DELL Technologies

Part 1 - Cloud Native Technical Workshop

Lab Manual

Abstract

This document is provided to assist attendees with completing the appropriate labs to apply the concepts and knowledge learnt throughout the technical workshop program. It is not intended to be used or distributed in isolation and may not contain all required information.

February 2021

Student Lab Guide

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Revisions

Version	Date	Description
0.1	May 2020	Initial draft
0.2	June 2020	Updates- Labs documented with detailed steps and additional screenshots
0.3	July 2020	Lab release 2.0
0.4	July 2020	Removed requirement for S3 browser application
1.0	Feb 2021	Refresh of all content for 2021 courseware

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Contents

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Pre-requisites

Accounts:

Please ensure you have created the following accounts before commencing these labs.

- **GitHub**
  https://github.com/join?ref_cta=Sign+up&ref_loc=header+logged+out&ref_page=%2F&source=header-home

- **ECS Test Drive** https://portal.ecstestdrive.com/Account/Register

  Note: ECS Test Drive accounts typically require **24-48 business hours** to be approved and should use your corporate email (e.g. @dell.com). The approval email may also be blocked by spam filters and may need to be released from quarantine. If you are a Dell employee, search for "Email Digest:" in your inbox and release the email from ECS Test Drive.

These accounts are required to complete parts of the lab and you will not be able to proceed without these account credentials.

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Lab 1: Github

Module Objectives:

- ❑ Learn about git, git tools, Github and Github Desktop GUI
- ❑ Setup a new personal repo for our project
- ❑ Use git tools to learn the skills to commit code
- ❑ Upload a file to Github

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What is Git?

- *Distributed* version control system for tracking changes in ANY set of files
  - Created by Linus Torvalds in 2005 for Linux kernel development
- Important to note that Git is an open standard and licensed under the GNU GPL v2
- Here are a few of the popular SaaS based implementations;
  - Github
  - Bitbucket
  - AWS Code Commit
  - Gitlab
  - Etc….

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How to use .gitignore to avoid committing sensitive data

- Posting passwords to services like AWS costs **$$$$**
- Best Practice: When publishing code use **.gitignore** to exclude any files containing sensitive data
- Below is an example of using an external file containing credentials and using python code to reference the variables rather than embedding the username and password directly into the main.py application code. You can then use the .gitignore file to exclude the setenv.py file that contains sensitive data.
- This approach is more secure than embedding credentials into application code, but is still not 12-factor compliant and can easily be mistakenly uploaded to a git repository or hosting provider with your source code.

setenv.py

```
user = "joeblogs"
password = "whatever"
```

.gitignore

```
setenv.py
```

main.py

```
from setenv import user,
password

print "user is : " + user
print "pass is : " + password
```

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More Tutorials (if required)

- If you do not know how to use Github and want to learn more, please complete the following tutorial

  https://guides.github.com/activities/hello-world/

- If you do not know how to use Github Desktop GUI client and want to learn more, please complete the following tutorial

  https://help.github.com/desktop/guides/getting-started-with-github-desktop/

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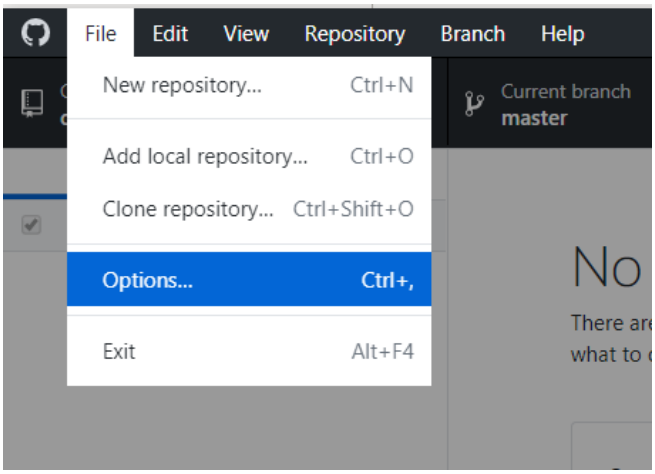
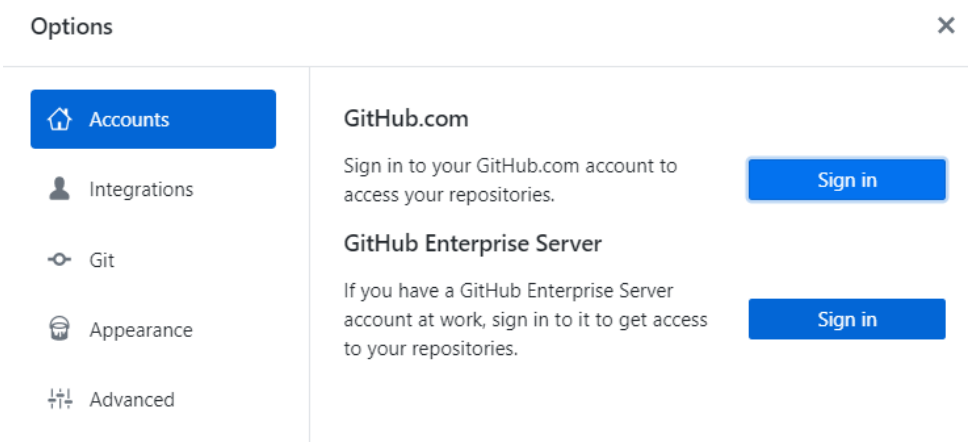
Lab Exercise: Create a new repo and publish a file with your name

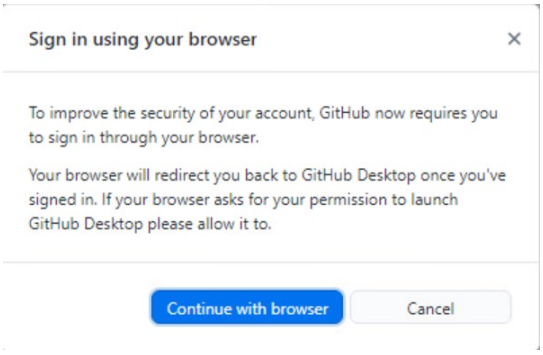
1. Open the GitHub Desktop Client (from the shortcut on the desktop)
2. Go to “File > Options” to login to GitHub



3. Click on “Accounts > Sign in” in order to Login to GitHub.com

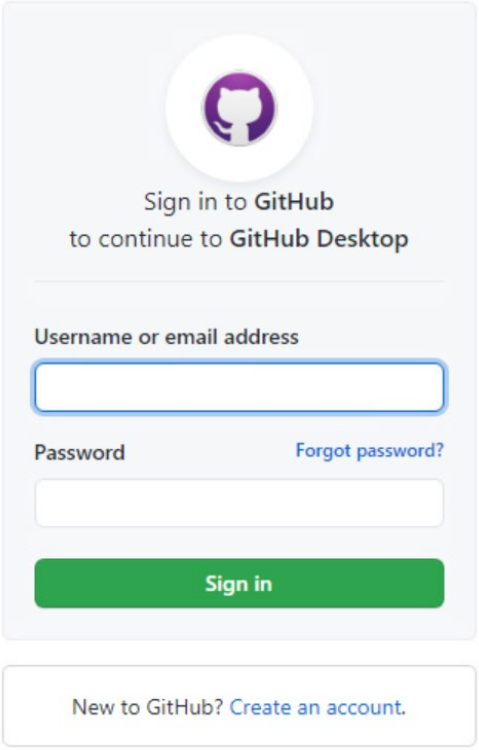


4. Click the button to ‘continue with browser’

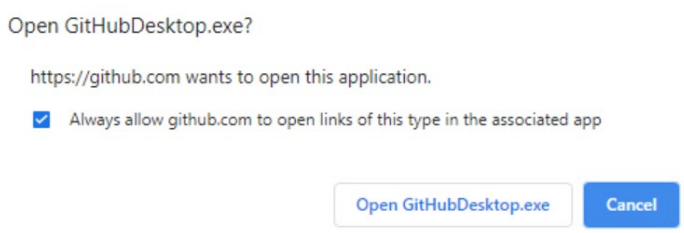


5. A browser window should open and prompt you to sign in to GitHub.

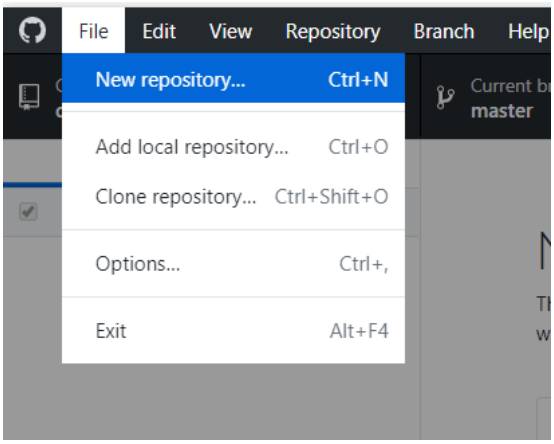
   Sign in using your personal account with the email ID and password you created in the pre-requisites.



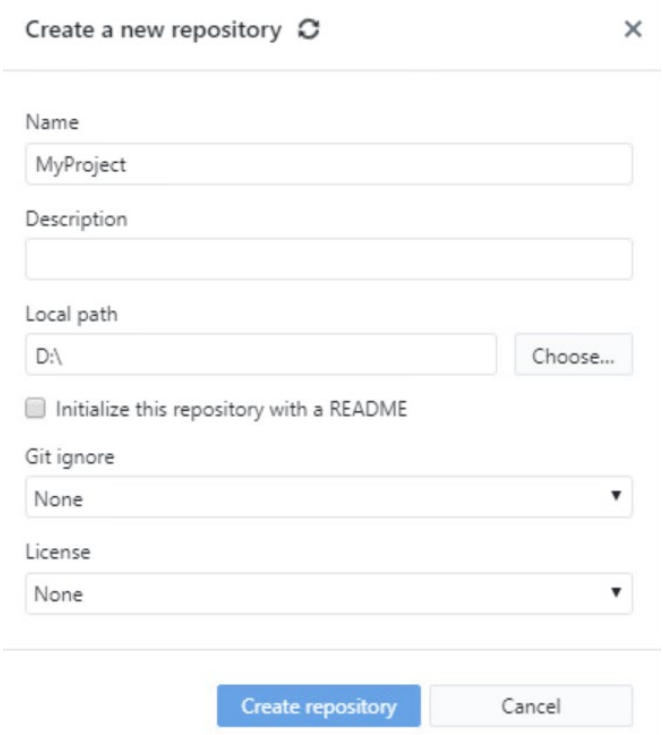
6. You may be prompted to ‘Open GitHubDesktop.exe’, as shown below. Click the open button.



7. Create a new repository from “File> New Repository” option



8. Type in a name for your personal project (e.g. MyProject) and change the path to your preferred path (i.e. D:\) before clicking on create repository (leave the remaining options as default)



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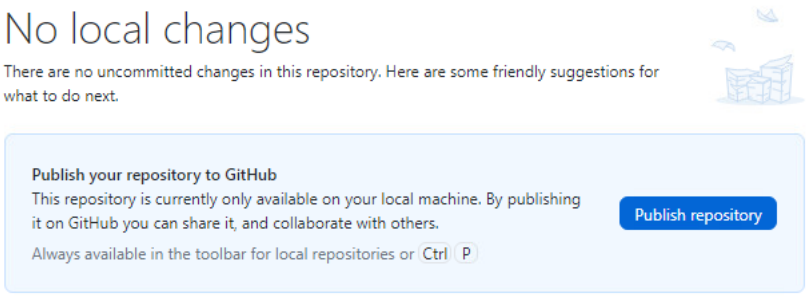
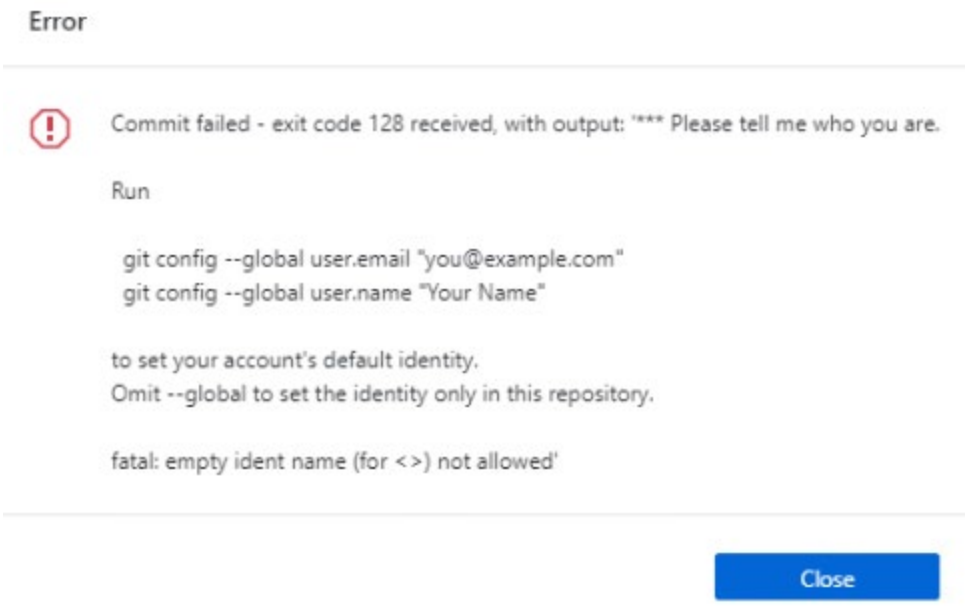
9. **After the repository has been created, click on 'Publish repository'**



10. **NOTE- If you receive below error code 128, follow the steps below;**

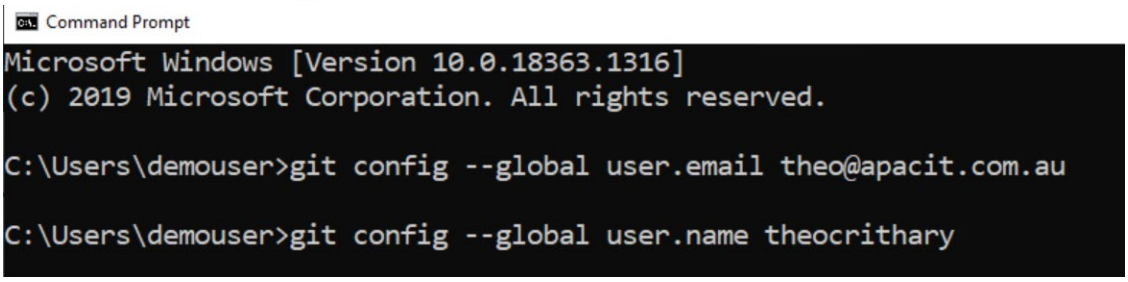
This is a one time configuration of the GitHub Desktop application and will not need to be performed again for any other labs.



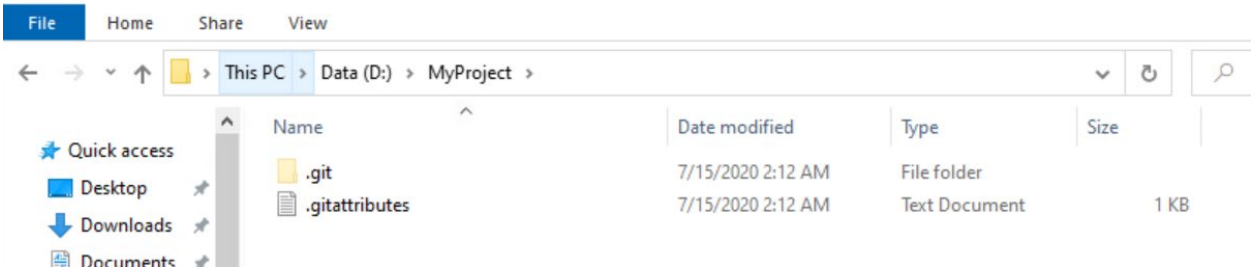
Open the Windows command prompt and type in below 2 commands (example in below screenshot) by:

> git config --global user.email "you@example.com"
(replacing last field in the command with your GitHub account email address)

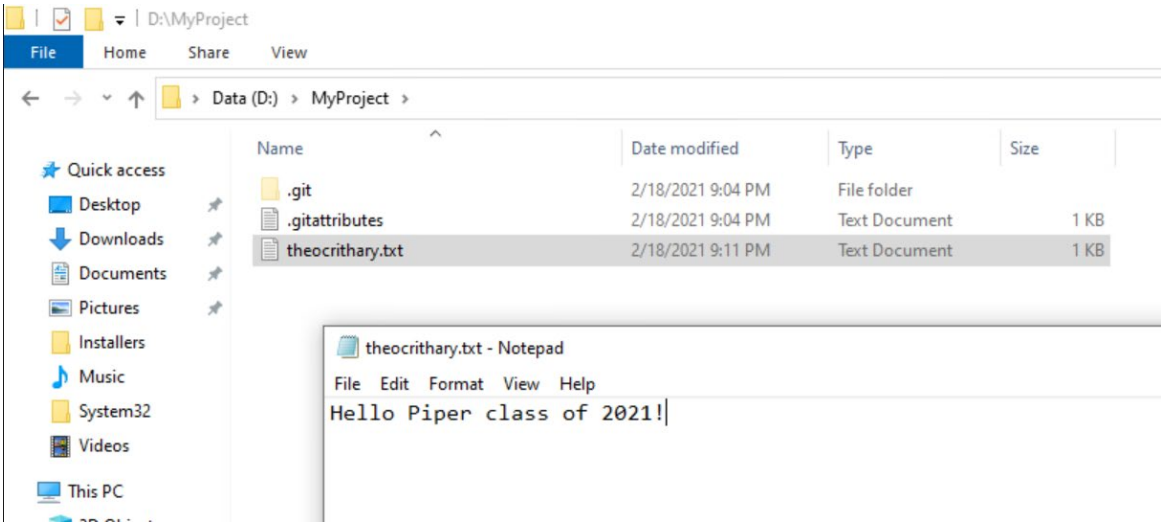
> git config --global user.name "Your Name"
(replacing last field in the command with your username)


