2020-10-25

ASSIGNMENT 5

FUNDAMENTALS OF DATABASE TECHNOLOGIES

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Question 1:

ORM(Object-relational mapper) is a programming technique which maps class to table in database. Specifically, it maps object from record, and maps attribute from field. ORM is useful in database programming because it provides a method for developers to interact with database using any language of choice, instead of writing SQL statements. It also provides a lot of advanced features, such as support for transactions, connection pooling, migrations, seeds, and streams.[1]

Question 2:

• The Flask server: flask is a python framework which is used to create web app. It is classified as a microframework because it does not require particular tools and libraries, so the code is simple while extensible. Flask supports extensions to add functionality to the application, including database integration, form validation, upload handling, various open authentication technologies, and more.[2] It is created by Armin Ronacher of Pocoo, an international group of Python enthusiasts formed in 2004. [3]

• The SQLAlchemy ORM: SQLAlchemy ORM is a python library which facilitates python program to communicate with relational databases. It is named as ORM because it could translates Python classes to tables on relational databases and automatically converts function calls to SQL statements. It is usually used to query data on Python applications.[4]It is a open-source SQL toolkit and is initially released on February 14, 2006. The original author is Michael Bayer.[5]

• The Heroku hosting platform: Heroku is a cloud platform as a service. It is a managed container system, with integrated data services and a powerful ecosystem, for deploying and running modern apps.[6] Heroku was initially developed by James Lindenbaum, Adam Wiggins, and Orion Henry for supporting projects that were compatible with the Ruby programming platform known as Rack. The name "Heroku" is a portmanteau of "heroic" and "haiku. It faced drawbacks after it is initially released because it lacked market, as many app developers used their own tools and environment.[7]

• The Git version control tool: Git is a modern version control system. It helps software developers to manage changes to source code over time. Git keeps track of every modification to the code in a special kind of database. If a mistake is made, developers can turn back the clock and compare earlier versions of the code to help fix the mistake while minimizing disruption to all team members. It is originally developed in 2005 by Linus Torvalds, the famous creator of the Linux operating system kernel.[8]

Question 3:

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>pip install flask
Collecting flask
  Using cached Flask-1.1.2-py2.py3-none-any.whl (94 kB)
Requirement already satisfied: Jinja2>=2.10.1 in f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assignment
_5\server\venv\lib\site-packages (from flask) (2.11.2)
Requirement already satisfied: itsdangerous>=0.24 in f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assign
ment_5\server\venv\lib\site-packages (from flask) (1.1.0)
Requirement already satisfied: click>=5.1 in f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assignment_5\s
erver\venv\lib\site-packages (from flask) (7.1.2)
Requirement already satisfied: Werkzeug>=0.15 in f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assignment
_5\server\venv\lib\site-packages (from flask) (1.0.1)
Requirement already satisfied: MarkupSafe>=0.23 in f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assignme
nt_5\server\venv\lib\site-packages (from Jinja2>=2.10.1->flask) (1.1.1)
Installing collected packages: flask
Successfully installed flask-1.1.2
WARNING: You are using pip version 20.2.1; however, version 20.2.4 is available.
You should consider upgrading via the 'f:\ic_ba_2020\fundamentals_of_database_technologies\homework\assignment_5\server\
venv\scripts\python.exe -m pip install --upgrade pip' command.
```

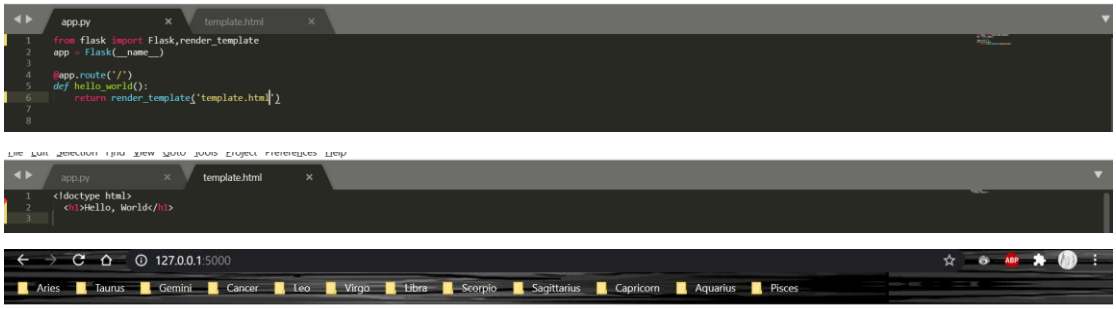
Question 4:

Question 5:

If I change the scripts in app.py to something else and refresh the web page, the new value is not shown. Therefore, I searched online for solution and found that I need to turn on the debug mode by setting FLASK_ENV the environment variable to development. After I done that, I reran the FLASK RUN command. Now if I change the scripts in app.py and save it, Flask will automatically reload the code.

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>set FLASK_ENV=development

(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>flask run
 * Environment: development
 * Debug mode: on
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 378-561-476
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Question 6:



Hello, World!

Question 7:

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>git init
Initialized empty Git repository in F:/IC_BA_2020/Fundamentals_of_Database_Technologies/Homework/Assignment_5/server/.gi
t/
```

