access to the *ituis17* organisation, the following steps may not work. ⚠

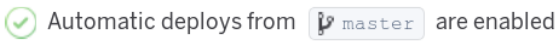
Now choose “ituis17” from the dropdown list and type your assignment 3 repository name, click “Search” to find it and click “Connect” next to the repository in the resulting search results list, as below:



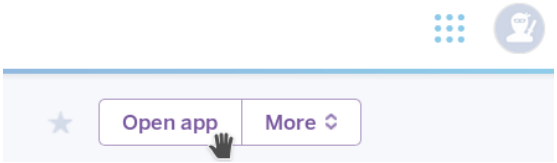
Next, ensuring the branch selected for deployment is “master”, choose “Enable Automatic Deploys”:



Whenever you come to this Deploy tab from now on you should see a message that automatic deploys are enabled, similar to:



Now, whenever you make a change to your repository on GitHub, the changes should be reflected in your Heroku application (use the “Activity” tab in Heroku if you want to see when Heroku brought changes from GitHub). At any time you can open the Heroku web application from the dashboard page as below:



Or you can bookmark the resulting link. The link would be something like `https://YOURAPPNAME.herokuapp.com/`

⁕ Deployments to Heroku from GitHub can take some time. Use the “Activity” tab to follow the process. ⁕

Step 1

Finish by approximately 11 December.

Clone the repository to your computer

In order to run the following steps you need *Python 3* and *Bottle* installed on your computer. To install bottle on a Linux Mint or Ubuntu system, the simplest way is:

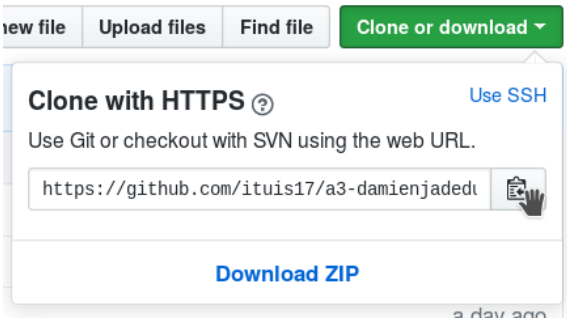
```
sudo apt-get install python3-bottle
```

Now you can run the assignment 3 repository code on your own computer.

As with previous assignments, you will clone the GitHub repository to your computer to edit it. With the command line, you would run:

```
git clone ADDRESS
```

Where ADDRESS can be found from your GitHub repository home page as shown below.



You can subsequently use git commands to commit to your repository and push the changes to GitHub (from where they will be automatically deployed to Heroku if you have successfully completed Step 0 above).

Visit the locally-hosted website with your browser.

In the provided repository was a template file, `bottle_app.py`.

Using a terminal set the terminal's current directory to the repository directory and run it like this:

```
python3 bottle_app.py
```

It will print something a little like this:

```
Bottle v0.12.0 server starting up (using WSGIRefServer())...
Listening on http://127.0.0.1:8080/
Hit Ctrl-C to quit.
```

Open the address (e.g. `http://127.0.0.1:8080/`) in your browser.

You should see the following web-paged being served by Bottle:

```
This is going to be an awesome website, when it is finished.
```

To quit Bottle go back to the terminal in which you ran python3 and press `<Ctrl-C>` (the Ctrl key together with the C key).

Try making a change to the source file `bottle_app.py` (e.g. change some of the text) then rerun the program and then go back to your browser and reload the address. The change should be visible.

Note: you can at any time see this same web application running in Heroku by using git commit and git push to send the files to GitHub, from where they will be sent to Heroku. However, it is usually more efficient to develop the code locally before worrying too much about internet deployment.

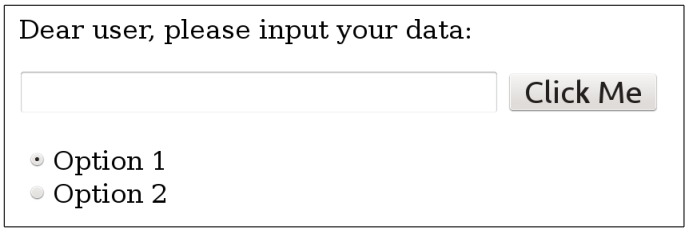
Make a preliminary design

In this assignment you are going to be making a *dynamic* website, one that changes the contents of pages over time. In particular, it will receive input from users and use that to build its content.

The concept of the website is a data presentation website, where users are presented with views of data from where they can do things like choosing different fields for presentation, filtering the data by value, sorting the data, getting more information about particular records, requesting different kinds of statistics, and so forth.

*** If you have an idea for a slightly different website, it may be possible. ***
(just check your idea with your lecturer first)

In this step, think about what pages your website will have, what information the users will need to see and enter, and how they might navigate from page to page. After you learn about HTML forms and HTTP in class you will be able to revisit this step and improve on it. You will be able to allow users to input data through forms like that illustrated below.



Note that you will probably change your design again later, and as you learn about the possibilities available to you, you will develop your approach. However, taking the first step of making an initial design is important.

Add some pages to your web server

Considering your preliminary design, add the necessary web-pages to your web site by adding them to your bottle application. You do this by creating functions and assigning them to resources (routes) by using the `route()` function. Information about this is given in lectures or you can use the provided template as a starting point.

Ensure that the pages produced are valid HTML 5. You would not be expected to use HTML forms at this point; so skip those bits until next week.

FOR THIS ASSIGNMENT WE ARE USING PYTHON VERSION 3. Do not develop your code for any version less than 3.3.

Step 2

Finish by approximately 18 December.

Display your data

Your data set will be loaded from disk, probably from the CSV file that you used in assignment 2. If you wish, you can use the below sample code if your data is in a CSV file (called "a2_input.csv" in this case):

```
from csv import reader

contents = []
input_file = open("a2_input.csv","r")
for row in reader(input_file):
    contents = contents + [row]
```

You will want to show the data in a table in the first instance, but the limit is only your imagination. For this you will probably need to *iterate* over the data using loops.

Use user inputs

Add HTML forms to your web-pages to get the necessary input from the user. You might have search boxes, for example, or drop-down lists at the top of columns in displayed data tables for choosing different terms to filter by. You might provide links for clicking on certain data items to get more information. The limit here is your imagination.

You do not need to worry about saving any data to file in this assignment.

Note: To ensure that your website is compliant with the HTML 5 standard, put the page addresses into the HTML validator at https://html5.validator.nu/.

Step 3

*Finish by **25 December 9.30 am** (your files will be automatically retrieved from GitHub).*

Finalise information display & design

In this step, you will finalise the design of your website so that it matches your intentions as closely as possible. For example, maybe you would like to add a navigation bar.

Do not show just "raw" output from the data you have: show it in a fashion convenient to the user, using lists, tables, CSS, and so forth.

If you have any other features of your own invention that you would like to incorporate into your website, do so! Learning works best when you are working towards something you care about.

Take particular attention also to the evaluation criteria to ensure you at least include functionality relevant to each criterion.

Push to GitHub

Ensure you have committed all your changes and pushed those changes to your GitHub repository. These will be downloaded automatically at the due time be marked and will be the subject of your demonstration session (which you should ensure to attend to get your marks).

If you get the code and output pushed to GitHub by the due date and time, it will be marked.