Command Prompt
Microsoft Windows [Version 10.0.18363.1316]
(c) 2019 Microsoft Corporation. All rights reserved.
C:\Users\demouser>git config --global user.email theo@apacit.com.au
C:\Users\demouser>git config --global user.name theocrithary

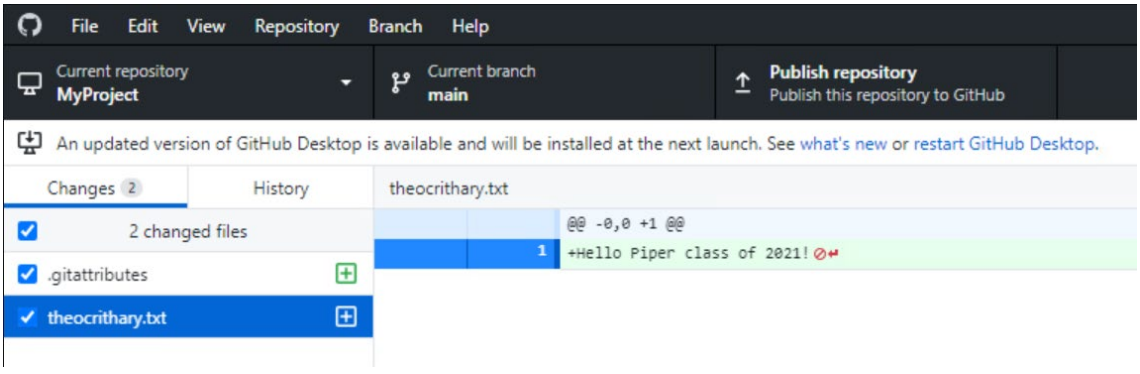
11. Open Windows Explorer and find the folder in the path created by GitHub Desktop Client with the folder name chosen as repository name (e.g. MyProject) with below structure



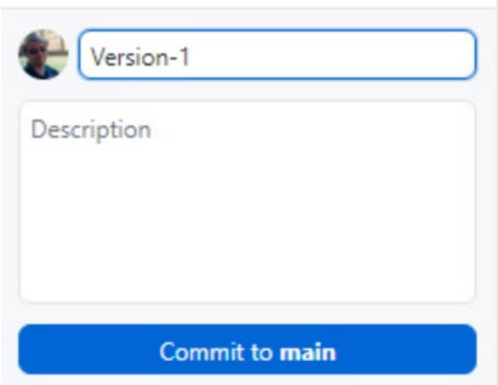
12. Create a text file with your name as the filename and add the content of the text file with the words “Hello Piper class of 2021!” and save the file



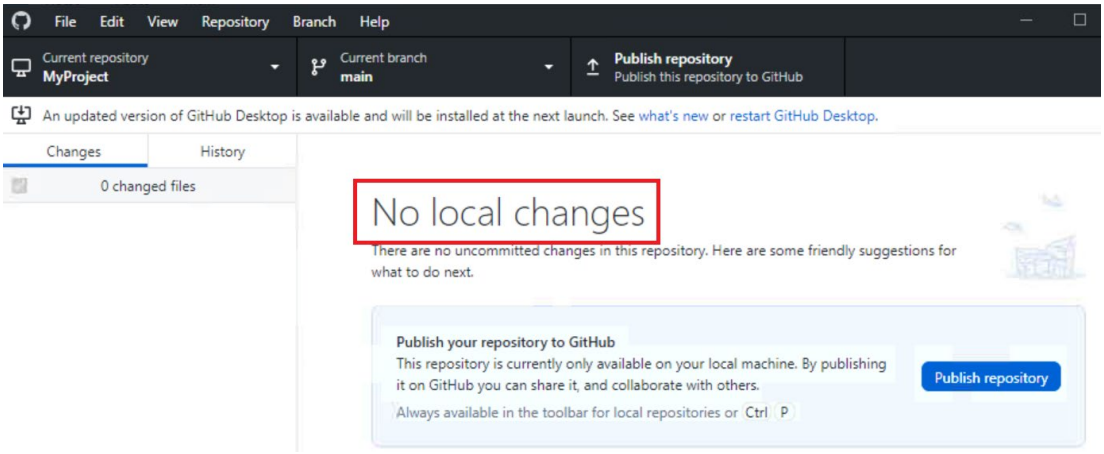
13. Go to already opened instance of GitHub Desktop Client and notice the newly created file and content and shows the changed files.



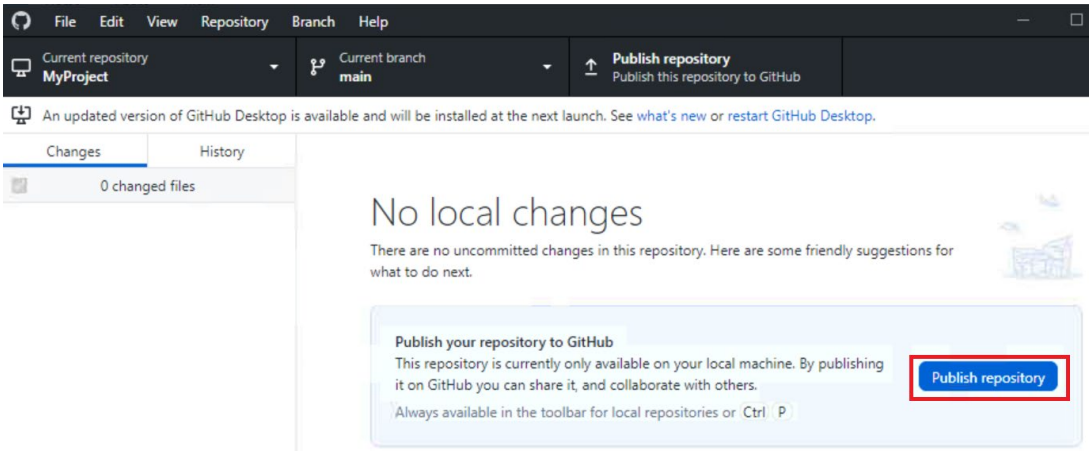
14. The current changes are only local and tracked by the git local database at this point. In order to commit the changes to the local git repository, type a comment in the summary field on the bottom left of the GitHub Desktop client and click on “Commit to main”



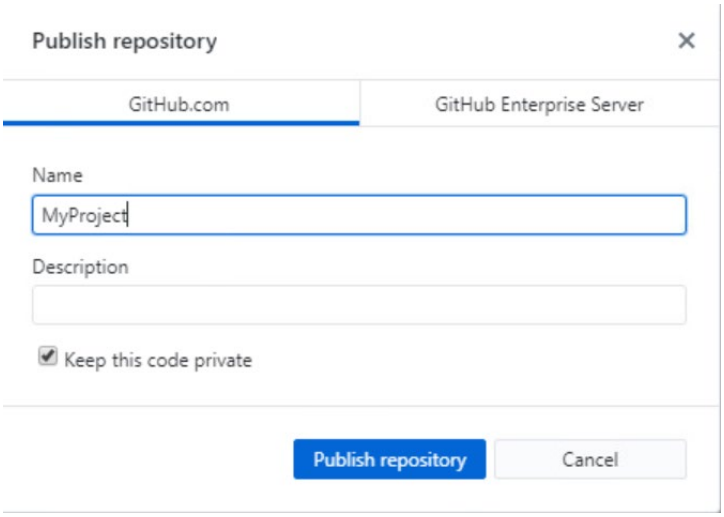
15. Above action should show below screen confirming commit with display as “No local changes”



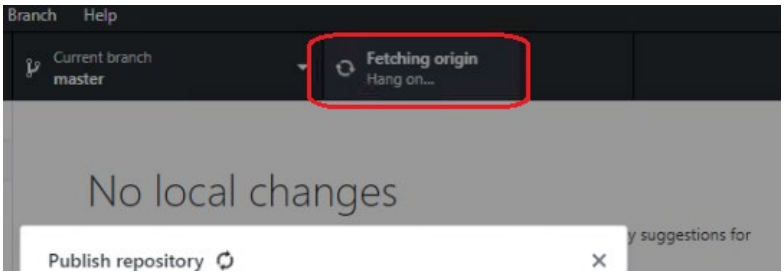
16. Publish the local repository to GitHub.com repository by clicking on “Publish repository”

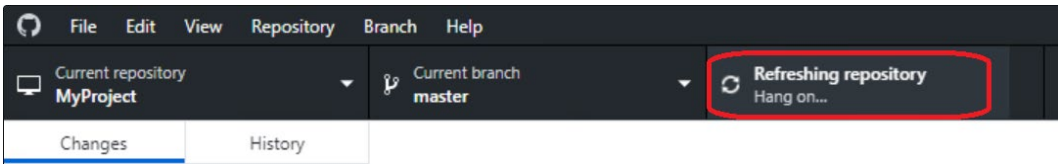


17. Upon which choose to keep it Private (visible to self only) or Public (visible to all on GitHub) and Click on Publish repository.

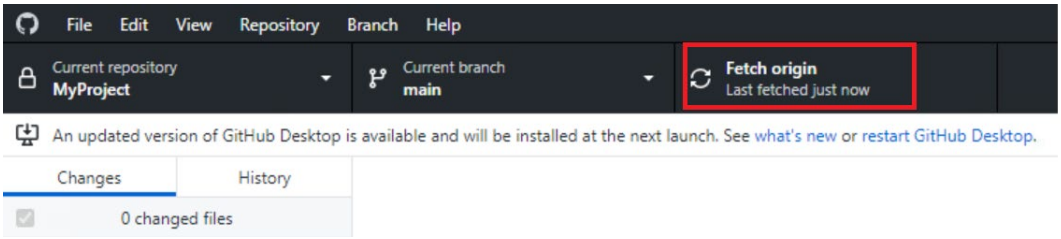


18. Notice the activity after publishing the repository to central GitHub repo.

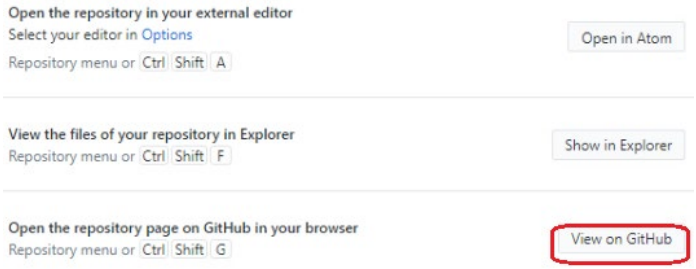




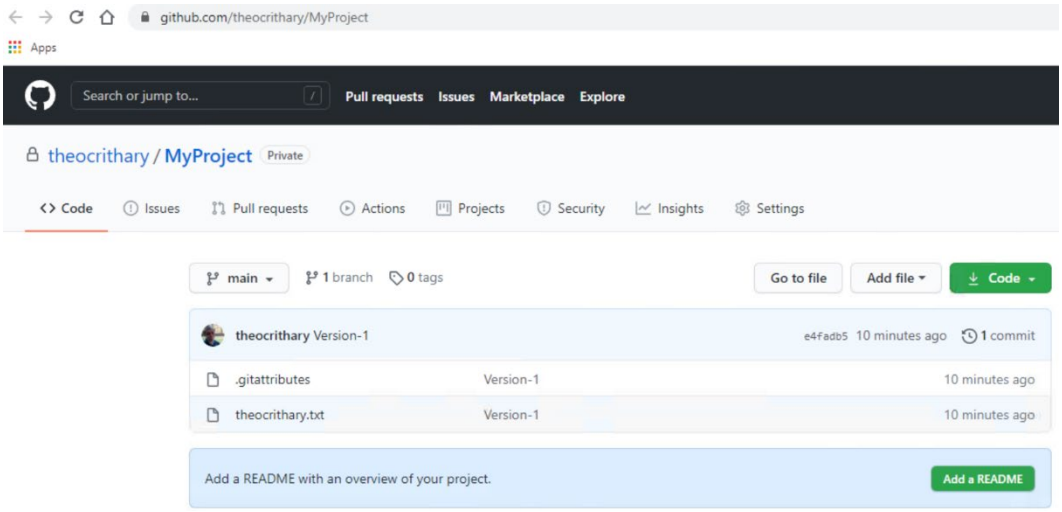
19. Once the repository is published to central GitHub repo, notice the message as Last fetched just now.



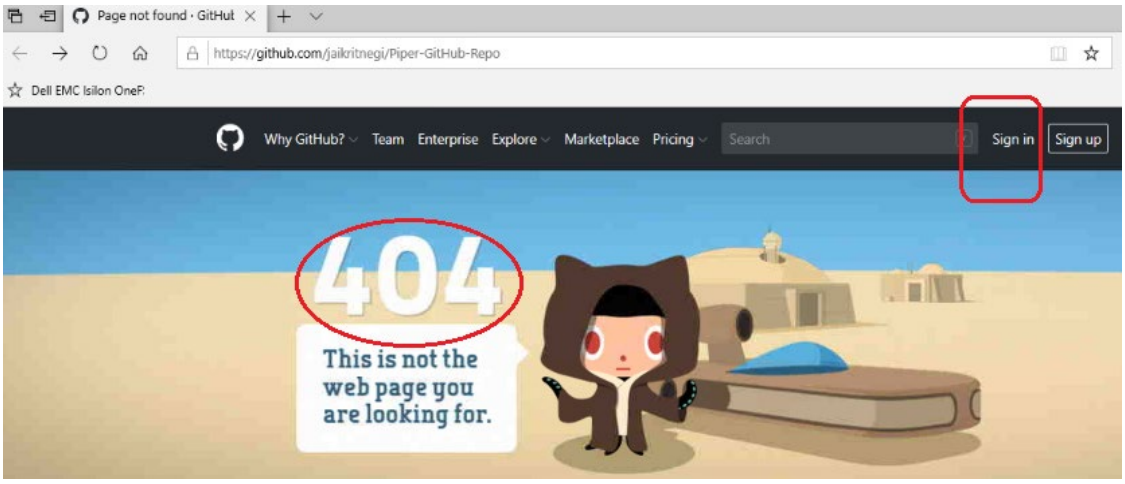
20. Once the repository is published, click on View on GitHub option that opens a browser window to verify the repository on GitHub in browser



21. You should be directed to a browser and automatically logged in to GitHub as you have already signed in via the browser earlier.



Should you encounter error code 404 on the web browser as below, click on 'sign in' to login with your GitHub credentials to view the published repository.