Question 8:

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>git add .
warning: LF will be replaced by CRLF in venv/Lib/site-packages/Flask-1.1.2.dist-info/INSTALLER.
The file will have its original line endings in your working directory
warning: LF will be replaced by CRLF in venv/Lib/site-packages/Flask-1.1.2.dist-info/LICENSE.rst.
The file will have its original line endings in your working directory
warning: LF will be replaced by CRLF in venv/Lib/site-packages/Flask-1.1.2.dist-info/METADATA.
```

Question 9:

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>git commit -m"my first commit"
[master (root-commit) d6bba06] my first commit
 1351 files changed, 228644 insertions(+)
 create mode 100644 __pycache__/app.cpython-38.pyc
 create mode 100644 app.py
 create mode 100644 templates/template.html
 create mode 100644 venv/Lib/site-packages/Flask-1.1.2.dist-info/INSTALLER
```

Question 10:

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>pip install heroku
Collecting heroku
  Using cached heroku-0.1.4.tar.gz (10 kB)
Collecting requests>=1.0.0
  Using cached requests-2.24.0-py2.py3-none-any.whl (61 kB)
Collecting python-dateutil==1.5
  Using cached python-dateutil-1.5.tar.gz (233 kB)
```

Question 11:

After I created an account on Heroku and downloaded the Heroku toolbelt, I first login into the account by using **Heroku login**, which brought me to a website.

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>heroku login
heroku: Press any key to open up the browser to login or q to exit:
Opening browser to https://cli-auth.heroku.com/auth/cli/browser/5304a670-27ed-4667-b8e8-1ee97d41d62f?requestor=SFMyNTY.g
3QAAAACZAAEZGF0YWOAAAAOMzEuMjA1LjIxMy4xNDBkAAZzaWduZWRuBgBKsghgdQE.Tmz1S7nV15Q2XGVtpqSERo8cVj_kzrVax4XkWjL0Vpc
Logging in... done
Logged in as z727629029@gmail.com
```

Then, I used **Heroku create** to create a app on Heroku, and deployed it with git.

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>heroku create
Creating app... done, ⬢ mysterious-plains-82636
https://mysterious-plains-82636.herokuapp.com/ | https://git.heroku.com/mysterious-plains-82636.git

(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>heroku git:remote -a mysterious-
plains-82636
set git remote heroku to https://git.heroku.com/mysterious-plains-82636.git

(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>
```

Then I used **pip freeze > requirements.txt** to generate a text file, which contains the Python libraries that Heroku needs to install to run the app.

```
(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>pip freeze > requirements.txt