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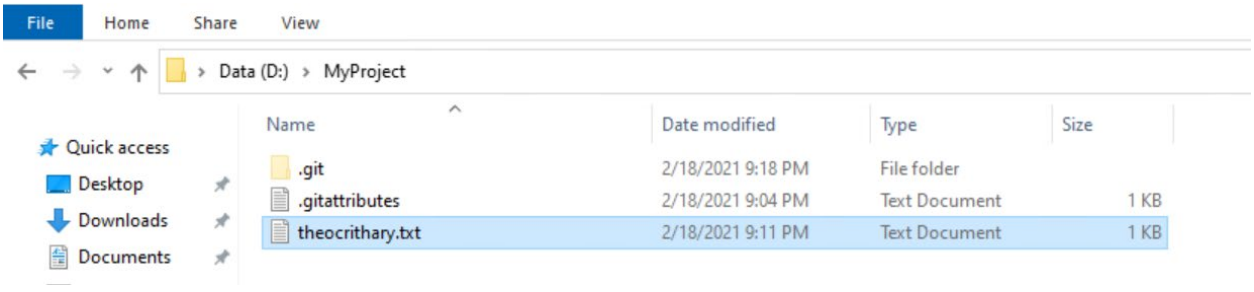
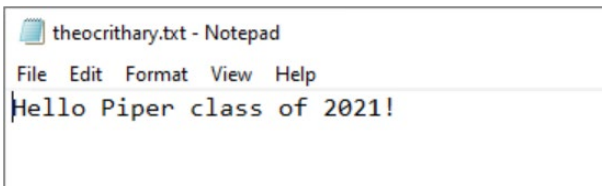
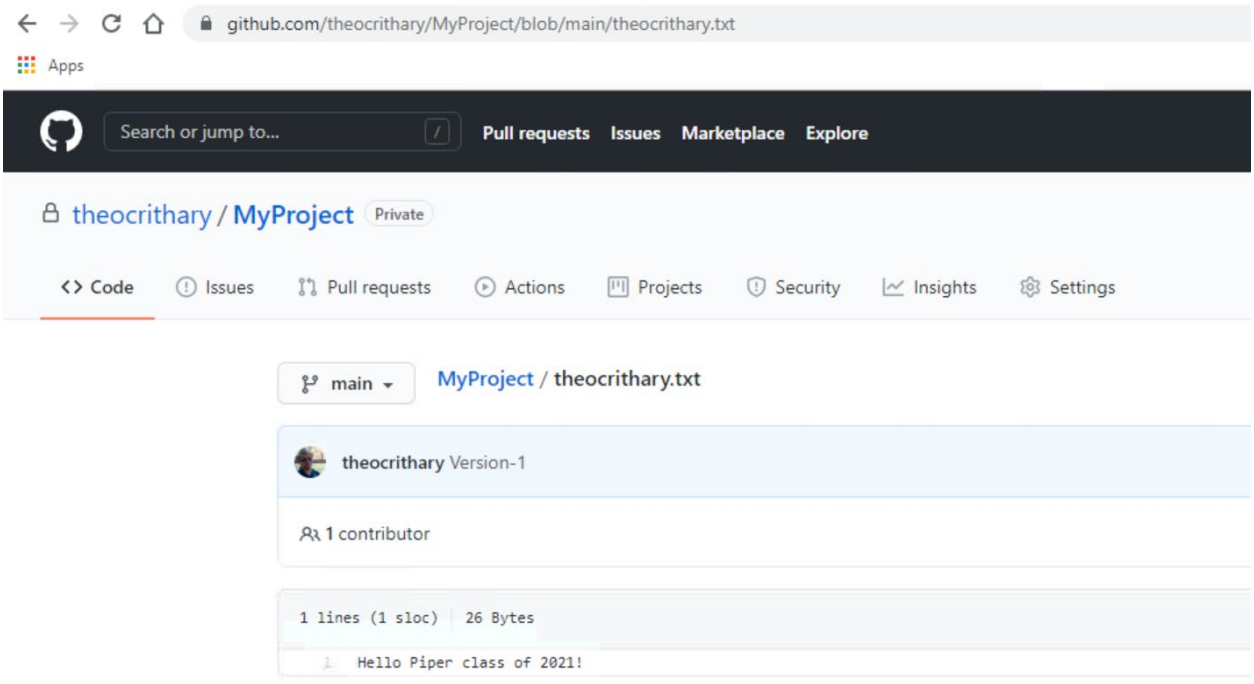
Retrospective: What was achieved

- ❑ Learnt about git, git tools, Github and Github Desktop UI
- ❑ Setup a new personal repo for our project
- ❑ Confirmed git tools are working and we have the skills to commit code
- ❑ Confirmed files uploaded to Github







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Lab 2: Deploy an App to Tanzu Application Service

Module Objectives:

- ❑ Learn about TAS & cf cli tools
- ❑ Confirm cf cli is installed and working
- ❑ Login to TAS via cf cli
- ❑ Push a demo app to TAS and confirm we have the skills and tools required to publish a web app to the TAS PaaS platform

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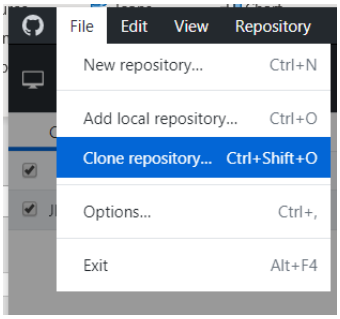
Lab Exercise: Clone an example app and deploy to TAS

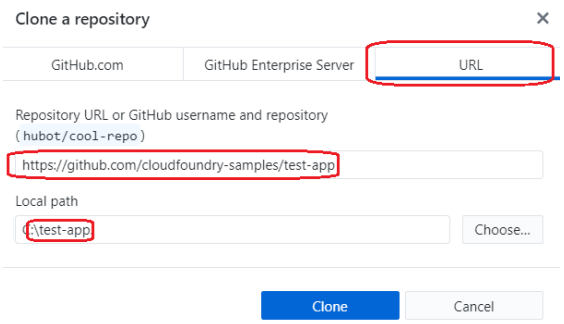
1. Open the GitHub Desktop Client (from the shortcut on the desktop)

2. Clone a repository – "Go to File > Clone repository" to clone it from GitHub

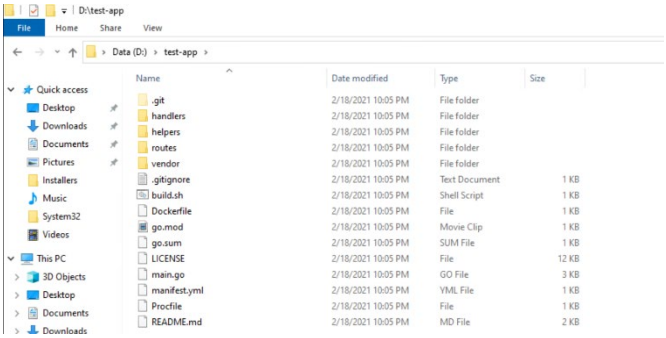


3. Click on the URL tab and copy the below GitHub URL and paste to the Repository URL field and select the local path on D:\ drive.

   https://github.com/cloudfoundry-samples/test-app.git

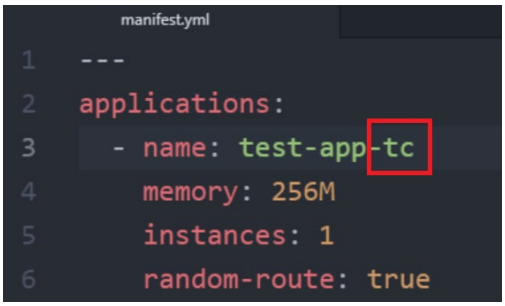


4. When it completes the clone process, you should have a new directory in D:\ with the 'test-app' files



5. Open the 'manifest.yml' file with any text editor (e.g. Atom or Notepad)

Add your initials or something unique to the end of the application name to avoid conflicts with other students.



Save and close the file.

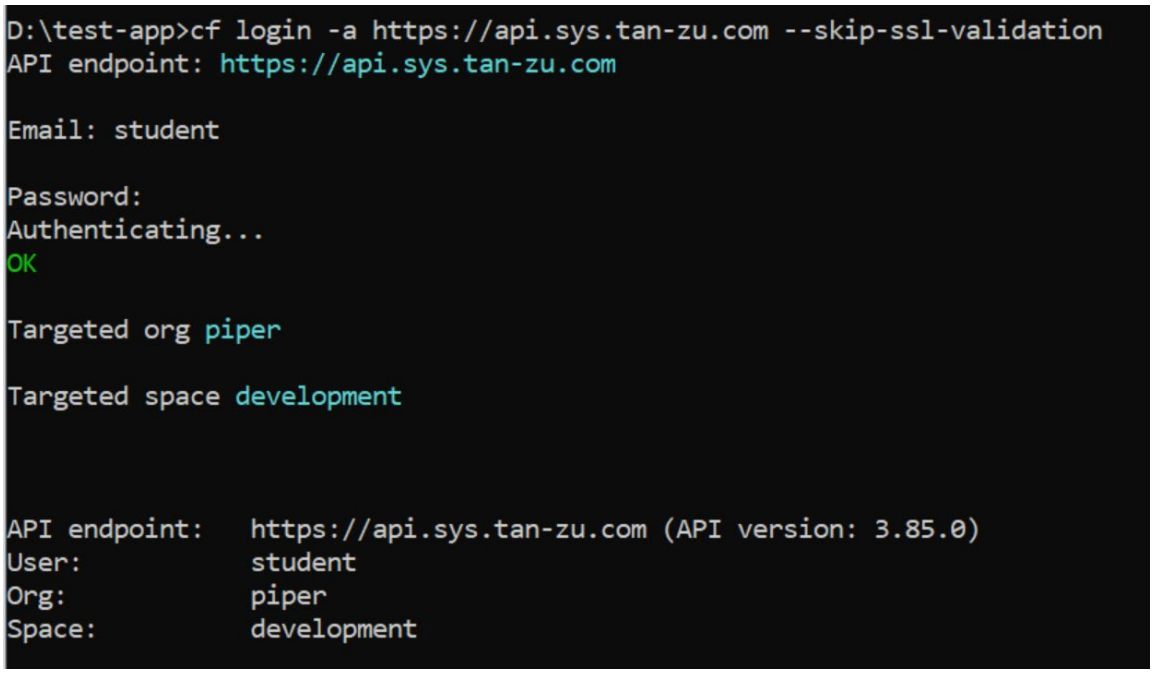
6. Open a command prompt and navigate to the directory cloned above

   > d:

   > cd test-app

7. Login to TAS with the following account credentials

   > cf login -a https://api.sys.tan-zu.com --skip-ssl-validation



8. Push the app to TAS and observe the output

   > **cf push**

```
D:\test-app>cf push
Pushing from manifest to org piper / space development as student...
Using manifest file D:\test-app\manifest.yml
Getting app info...
Creating app with these attributes...
+ name:         test-app-tc
  path:         D:\test-app
+ instances:    1
+ memory:       256M
  routes:
+   test-app-tc-anxious-crocodile-pm.apps.tan-zu.com
```

```
Creating app test-app-tc...
Mapping routes...
Comparing local files to remote cache...
Packaging files to upload...
Uploading files...
 37.28 KiB / 37.28 KiB [=============================================================================================================================================] 100.00% 1s

Waiting for API to complete processing files...

Staging app and tracing logs...
   Downloading binary_buildpack...
   Downloading ruby_buildpack...
   Downloading staticfile_buildpack...
   Downloading nginx_buildpack...
   Downloaded staticfile_buildpack
   Downloading nodejs_buildpack...
   Downloaded nginx_buildpack
   Downloading go_buildpack...
   Downloading r_buildpack...
   Downloaded ruby_buildpack
   Downloading python_buildpack...
   Downloaded binary_buildpack
   Downloading php_buildpack...
   Downloaded nodejs_buildpack
   Downloading dotnet_core_buildpack...
   Downloaded go_buildpack
   Downloading java_buildpack_offline...
   Downloaded r_buildpack
   Downloaded dotnet_core_buildpack
   Downloaded php_buildpack
   Downloaded python_buildpack
   Downloaded java_buildpack_offline
   Cell fc54c244-5559-4ad0-bdc6-640588cde62f creating container for instance 40aef8a1-2075-427d-8562-276cf83debe0
   Cell fc54c244-5559-4ad0-bdc6-640588cde62f successfully created container for instance 40aef8a1-2075-427d-8562-276cf83debe0
   Downloading app package...
   Downloaded app package (37.3K)
   -----> Go Buildpack version 1.9.23
          **WARNING** [DEPRECATION WARNING]:
          **WARNING** Please use AppDynamics extension buildpack for Golang Application instrumentation
          **WARNING** for more details: https://docs.pivotal.io/partners/appdynamics/multibuildpack.html
   -----> Installing godep 80
          Copy [/tmp/buildpacks/e7519bcc6c11b208735441867481547/dependencies/52a892f00e80ca4fdcf27d9828c7aba1/godep-v80-linux-x64-cflinuxfs3-b60ac947.tgz]
   -----> Installing glide 0.13.3
          Copy [/tmp/buildpacks/e7519bcc6c11b208735441867481547/dependencies/f5e4affa54f8cf8e22cf524de5165a6e/glide-v0.13.3-linux-x64-cflinuxfs3-ef07acb5.tgz]
   -----> Installing dep 0.5.4
          Copy [/tmp/buildpacks/e7519bcc6c11b208735441867481547/dependencies/f1900fcb2de60a12ea6743ecf05e14d2/dep-v0.5.4-linux-x64-cflinuxfs3-79b3ab9e.tgz]
   -----> Installing go 1.15.5
          Copy [/tmp/buildpacks/e7519bcc6c11b208735441867481547/dependencies/0de0ebec31838a4d1621b381cc3c31af/go_1.15.5_linux_x64_cflinuxfs3_fd04494f.tgz]
          **WARNING** Installing package '.' (default)
   -----> Running: go install -tags cloudfoundry -buildmode pie .
   Exit status 0
   Uploading droplet, build artifacts cache...
   Uploading droplet...
   Uploading build artifacts cache...
   Uploaded build artifacts cache (9.3M)
```

9. When the upload completes and the application has been deployed, you should see the below state ‘running’.

```
Waiting for app to start...

name:              test-app-tc
requested state:   started
routes:            test-app-tc-anxious-crocodile-pm.apps.tan-zu.com
last uploaded:     Thu 18 Feb 22:59:19 GMT 2021
stack:             cflinuxfs3
buildpacks:        go

type:            web
instances:       1/1
memory usage:    256M
start command:   test-app
     state     since                  cpu    memory      disk      details
#0   running   2021-02-18T22:59:28Z   0.0%   0 of 256M   0 of 1G
```

10. Copy the URL shown in the 'routes:' section of the output displayed in your command prompt.

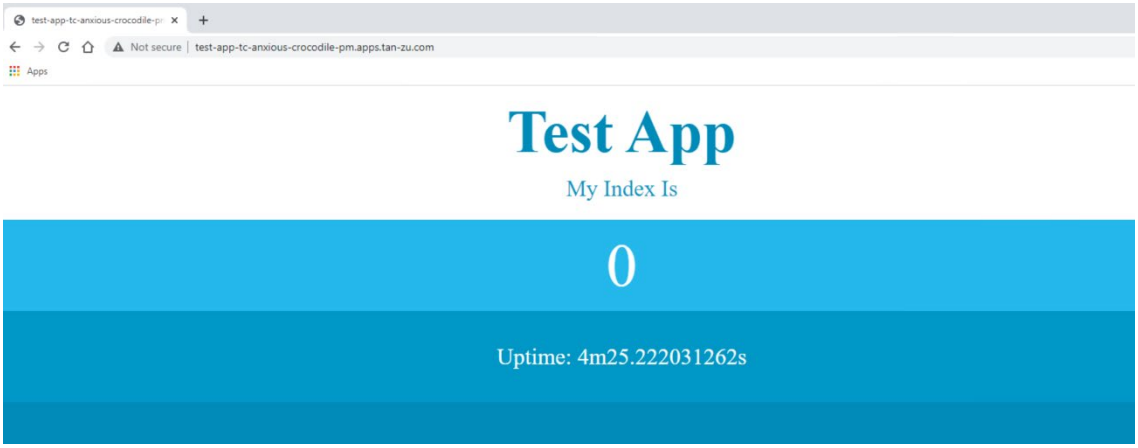
```
Waiting for app to start...

name:              test-app-tc
requested state:   started
routes:            test-app-tc-anxious-crocodile-pm.apps.tan-zu.com
last uploaded:     Thu 18 Feb 22:59:19 GMT 2021
stack:             cflinuxfs3
buildpacks:        go

type:            web
instances:       1/1
memory usage:    256M
start command:   test-app
     state     since                  cpu    memory      disk      details
#0   running   2021-02-18T22:59:28Z   0.0%   0 of 256M   0 of 1G
```

e.g. https://test-app-tc-anxious-crodile-pm.apps.tan-zu.com (NOTE- your URL will be different)

11. Confirm your app is working as available from a public facing website by opening in a browser



12. Clean up and delete your app by running the following in the command prompt
> cf delete test-app-xx -r

Note: use your unique application name as specified in the manifest file and don't forget the '-r' option at the end to remove the route for your application

Type 'yes' when prompted to confirm deletion.

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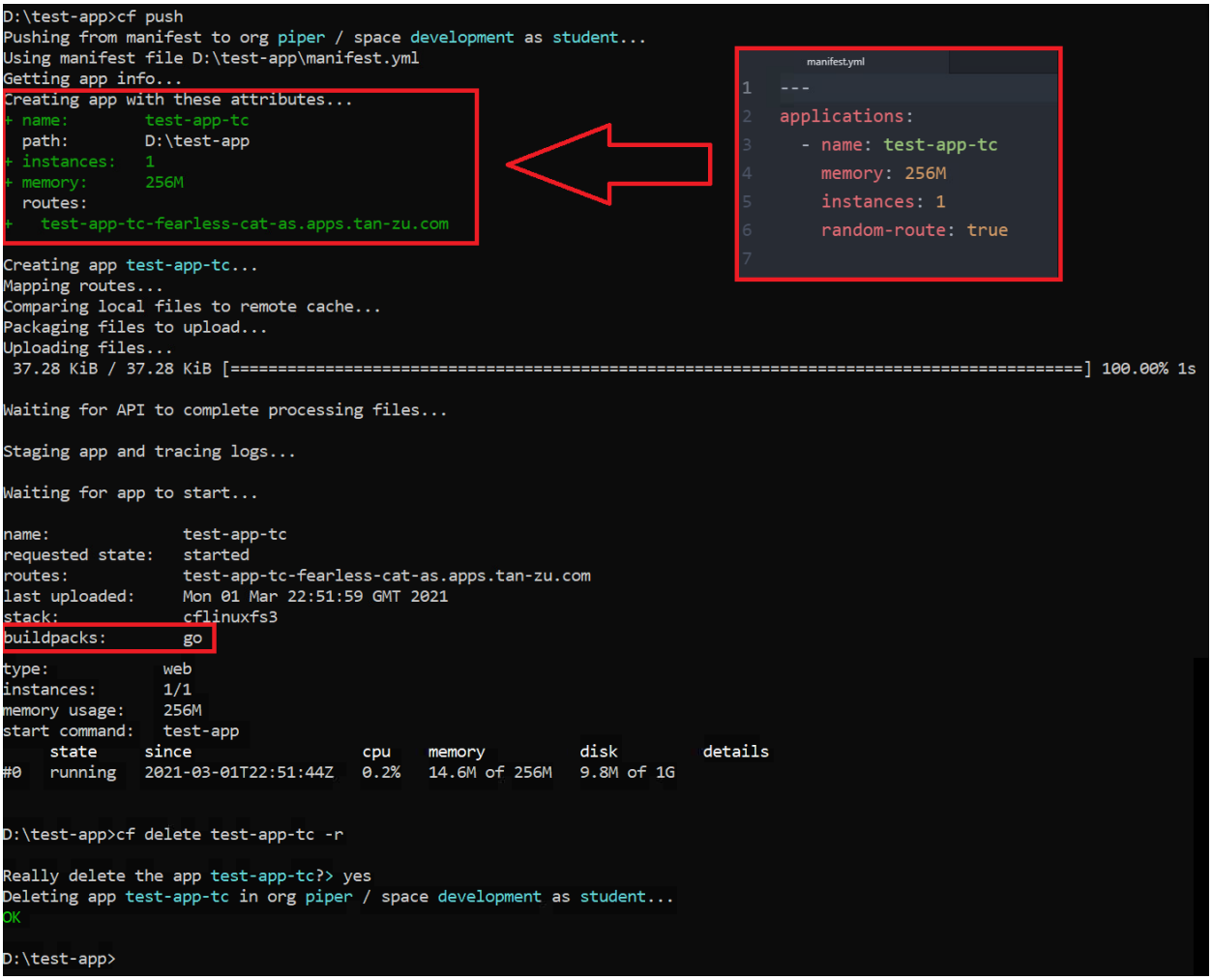
Retrospective: Reflect on what just happened

Take a look at the application name, number of instances, memory allocation, routes and build-pack details.

These are all provided by the **manifest.yml** file as application configuration options.

Random-route: true is a Cloud Foundry function that randomly generates a unique DNS based on selecting 2 words from a provided dictionary. This is used only in testing to ensure that DNS routes are not conflicting when deploying the same application many times.

buildpacks: are used to define the required libraries and runtimes to setup an environment for the application to run successfully. If you do not define a buildpack, Cloud Foundry will try to determine a default buildpack based on the language of the code provided.



Note: You did not allocate any IP addresses, build a VM / container, deploy an OS, install middleware / libraries, create a load balancer, assign a DNS entry, open a firewall rule or create any IP routing or VLANs to get this application running in a public facing website. The platform did all of that for you with one single command **"cf push"!**

DELL Technologies

Lab 3: Clone the GitHub Repository for all Piper Labs

Module Objectives:

- ❑ Clone the master repository for all labs provided in the Piper workshop
- ❑ Explore the folder structure
- ❑ Acknowledge the Piper-TH-Workshop folder as a read only copy of the source
- ❑ Establish a habit of copying files from the source to your personal project folder

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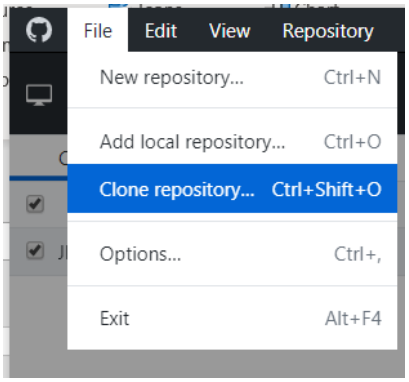
Lab Exercise: Clone the source repository

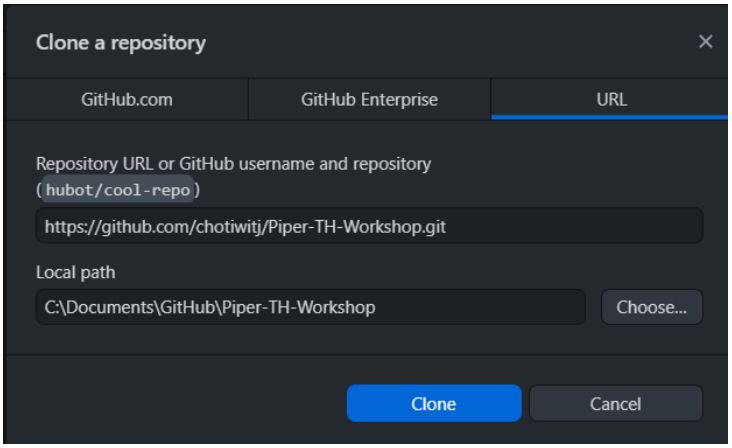
1. Open the GitHub Desktop Client (from the shortcut on the desktop)

2. Clone a repository – “Go to File > Clone repository” to clone it from GitHub

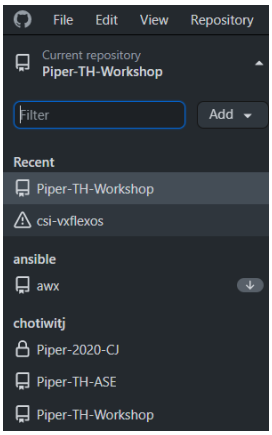


3. Click on the URL tab and copy the below GitHub URL and paste to the Repository URL field and select the local path on D:\ drive.

   https://github.com/chotiwitj/Piper-TH-Workshop.git

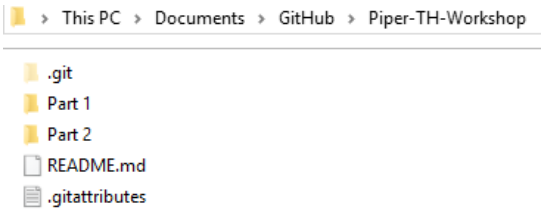


4. Make sure the correct repository is set as the current repository by clicking the drop-down arrow on the top left of the GitHub Desktop client and selecting “chotiwitj --> Piper-TH-Workshop”



5. Click on the “Show in Explorer” button to open the downloaded files in a windows explorer

6. All of the labs for this manual and corresponding labs are contained in the “Part 1” and “Part 2” folders.



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Retrospective: A read-only master source repository

Now that we have copied all of the source files to our local folder, we can now use these files for any labs going forward.

It is important to complete this lab as it will become a pre-requisite for all labs throughout this course.

When using the source files, ensure you copy the files to your personal project folder (e.g. D:\MyProject, or whatever you setup in Lab 1).

DO NOT edit or update the files directly in original folder as this will prompt the GitHub Desktop client to commit the changes and you may try to push them to GitHub by mistake.

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Lab 4: Create a Static HTML Website

Module Objectives:

- ❑ Learn a little bit about HTML & CSS
- ❑ Create a basic website that will be used as a starting point for our application
- ❑ Review the code and become familiar with the layout and design
- ❑ Test the functionality of the default website
- ❑ Save and upload to Github

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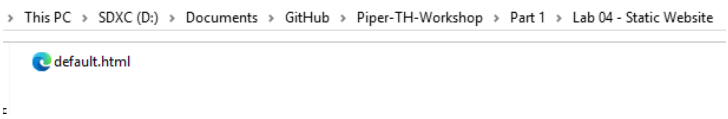
Lab Exercise: Copy the static webpage provided and setup a new project

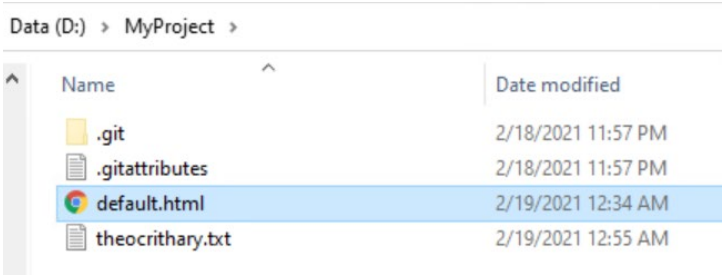
1. (If not already done in Lab 3), download the files from Lab 04 - Static Website directory of the repository (link as below) and place into your working project folder

   https://github.com/chotiwitj/Piper-TH-Workshop/tree/master/Part%201/Lab%2004%20-%20Static%20Website

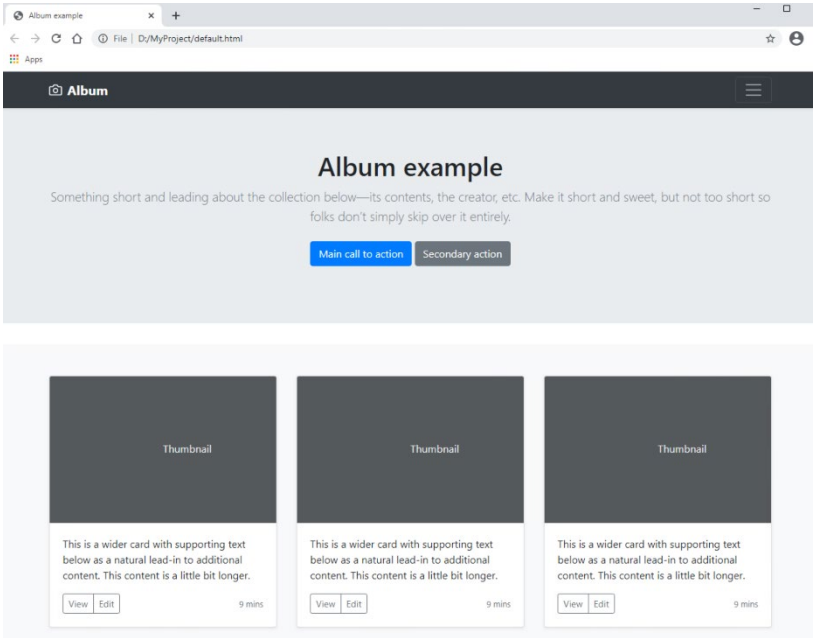
2. Open the D:\Piper-TH-Workshop folder and browse to the “Part 1 > Lab 04 – Basic Website” folder



3. Copy the ‘default.html’ file and paste into your personal working directory



4. Open the ‘default.html’ file in a browser to test its ‘look and feel’



5. Open the ‘default.html’ file in the Atom text editor and review the code

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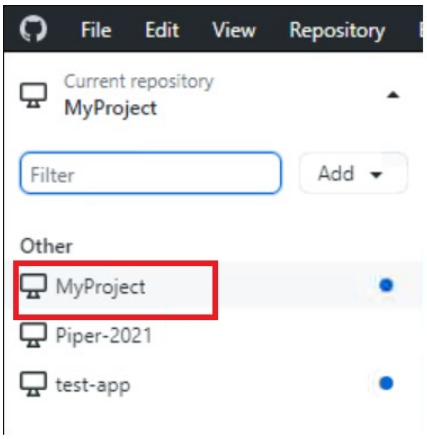
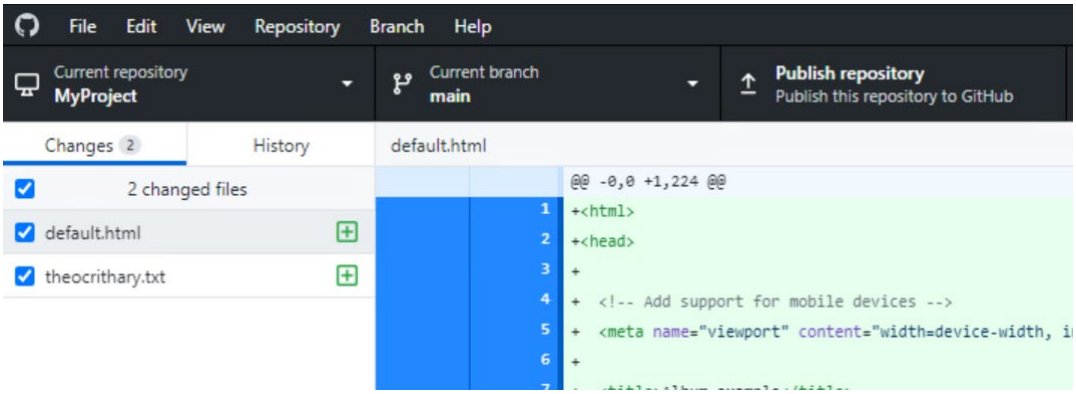
```
default.html
1  <html>
2  <head>
3
4    <!-- Add support for mobile devices -->
5    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
6
7    <title>Album example</title>
8
9    <!-- Bootstrap core CSS -->
10   <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bootstrap.min.css" integ
11
12 </head>
13 <body>
14
15   <!-- Top Navbar Section -->
16   <header>
17     <div class="collapse bg-dark" id="navbarHeader">
18       <div class="container">
```

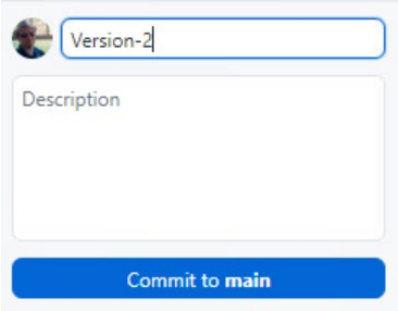
6. Open the GitHub Desktop client and select the “Current repository” as your personal project using the drop-down button and selecting the project you setup in Lab 1



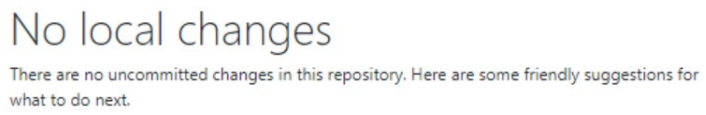
7. Notice the updated changes and new file that has been added to your working directory



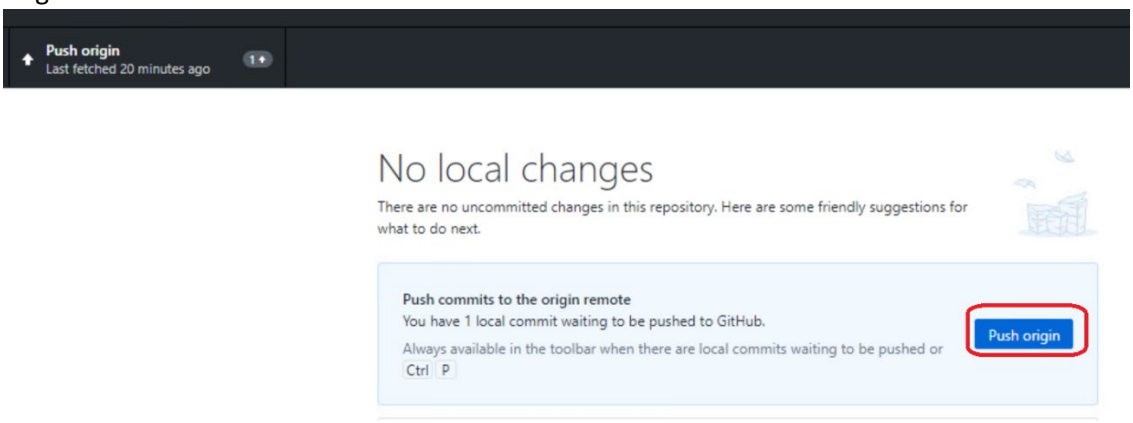
8. The current changes in the working directory is still only local and has not yet been committed to the local git repository. In order to commit the changes, type a comment in the summary field and click on commit to main



9. Above action should show below screen confirming commit with display as No local changes



10. Now we need to publish the local changes to the github.com repository by clicking on “Push origin”



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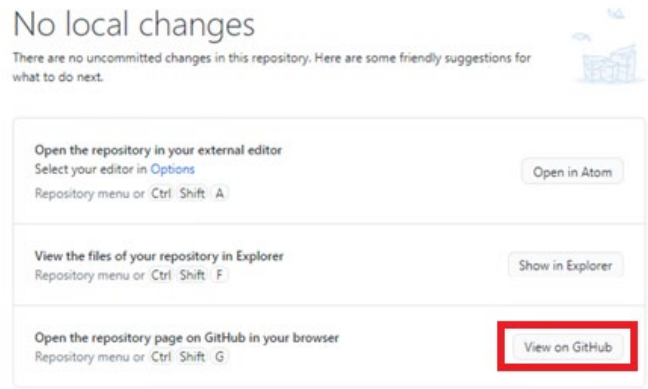
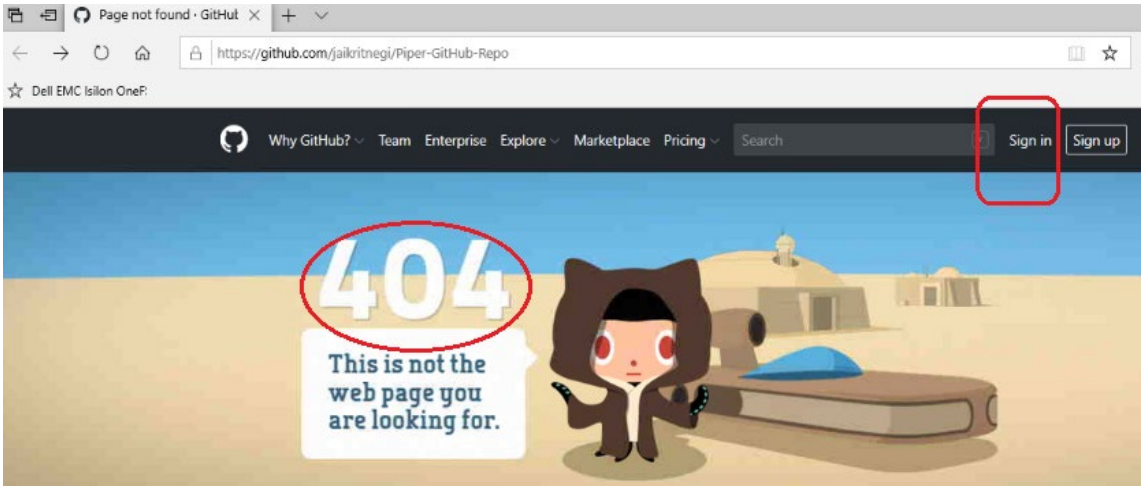
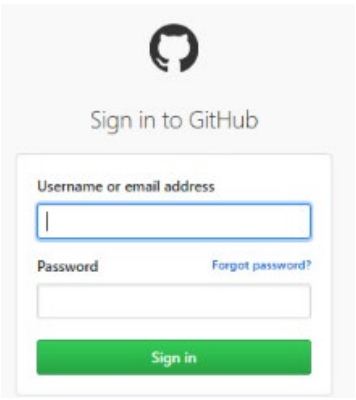
11. Once the repository is published, click on View on GitHub option that opens a browser window to verify the repository on GitHub in browser.