(venv) F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server>
```

I added a new line in app.py to tell Heroku that it should listen on port 5000, and created a Procfile to tell Heroku how to run my server.

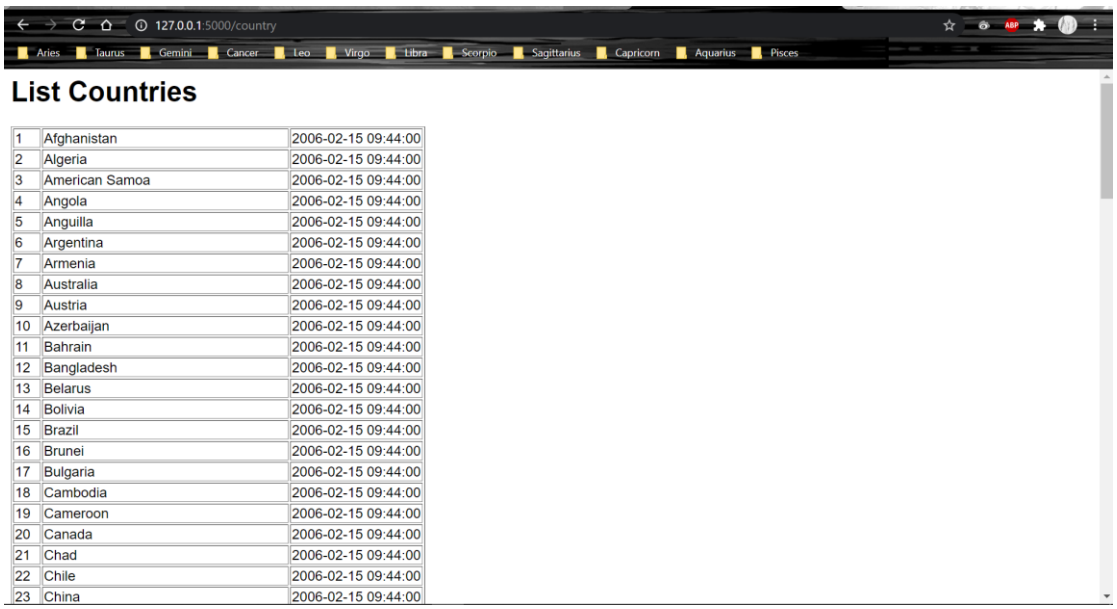
```python
from flask import Flask,render_template
app = Flask(__name__)

@app.route('/')
def hello_world():
    return render_template('template.html')


if __name__ == "__main__":
    port = int(os.environ.get('PORT', 5000))
    app.run(host='0.0.0.0', port=port)
```

```
web: python app.py
```

Now everything is set up, I used **git add .**, **git commit** and **git push heroku master** to deploy my app on Heroku. The website displays **Hello, World** successfully.

Hello, World

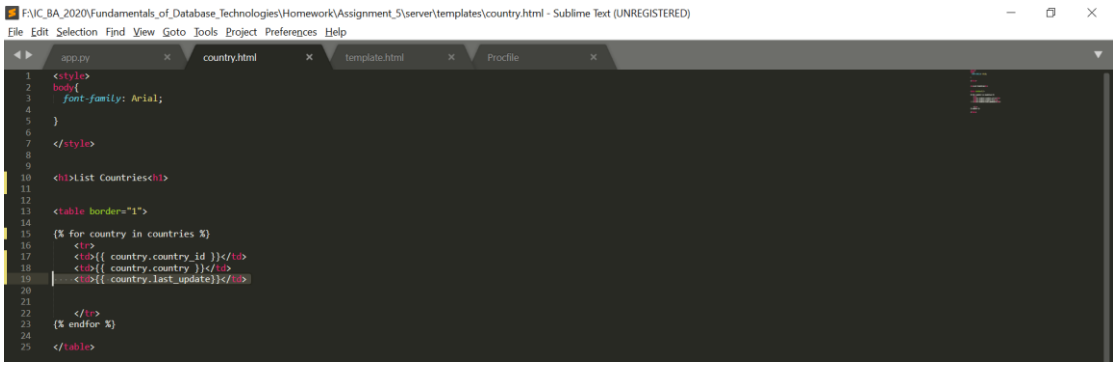
Question 12:



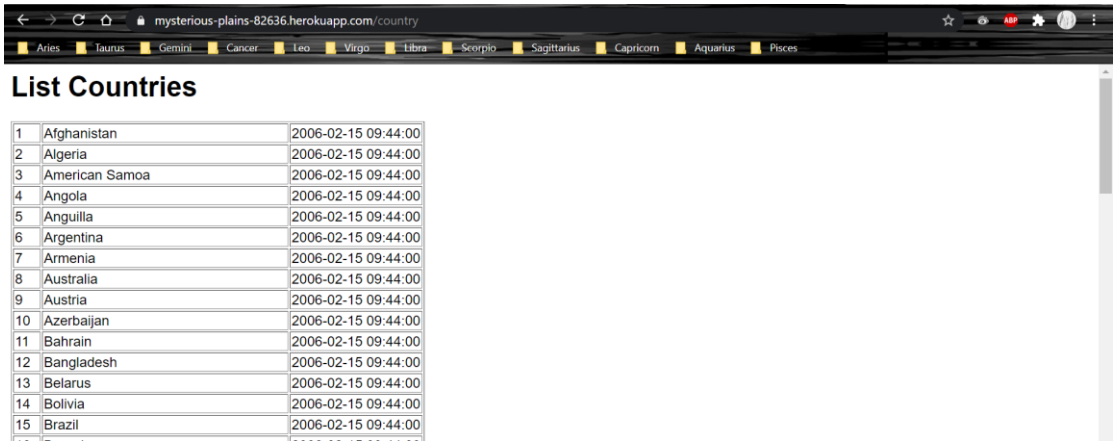
List Countries

1	Afghanistan	2006-02-15 09:44:00
2	Algeria	2006-02-15 09:44:00
3	American Samoa	2006-02-15 09:44:00
4	Angola	2006-02-15 09:44:00
5	Anguilla	2006-02-15 09:44:00
6	Argentina	2006-02-15 09:44:00
7	Armenia	2006-02-15 09:44:00
8	Australia	2006-02-15 09:44:00
9	Austria	2006-02-15 09:44:00
10	Azerbaijan	2006-02-15 09:44:00
11	Bahrain	2006-02-15 09:44:00
12	Bangladesh	2006-02-15 09:44:00
13	Belarus	2006-02-15 09:44:00
14	Bolivia	2006-02-15 09:44:00
15	Brazil	2006-02-15 09:44:00
16	Brunei	2006-02-15 09:44:00
17	Bulgaria	2006-02-15 09:44:00
18	Cambodia	2006-02-15 09:44:00
19	Cameroon	2006-02-15 09:44:00
20	Canada	2006-02-15 09:44:00
21	Chad	2006-02-15 09:44:00
22	Chile	2006-02-15 09:44:00
23	China	2006-02-15 09:44:00