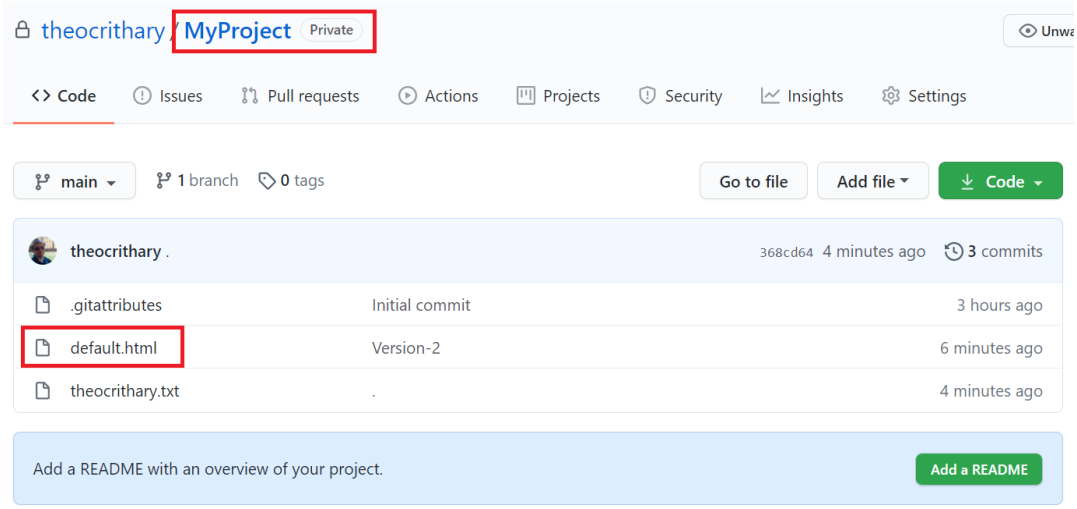


12. Should you encounter error code 404 on the web browser as below, click on sign in to login with your GitHub credentials to view the published repository.



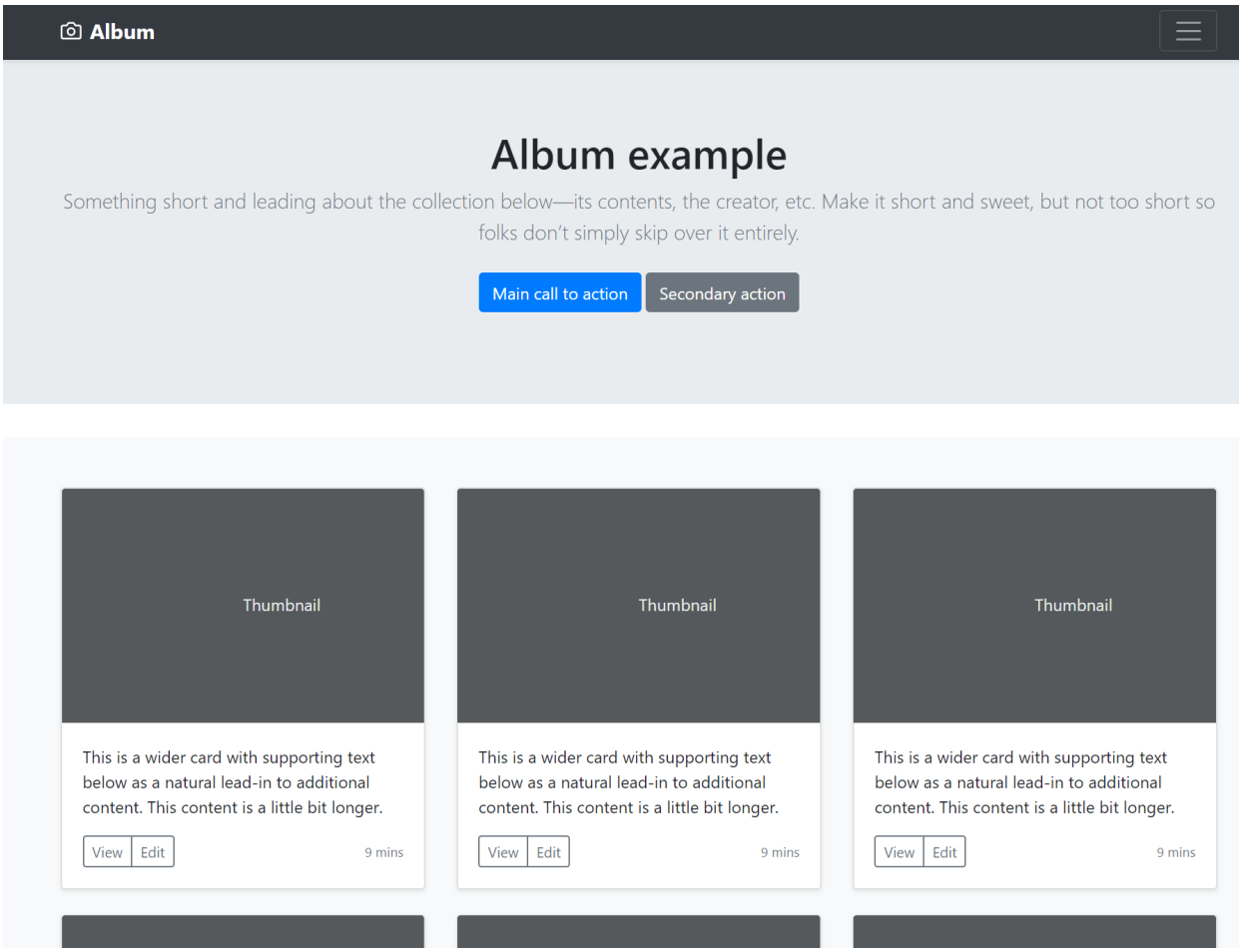


13. Upon successful login, you can verify the published repository and content on GitHub.com repository



Retrospective: A basis for an MVP

You now have a HTML web page that can be used as a template design for our new application.



If you opened the default.html file in the Atom text editor, you might have noticed the below lines of code in the <head> section at the top;

```
<!-- Add support for mobile devices -->
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
```

```
<!-- Bootstrap core CSS -->
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bootstrap.min.css" integrity="sha384-ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUOhcWr7x9JvoRxT2MZw1T" crossorigin="anonymous">
```

These are the Bootstrap responsive design and external CSS functionality that provides the look and feel of the webpage as discussed in the theory module earlier.

Try commenting out these lines of code and reload the page in the browser to see what happens.

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Lab 5: Python and Flask

Module Objectives:

- ❑ Learn about Python & Flask
- ❑ Write a Python app using Flask web server to run the ‘default.html’ website we created earlier
- ❑ Review the code and become familiar with the Python code
- ❑ Test the functionality of the web app
- ❑ Save and upload to Github

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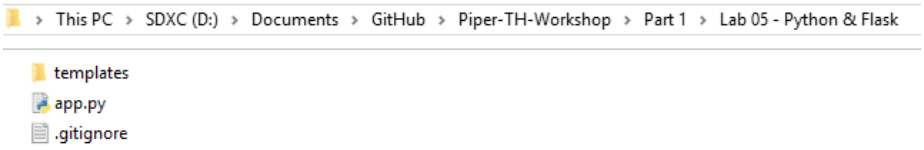
Lab Exercise: Create a basic Python app to run the Flask web server

1. (If not already done in Lab 3), download the files from Lab 05 – Python & Flask directory of the repository (link as below) and place into your working project folder

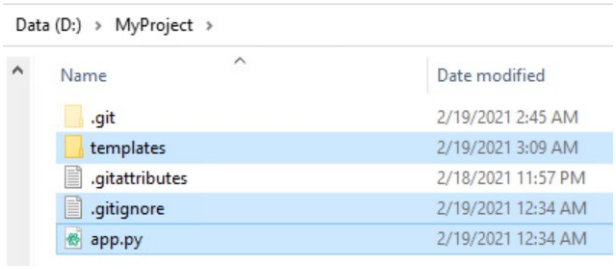
   https://github.com/chotiwitj/Piper-TH-Workshop/tree/master/Part%201/Lab%2005%20-%20Python%20%26%20Flask

2. Delete the existing 'default.html' and 'theocrithary.txt' files from Labs 1 & 4

3. Copy all the files and folders from the Lab 05 directory above and paste them into your working project directory (e.g. D:\MyProject)



4. Your project directory should look like this;



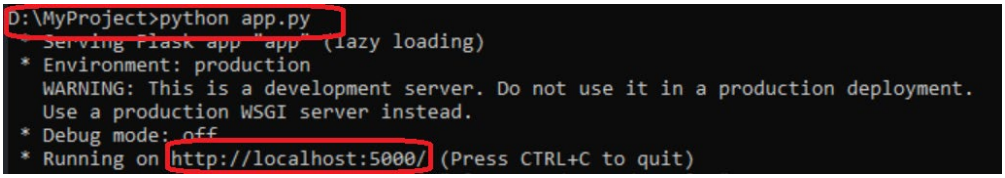
5. Open a command prompt and navigate to your working project folder

   > d:

   > cd MyProject

6. Run the following command to start your application

   > python app.py



7. Open a browser with the following URL

   http://localhost:5000

8. Press CTRL + C to quit upon testing the webapp

9. Save work in your working project folder and upload to GitHub

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Retrospective: Applying concepts of Model, Views, Controllers

Review the app.py code to see how views and controllers are used to implement a template with a default route controller;

app.py

```
#!/usr/bin/env python3

##############################################
# This is the main application file.
# It has been kept to a minimum using the design
# principles of Models, Views, Controllers (MVC).
##############################################

# Import modules required for app
from flask import Flask, render_template, request

# Create a Flask instance
app = Flask(__name__)

##### Define routes #####
@app.route('/')
def home():
    return render_template('default.html',url="home")

##### Run the Flask instance, browse to http://localhost:5000 #####
if __name__ == "__main__":
    app.run(debug=False, host='localhost', port='5000', threaded=True)

```

Remember controllers / routes from MVC architecture principles?

And views / templates?

Port bindings from 12-factor apps?

Also take note of the port on the last line of code that determines which port the web server will listen on.

For testing purposes, we are using port 5000, but this can easily be changed to port 80 at any time.

DELL Technologies

Lab 6: MongoDB

Module Objectives:

- ❑ Setup local MongoDB server & install pymongo module (this is pre-installed in the lab environment)
- ❑ MongoDB test for its functionality
- ❑ Edit our Python app we created earlier to add dynamic functionality with MongoDB
- ❑ Review the code and become familiar with the new Python code
- ❑ Test the functionality of the web app
- ❑ Save and upload to Github

DELL Technologies

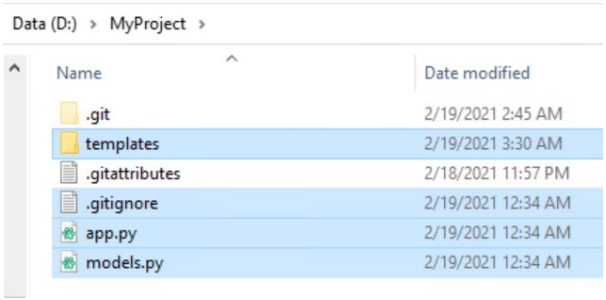
Lab Exercise: Copy the new code files and overwrite existing application files

1. (If not already done in Lab 3), download the files from Lab 06 - MongoDB directory of the repository (link as below) and place into your working project folder

   https://github.com/chotiwitj/Piper-TH-Workshop/tree/master/Part%201/Lab%2006%20-%20MongoDB

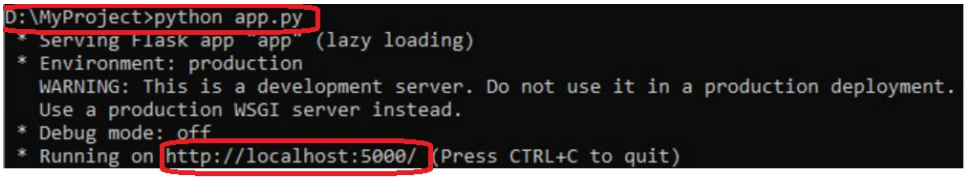
2. Copy all files in the Lab 06 - MongoDB folder and place into your working directory (overwrite any existing files in your working directory)

3. Your project directory should now look like this;



4. Open a command prompt, navigate to your project directory and run the app

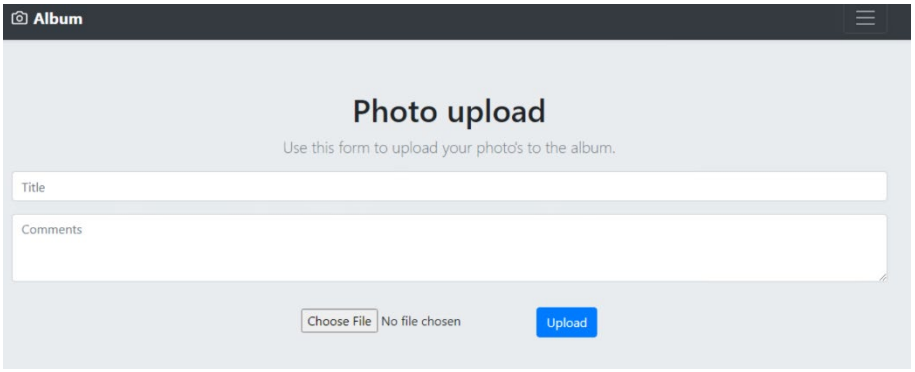
   > d:
   > cd MyProject
   > python app.py



5. Open a browser with the following URL

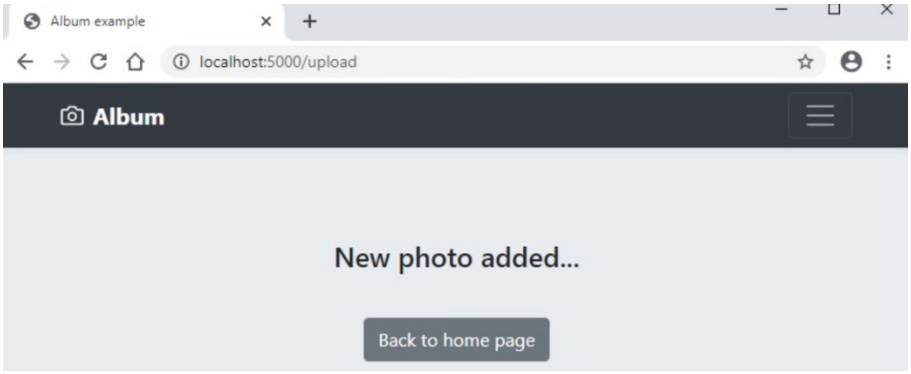
   http://localhost:5000

6. Test uploading an image and confirm the page loads correctly with the newly introduced functionality of a couple of text fields and an image upload function.

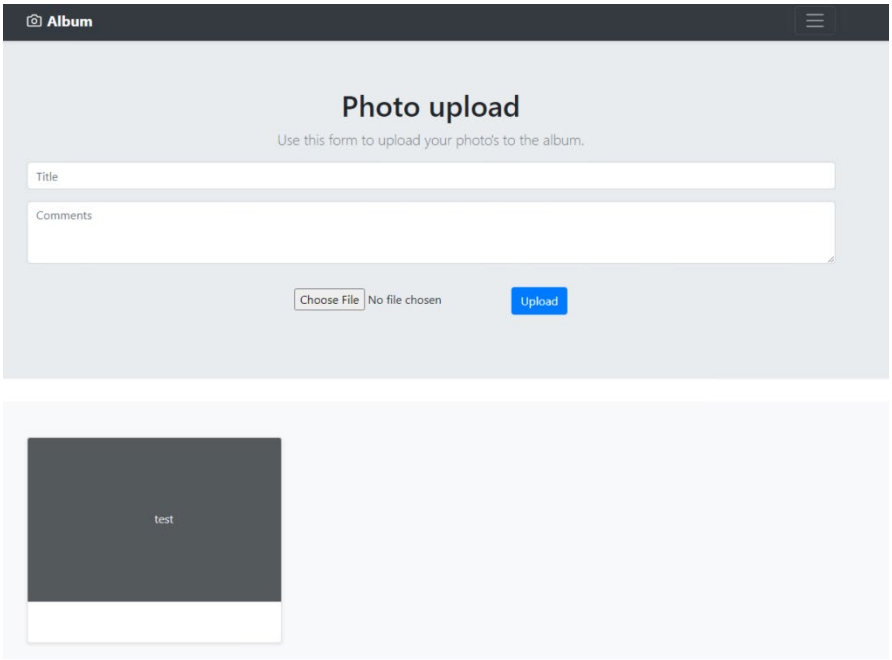


7. Test the functionality by entering some text in the 'title' and 'comments' field, then clicking the 'Choose File' button and selecting an image before clicking on 'Upload'.

   If your upload is successful, you will see the below confirmation page.



8. Click on the 'Back to home page' function and you will be sent back to the default home page with a placeholder thumbnail representing your uploaded image.



9. Press CTRL + C on the command prompt to quit upon testing the webapp

10. Save work in your working project folder and upload to Github (if any changes to your local working directory)

    - Follow Lab 4- Steps 6 to 11 (if need guidance on the steps for pushing the changes from local repository to GitHub.com repository)

DELL Technologies

Retrospective: Review the implementation of 'models' into our application

Review the models.py code to understand how the form data is being collected and inserted into the MongoDB database.

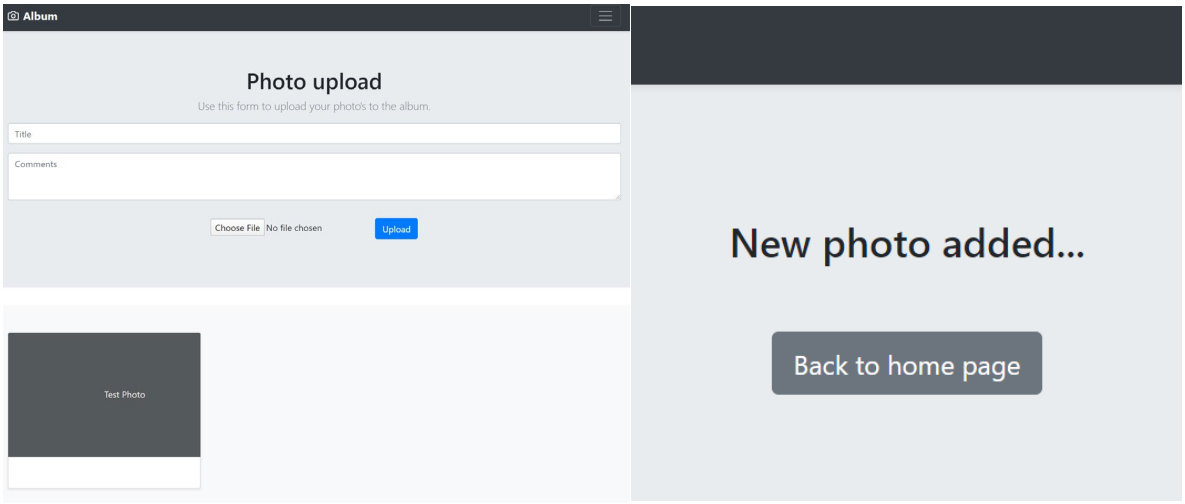
models.py

```
#!/usr/bin/env python3

#######################################################
# This is the database processing file. (aka. Models)
# It contains the DB connections, queries and processes.
# Uses principles of Models, Views, Controllers (MVC).
#######################################################

# Import modules required for app
import os
from pymongo import MongoClient
from werkzeug.utils import secure_filename

### Applicaiton configuration settings ###
# Set the database target to your local MongoDB instance
client = MongoClient('127.0.0.1:27017')
DB_NAME = "mongodb"  # This will be the name of your database
COL_NAME = "photos"  # This will be the name of your collection


##### Main body code #####

db = client[DB_NAME] # Create the database using the name provided and client connection to the MongoDB server
db_collection = db[COL_NAME]   # Create the collection using the name provided and database connection

# Retrieve all photos records from database
def get_photos():
    return db_collection.find({})

# Insert form fields into database
def insert_photo(request):
    title = request.form['title']
    comments = request.form['comments']
    filename = secure_filename(request.files['photo'].filename)
    thumbfile = filename.rsplit(".",1)[0] + "-thumb.jpg"

    db_collection.insert_one({'title':title, 'comments':comments, 'photo':filename, 'thumb':thumbfile})
```

Also take note of the additional route added to the app.py code that provides a new application function to confirm the upload and provide the user with a message before returning to the main page.

app.py

```python
#!/usr/bin/env python3

##############################################
# This is the main application file.
# It has been kept to a minimum using the design
# principles of Models, Views, Controllers (MVC).
##############################################

# Import modules required for app
import os
from flask import Flask, render_template, request
from models import get_photos, insert_photo

# Create a Flask instance
app = Flask(__name__)

##### Define routes #####
@app.route('/')
def home():
    album_photos = get_photos()                    # Call function in 'models.py' to retrieve all photo's from database
    return render_template('default.html',album_photos=album_photos,url="home")

# This route accepts GET and POST calls
@app.route('/upload', methods=['POST'])
def upload():
    insert_photo(request)                          # Call function in 'models.py' to process the database transaction
    return render_template('submit-photo.html')    # Return a page to inform the user of a successful upload

##### Run the Flask instance, browse to http://<< Host IP or URL >>:5000 #####
if __name__ == "__main__":
    app.run(debug=False, host='0.0.0.0', port=int(os.getenv('PORT', '5000')), threaded=True)
```



At this point, we still do not have anywhere to store the images and are only inserting the name of the image into the database. *That's why you do not see the actual image on the web page yet.*

In our next lab we will add some object storage to upload the user's images and use the database to store the URL link to the images.

DELL Technologies

Lab 7: ECS

Module Objectives:

- ❑ Setup object storage with ECS test drive
- ❑ Edit our Python app we created earlier to add object storage functionality with S3 compliant Python module
- ❑ Review the code and become familiar with the Python code
- ❑ Test the functionality of the web app
- ❑ Save and upload to Github

DELL Technologies

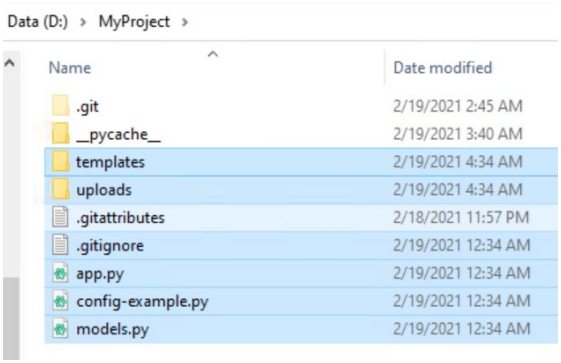
Lab Exercise: Use Boto3 Python module to upload images to ECS

1. (If not already done in Lab 3), download the following files from Lab 07 - ECS directory of the repository (link as below) and place into your working project folder

   https://github.com/chotiwitj/Piper-TH-Workshop/tree/master/Part%201/Lab%2007%20-%20ECS

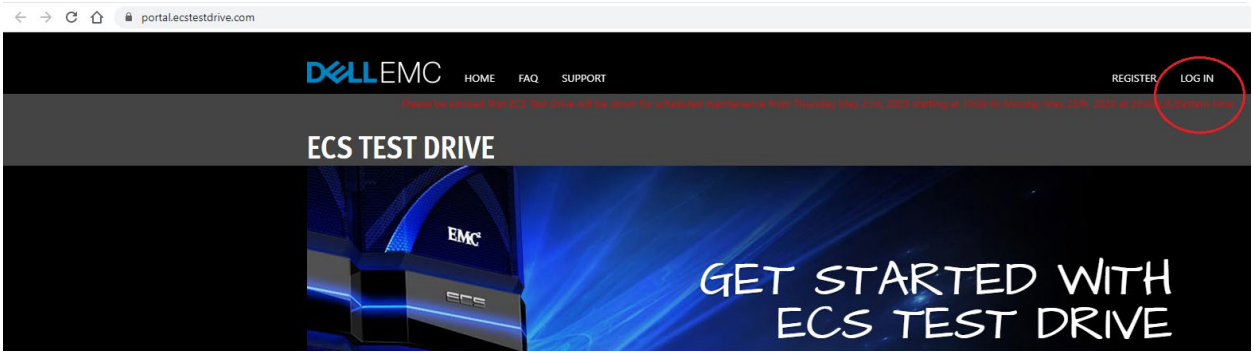
2. Copy all files in the Lab 07 - ECS folder and place into your working directory (overwrite any existing files in your working directory)

3. Your project directory should look like this;

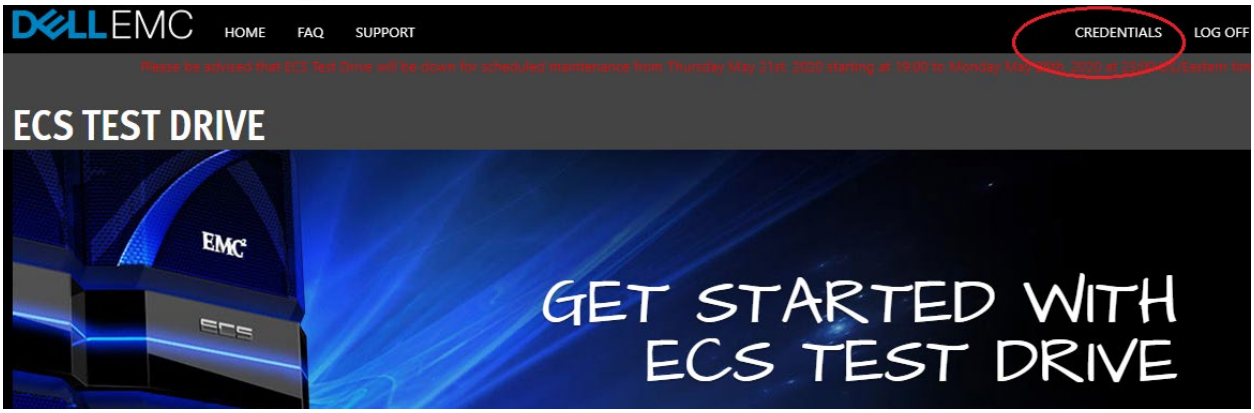


4. Rename the 'config-example.py' file to 'config.py'

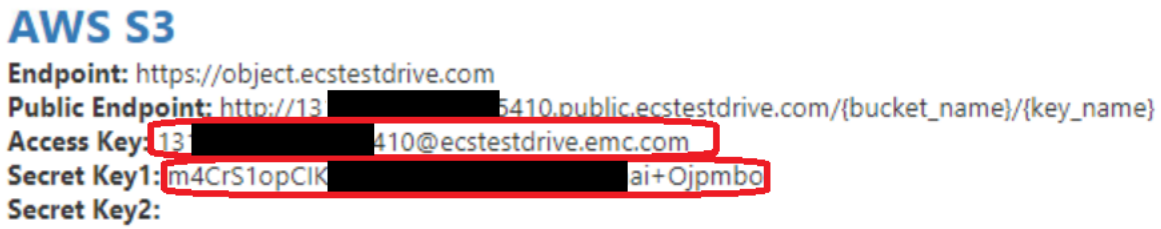
5. Login to ECS Test Drive portal at https://portal.ecstestdrive.com/ using the account you created during the pre-requisites before starting these labs.



6. Upon successful login, retrieve your ECS credentials from the credentials link at the top right corner of the page as following;



7. Take note of the Access key and secret key1 as following under the “AWS S3” section:

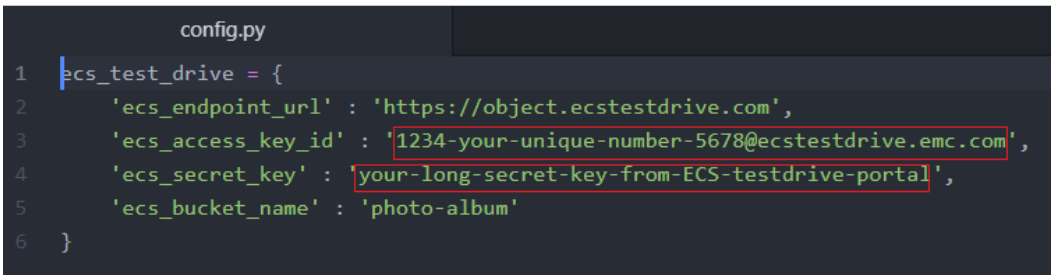


Note: if you do not have a secret key, go to ‘Manage Secret Keys’ and create a new secret key1

8. Edit the ‘config.py file’ and replace the following sections with your ECS credentials

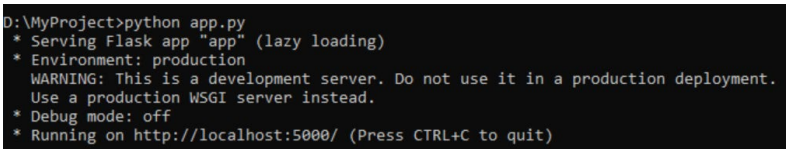
   - ecs_access_key_id with your access key (noted as above)
   - ecs_secret_key with your secret key1 (noted as above)

   NOTE- keep the opening and closing indents (‘____’) of the replaced values as-is



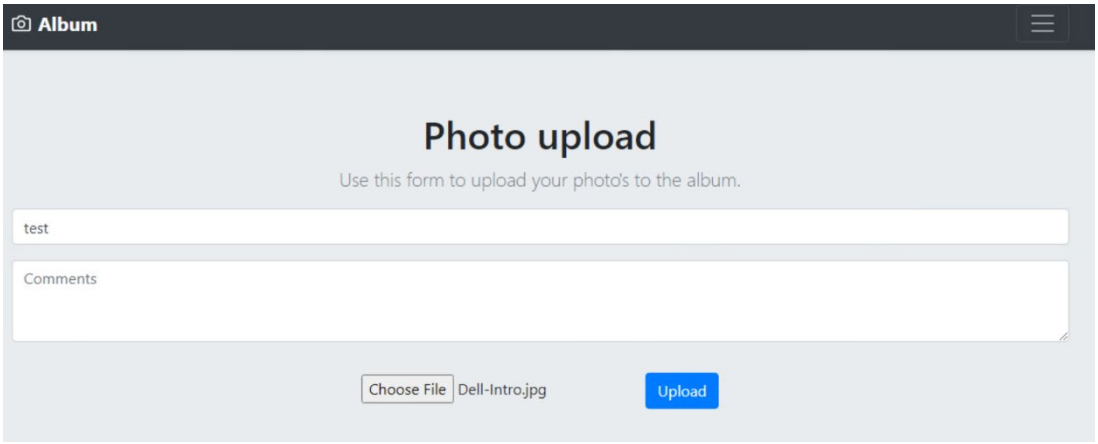
9. Run your app

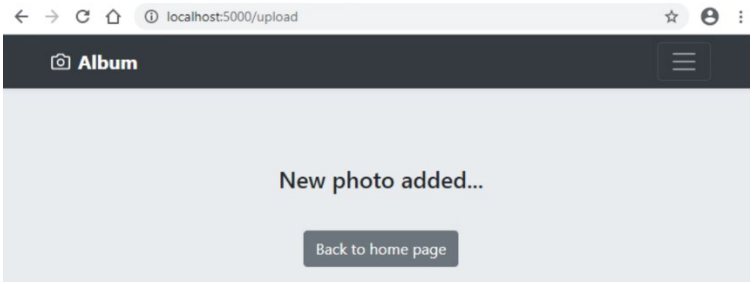
   > d:
   > cd MyProject
   > python app.py

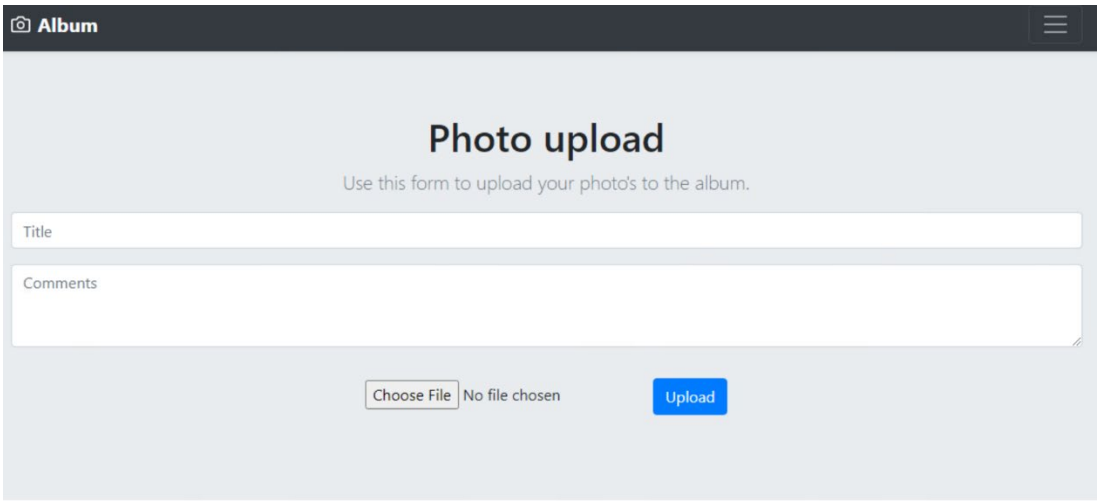


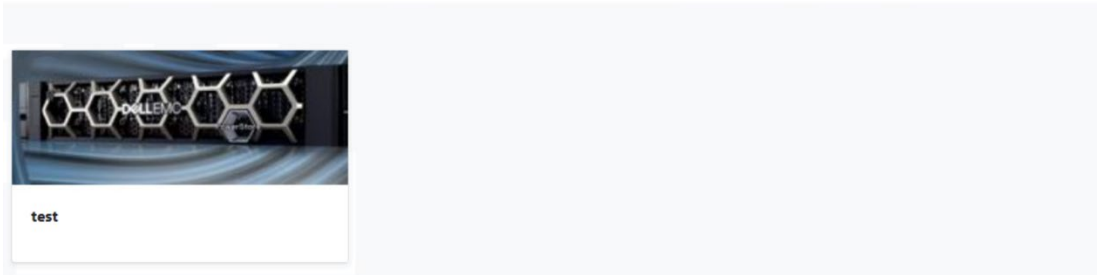
10. Test your app and upload an image;

    http://localhost:5000









11. Press CTRL + C on the command prompt window to stop the python webapp after testing
12. Save work in your working project folder and upload to Github (if any changes to your local working directory)
    - Follow Lab 4- Steps 6 to 11 (if need guidance on the steps for pushing the changes from local repository to GitHub.com repository)