```python
import os
from pdb import set_trace
from flask import Flask
from flask_sqlalchemy import SQLAlchemy
from flask import render_template
from sqlalchemy.orm import relationship
from sqlalchemy import Table, Column, Integer, ForeignKey
import pdb


app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = "postgres://imperial:imperial-fdt-online-2019-colossal-shelf@imperial-2020.ckp3dl3vzxoh.eu-west-2.rds.amazonaws.com:5432/dvdrental"
db = SQLAlchemy(app)

class Country(db.Model):
  country_id = db.Column(db.Integer(), primary_key=True)
  country = db.Column(db.VARCHAR())
  last_update = db.Column(db.DateTime())

  def __repr__(self):
    return 'Country ID: '+str(self.country_id)

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

@app.route('/country')
def country():
  countries = Country.query.all()

  return render_template('country.html', countries = countries)

if __name__ == "__main__":
  port = int(os.environ.get('PORT', 5000))
  app.run(host='0.0.0.0', port=port)
```


F:\IC_BA_2020\Fundamentals_of_Database_Technologies\Homework\Assignment_5\server\templates\country.html - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
app.py
country.html
template.html
Procfile
<style>
body{
font-family: Arial;
}
</style>
<h1>List Countries</h1>
<table border="1">
{% for country in countries %}
<tr>
<td>{{ country.country_id }}</td>
<td>{{ country.country }}</td>
<td>{{ country.last_update}}</td>
</tr>
{% endfor %}
</table>

Question 13:


mysterious-plains-82636.herokuapp.com/country
Aries
Taurus
Gemini
Cancer
Leo
Virgo
Libra
Scorpio
Sagittarius
Capricorn
Aquarius
Pisces
List Countries
1 Afghanistan 2006-02-15 09:44:00
2 Algeria 2006-02-15 09:44:00
3 American Samoa 2006-02-15 09:44:00
4 Angola 2006-02-15 09:44:00
5 Anguilla 2006-02-15 09:44:00
6 Argentina 2006-02-15 09:44:00
7 Armenia 2006-02-15 09:44:00
8 Australia 2006-02-15 09:44:00
9 Austria 2006-02-15 09:44:00
10 Azerbaijan 2006-02-15 09:44:00
11 Bahrain 2006-02-15 09:44:00
12 Bangladesh 2006-02-15 09:44:00
13 Belarus 2006-02-15 09:44:00
14 Bolivia 2006-02-15 09:44:00
15 Brazil 2006-02-15 09:44:00

References

[1] https://blog.bitsrc.io/what-is-an-orm-and-why-you-should-use-it-b2b6f75f5e2a
[2] https://flask.palletsprojects.com/en/1.1.x/foreword/
[3] https://en.wikipedia.org/wiki/Flask_(web_framework)
[4] https://auth0.com/blog/sqlalchemy-orm-tutorial-for-python-developers/
[5] https://en.wikipedia.org/wiki/SQLAlchemy
[6] https://www.heroku.com/platform
[7] https://en.wikipedia.org/wiki/Heroku
[8] https://www.atlassian.com/git/tutorials/what-is-version-control