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Retrospective: Review code and note implementation of Boto3 & Pillow

Take a look at the app.py code and notice the additional route used for displaying a full resolution image on a separate page and the additional call to the upload_photo function provided by the models.py file.

app.py

```
#!/usr/bin/env python3

################################################
# This is the main application file.
# It has been kept to a minimum using the design
# principles of Models, Views, Controllers (MVC).
################################################

# Import modules required for app
from flask import Flask, render_template, request
from models import get_photos, insert_photo, upload_photo

# Create a Flask instance
app = Flask(__name__)

##### Define routes #####
@app.route('/')
def home():
    album_photos = get_photos()                          # Call function in 'mode
    return render_template('default.html',album_photos=album_photos,url="home")

# This route accepts GET and POST calls
@app.route('/upload', methods=['POST'])
def upload():
    insert_photo(request)                                # Call function in 'mode
    upload_photo(request.files['photo'])                 # Call function in 'mode
    return render_template('submit-photo.html')          # Return a page to infor

@app.route('/photo/<path:photo>')
def photo(photo):
    return render_template('photo.html',photo=photo)

##### Run the Flask instance, browse to http://localhost:5000 #####
if __name__ == "__main__":
    app.run(debug=False, host='localhost', port='5000', threaded=True)
```

Open the models.py file and note the additional upload_photos function that uses the **Boto3 module to upload the image into ECS test drive** using the standards based S3 protocol and the **Pillow module that converts the full resolution image into a smaller thumbnail image** to be used in the gallery page of our application.

```python
def upload_photo(file):
    # Get ECS credentials from external config file
    ecs_endpoint_url = ecs_test_drive['ecs_endpoint_url']
    ecs_access_key_id = ecs_test_drive['ecs_access_key_id']
    ecs_secret_key = ecs_test_drive['ecs_secret_key']
    ecs_bucket_name = ecs_test_drive['ecs_bucket_name']

    # Open a session with ECS using the S3 API
    session = boto3.resource(service_name='s3', aws_access_key_id=ecs_access_key_id, aws_secret_access_key=e

    # Remove unsupported characters from filename
    filename = secure_filename(file.filename)

    # First save the file locally
    file.save(os.path.join("uploads", filename))

    # Create a thumbnail
    size = 225, 225
    with open("uploads/" + filename, 'rb') as f:
        imgraw = Image.open(f)
        img = imgraw.convert("RGB")
        img.thumbnail(size)
        thumbfile = filename.rsplit(".",1)[0] + "-thumb.jpg"
        img.save("uploads/" + thumbfile,"JPEG")
        img.close()

    # Empty the variables to prevent memory leaks
    img = None

    ## Upload the original image to ECS
    session.Object(ecs_bucket_name, filename).put(Body=open("uploads/" + filename, 'rb'), ACL='public-read')

    ## Upload the thumbnail to ECS
    session.Object(ecs_bucket_name, thumbfile).put(Body=open("uploads/" + thumbfile, 'rb'), ACL='public-read

    # Delete the local files
    os.remove("uploads/" + filename)
    os.remove("uploads/" + thumbfile)
```

The credentials are kept as an external file and the .gitignore file ensures that the credentials are not uploaded accidently to your Github repository.

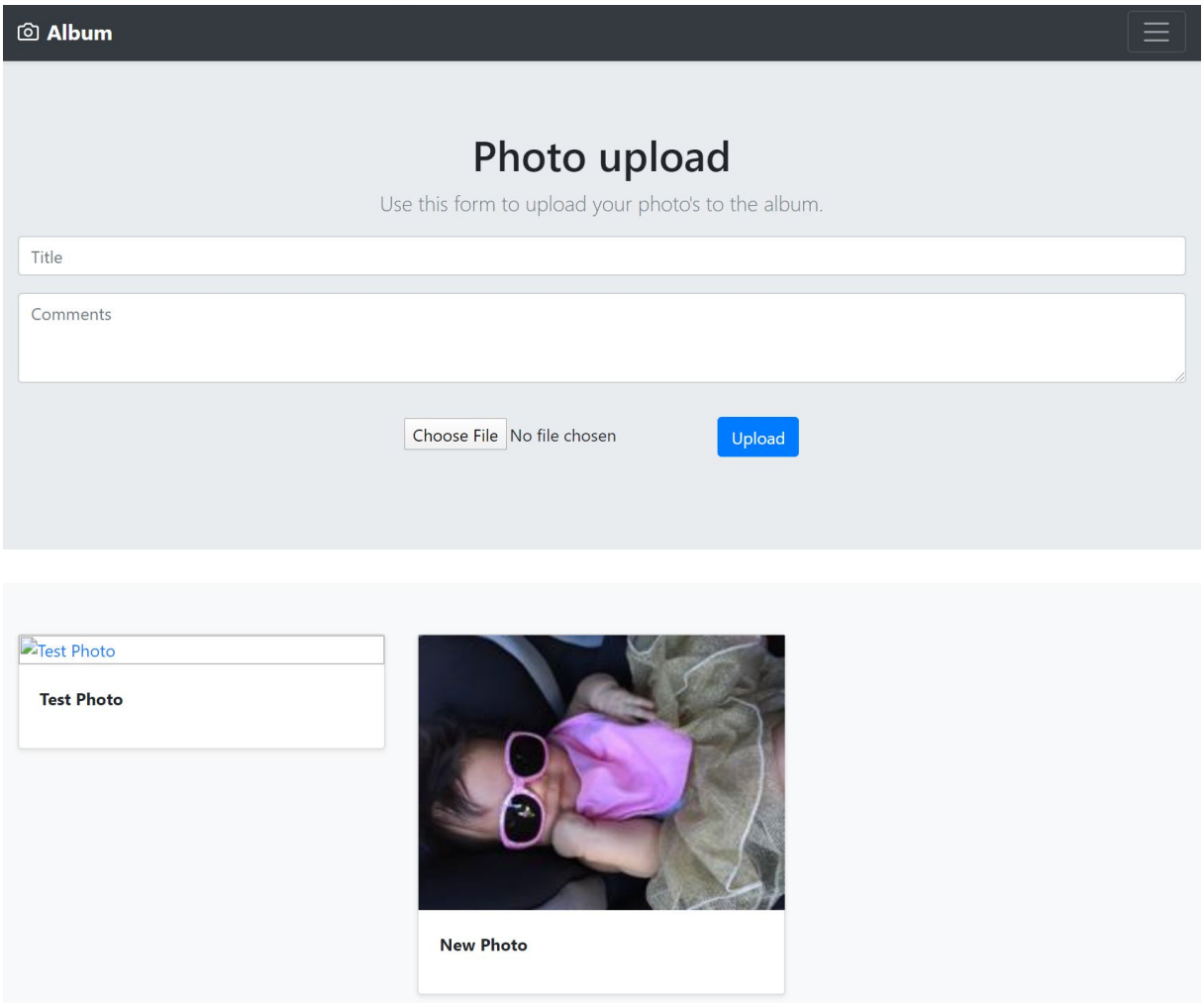
config-example.py

```
ecs_test_drive = {
    'ecs_endpoint_url' : 'https://object.ecstestdrive.com',
    'ecs_access_key_id' : '1234-your-unique-number-5678@ecstestdrive.emc.com',
    'ecs_secret_key' : 'your-long-secret-key-from-ECS-testdrive-portal',
    'ecs_bucket_name' : 'photo-album'
}
```

.gitignore

```
1  config.py
2  __pycache__
```

When you test your new app, it should link your image and display the thumbnail similar to the below;


Album
Photo upload
Use this form to upload your photo's to the album.
Title
Comments
Choose File
No file chosen
Upload
Test Photo
Test Photo
New Photo

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Lab 8: TAS & MongoDB

Module Objectives:

- ❑ Upload app to TAS PaaS platform
- ❑ Use a shared MongoDB instance
- ❑ Edit the TAS environment variables to connect the app to the MongoDB database
- ❑ Review the code and become familiar with the Python code
- ❑ Test the functionality of the web app
- ❑ Save and upload to GitHub

DELL Technologies

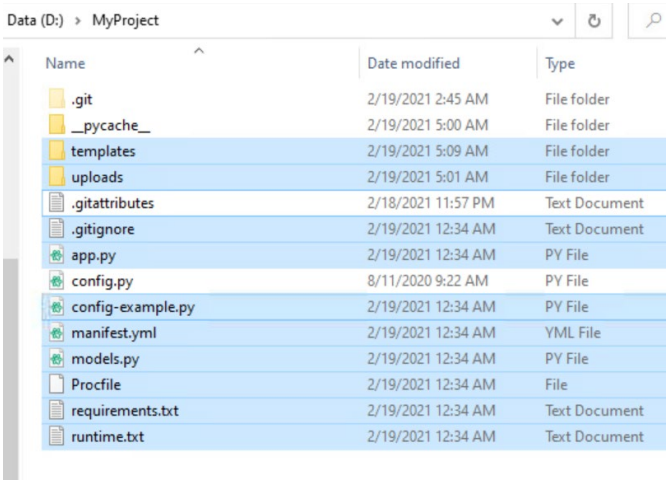
Lab Exercise (Part A): Create the pre-requisite platform files and upload the app to Hosted TAS

1. (If not already done in Lab 3), download the following files from Lab 08 - TAS & MongoDB directory of the repository (link as below) and place into your working project folder

   https://github.com/chotiwitj/Piper-TH-Workshop/tree/master/Part%201/Lab%2008%20-%20TAS%20%26%20MongoDB

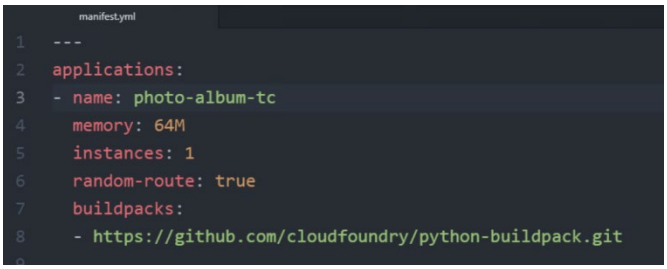
2. Copy all files in the Lab 08 – TAS & MongoDB folder and place into your working directory (overwrite any existing files in your working directory)

3. Your project directory should look like this;



4. Edit the manifest.yaml file and make the following 2 changes
   – Add a unique name to the application name: line

   Your file should look similar to the below;



5. Open a command prompt and navigate to your project

   > d:
   > cd MyProject

6. Login to TAS with the below account credentials

   > cf login -a https://api.sys.tan-zu.com --skip-ssl-validation

```
D:\MyProject>cf login -a https://api.sys.tan-zu.com --skip-ssl-validation
API endpoint: https://api.sys.tan-zu.com

Email: student

Password:
Authenticating...
OK

Targeted org piper

Targeted space development



API endpoint:   https://api.sys.tan-zu.com (API version: 3.85.0)
User:           student
Org:            piper
Space:          development
```

7. Push the app to the TAS platform

   > cf push

```
D:\MyProject>cf push
Pushing from manifest to org apples-pivotal-org / space development as theo.crithary@dell.com...
Using manifest file D:\MyProject\manifest.yml
Getting app info...
Creating app with these attributes...
+ name:        photo-album
  path:        D:\MyProject
+ instances:   1
+ memory:      64M
  routes:
+   photo-album-shiny-hippopotamus-dn.cfapps.io

Creating app photo-album...
Mapping routes...
Comparing local files to remote cache...
Packaging files to upload...
Uploading files...
 90.00 KiB / 90.00 KiB [=============================================================================================] 100.00% 1s

Waiting for API to complete processing files...

Staging app and tracing logs...
```

8. Your app will fail to start and crash……. Why?

```
Waiting for app to start...
Start unsuccessful

TIP: use 'cf logs    photo-album --recent' for more information
FAILED
```

   This is because we have not provided the connection details for the MongoDB database. In the next section (Part B) we will use the platform environment variables to connect our application to the database as a more secure 12-factor compliant method of storing credentials than the previous examples of using plain text files and hard coded connection strings.

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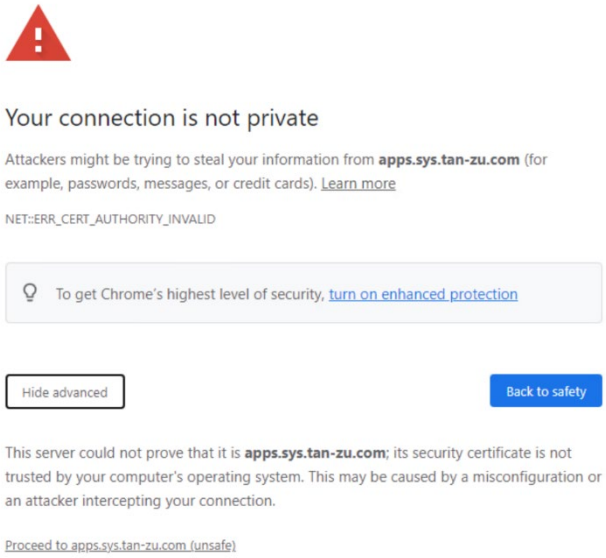
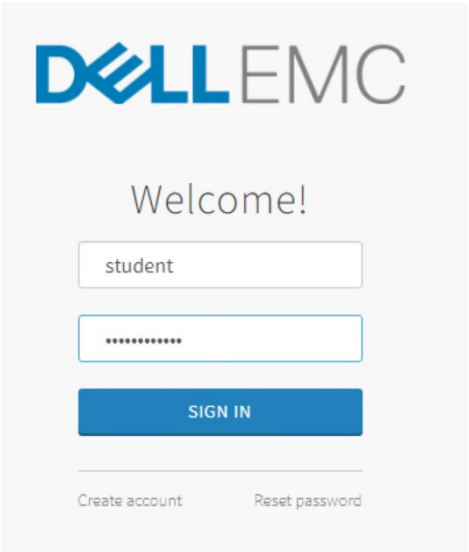
Lab Exercise (Part B): Add the MongoDB database connection environment variables

1. Open a browser and go to https://apps.sys.tan-zu.com
   (accept the SSL certificates as they are self-signed, you will need to do this twice)

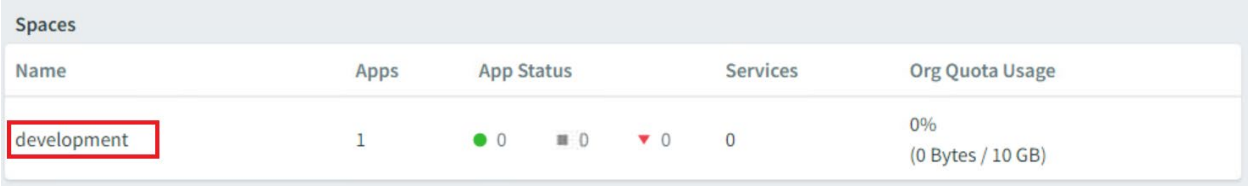


2. Login with the same account credentials as above

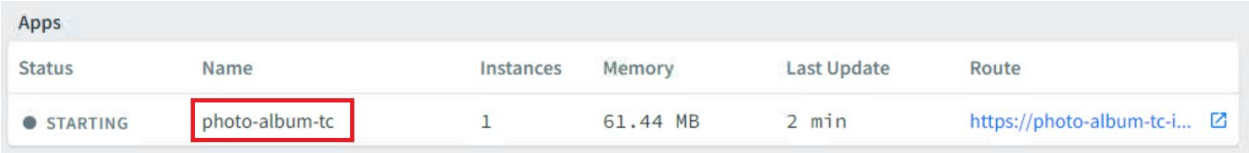


3. Click on the org name – piper

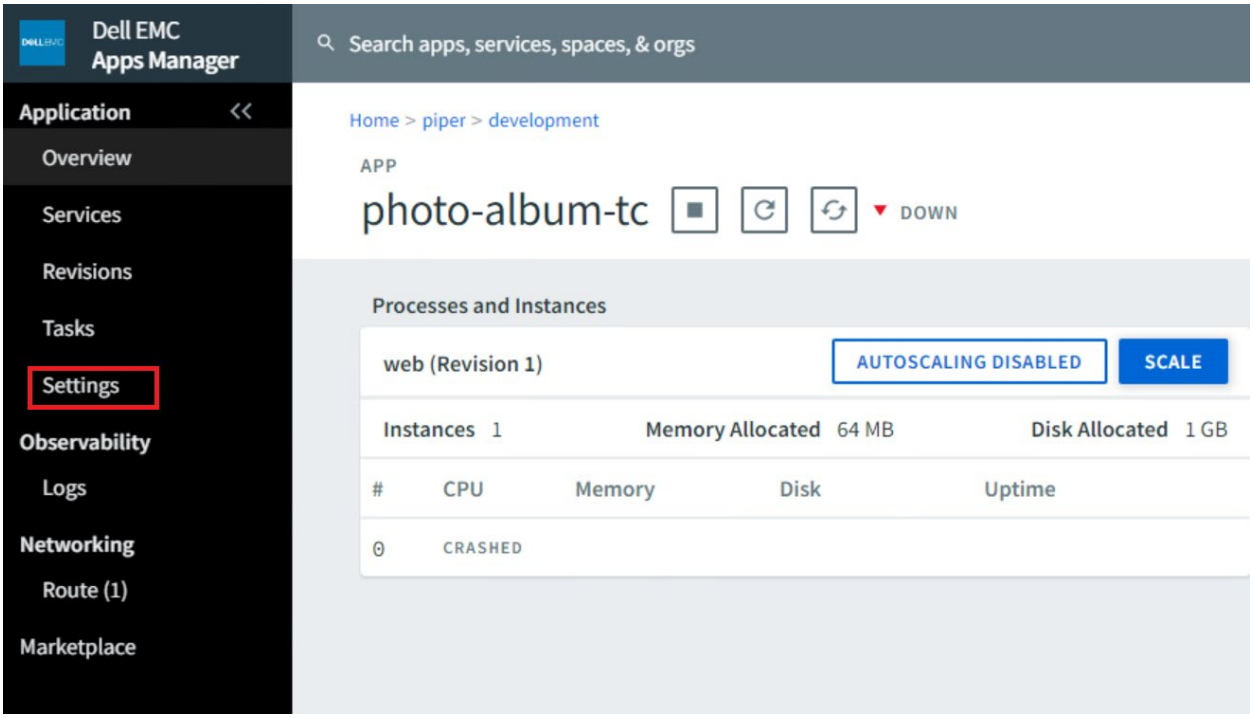
Then the space named – development



Then 'your' application, as named in the manifest file in Part A - e.g. photo-album-tc

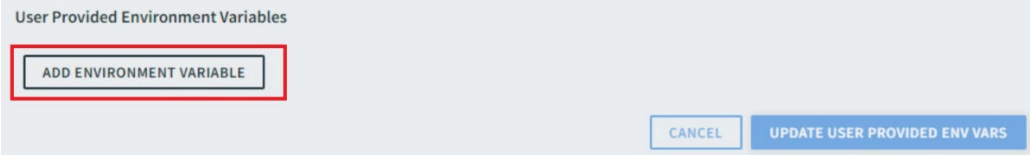


4. Now, on the left-hand menu, click 'settings'



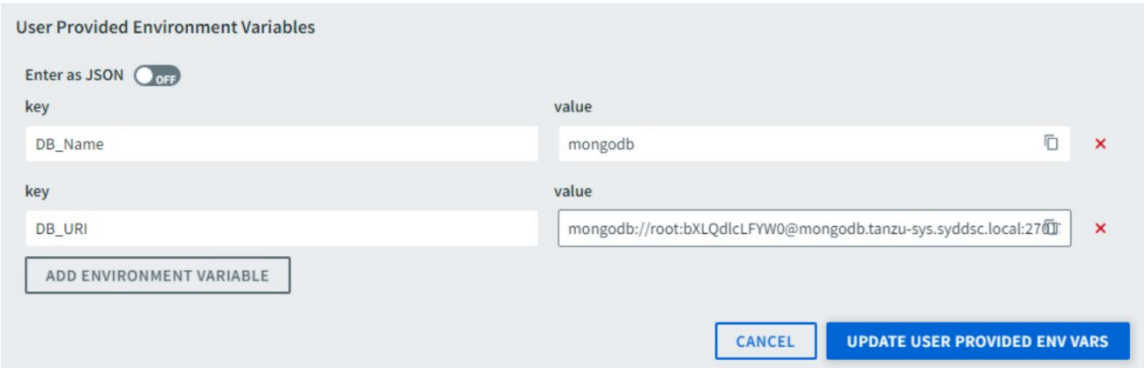
5. Scroll down to the section "User Provided Environment Variables" and click on "REVEAL USER PROVIDED ENV VARS"

6. Then click on “ADD ENVIRONMENT VARIABLES”



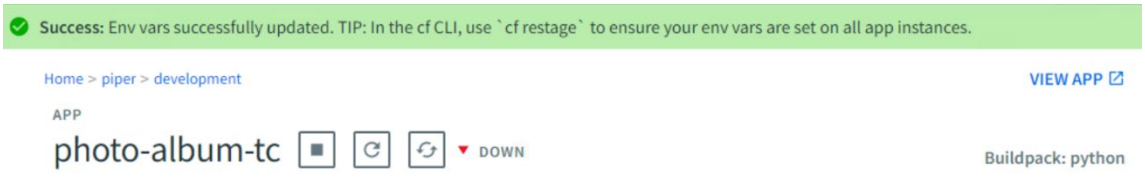
7. Add these two users provided environment variables-

- 1st key value pair as:
  - Key- DB_Name
  - Value- mongodb
- Then, click on ADD ENVIRONMENT VARIABLE and 2nd key value pair as below
  - key- DB_URI
  - value- mongodb://root:bXLQdIcLFYW0@mongodb.sys.tan-zu.com:27017/?authSource=admin

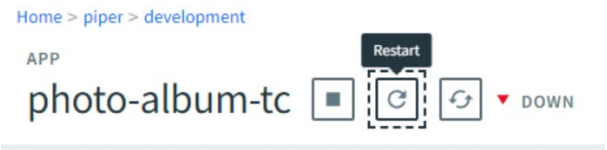


Then, click on ‘update user provided env vars’ to save the changes

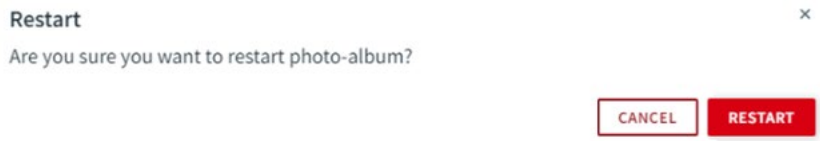
8. Upon successful update, you will receive the following message as successfully updated.



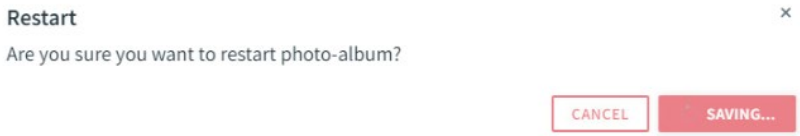
9. Click on restart button on the App- photo-album.



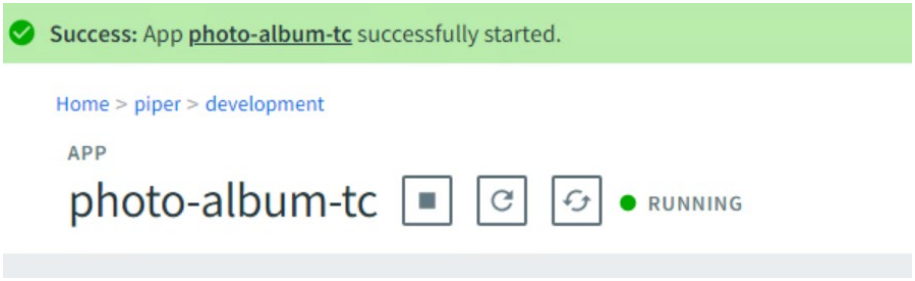
10. Confirm Restart when message pops up for confirmation to restart the app.



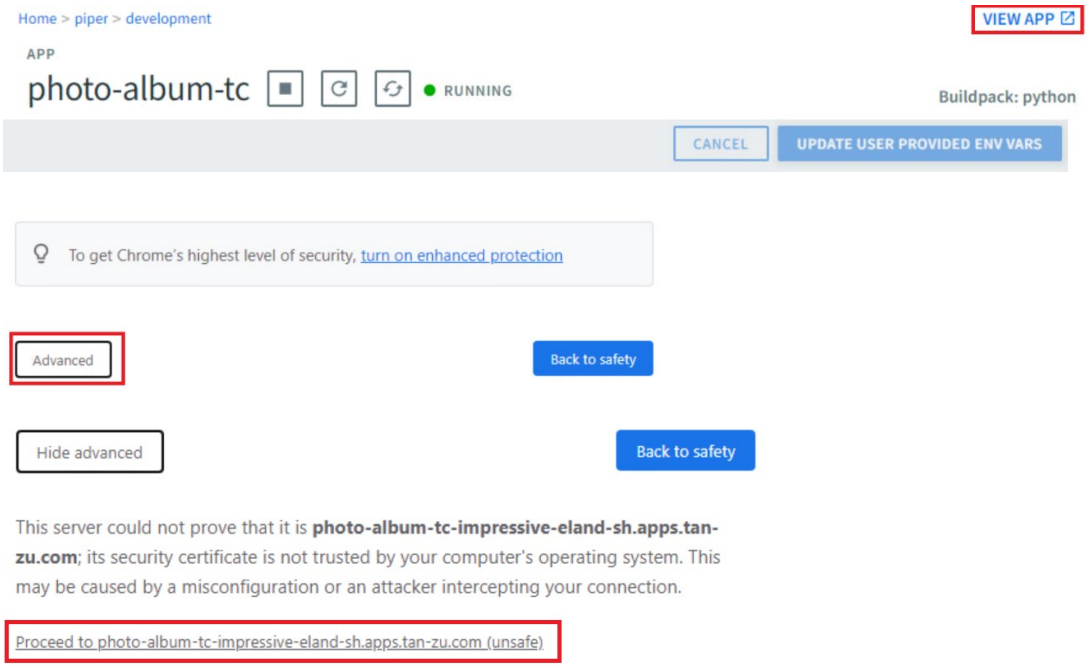
11. Await while its saving… (takes a minute)



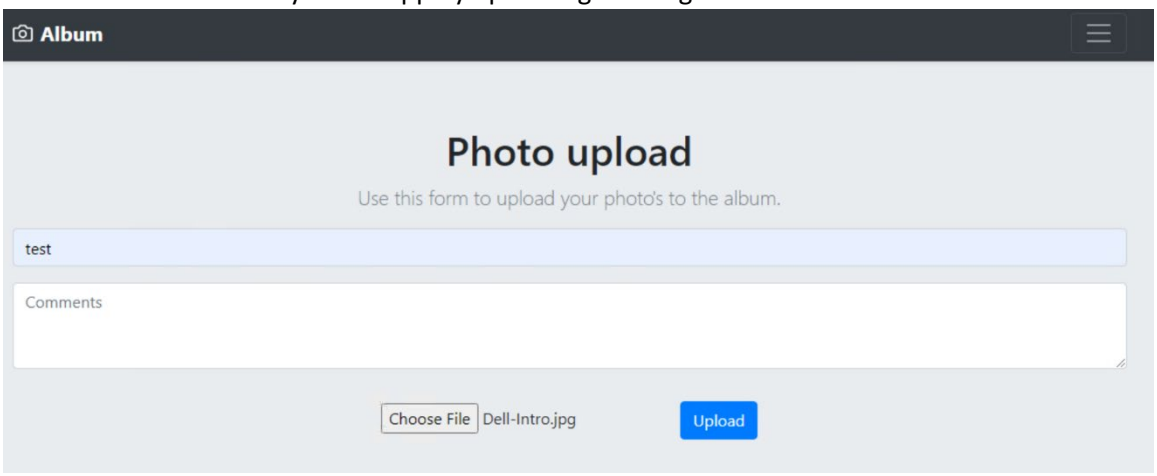
12. Upon successfully saving the settings, you should see app successfully started with below message

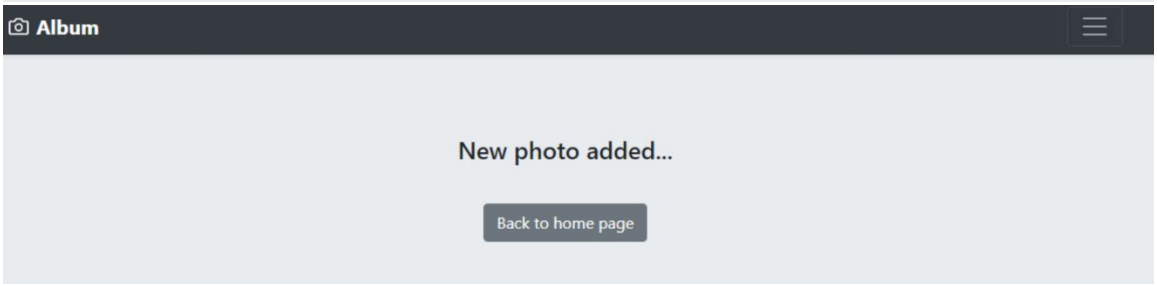


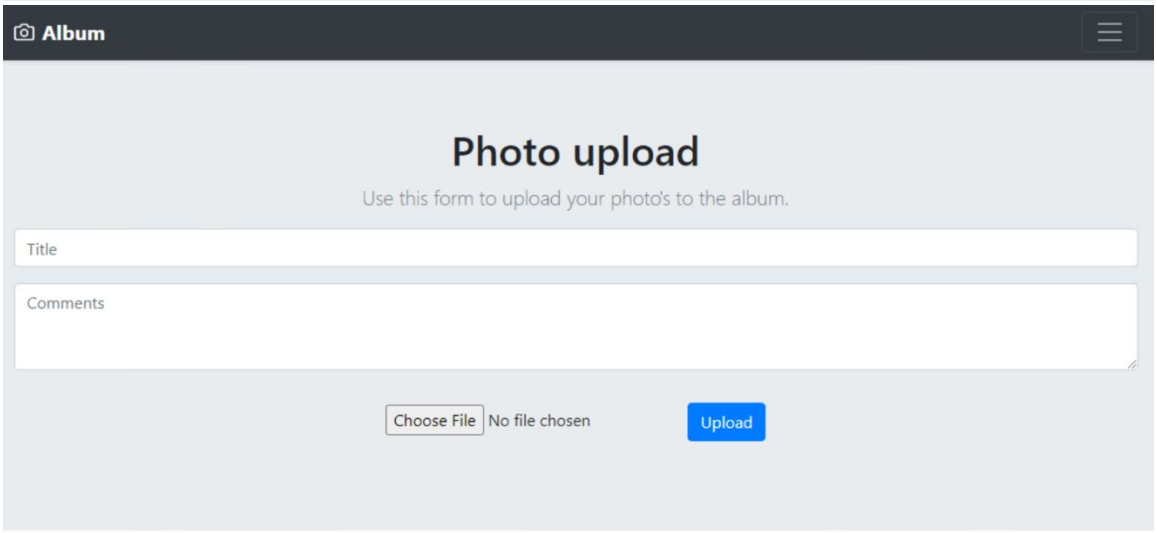
13. Verify the app by clicking on View App and accept the self-signed certificates again

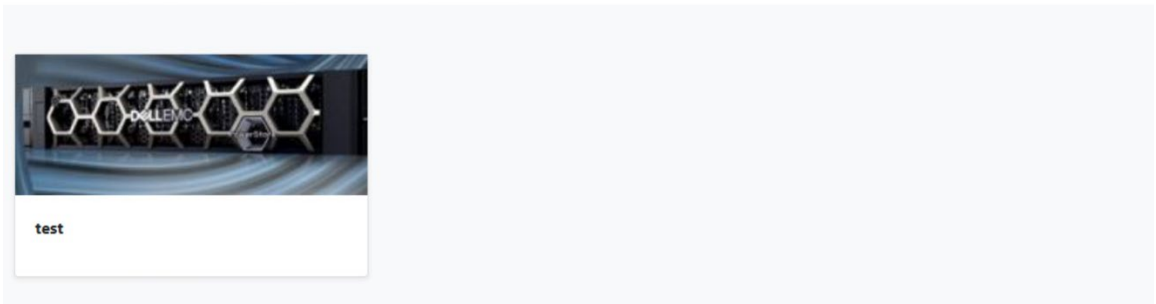


14. Confirm the functionality of the app by uploading an image.









15. Clean up and delete your app by running the following in the command prompt
    > cf delete photo-album -r

    Note: use your unique application name as specified in the manifest file and don't forget the '-r' option at the end to remove the route for your application

DELL Technologies

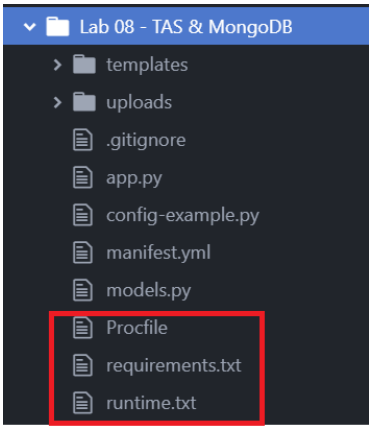
Retrospective: Review code and take note of the 'DB_URI' section in models.py

The application is now running in a resilient PaaS platform with the ability to scale on demand with autoscaling or manually with admin intervention.

Take note of the models.py application code for user defined environment variables for MongoDB that we setup manually in the previous Lab Part B section.

```
### Application configuration settings ###
# Check if user defined environment variable exists
if "DB_URI" in os.environ:
    client = MongoClient(os.environ['DB_URI'])
    DB_NAME = os.environ['DB_Name']
```

Take note of the **platform specific files required for the PaaS environment** to configure and setup the containers with the right pre-requisites for the application to run.



manifest.yml

```
---
applications:
- name: photo-album
  memory: 64M
  instances: 1
  random-route: true
```

requirements.txt

```
pip==21.0.1
Flask==1.1.2
boto3==1.17.4
Pillow==8.1.0
pymongo==3.11.3
Werkzeug==1.0.1
dnspython==2.1.0
```

Procfile

```
web: python3 app.py
```

runtime.txt

```
python-3.9.1
```