GMIT-Forum

Dongming Guo

Bachelor of Software & Electronic Engineering

Galway-Mayo Institute of Technology

2019/2020

Declaration

I here by declare that the project work entitled “GMIT FORUM” submitted to the GMIT, is a record of an original work done by me and the supervisor of Mark Sherlock, and this project work is submitted in the partial fulfilment of the requirements for the award of the degree of Honours degree of Galway-Mayo institute of technology in Software and electronic engineering. The results embodied in this thesis have not beed submitted to any other University or Institute for the award of any degree or diploma.

DongmingGuo

April 10th 2020

G00353397

Acknowledgements

The project started in October 2019 the first week, Appreciate the help from the supervisor Mark Sherlock, through each week Monday meeting I could get few suggestions so that it can help me to have a good direction to do my home work. And I am grateful to the GMIT offers me the hardware to do some work for this project.

As for the budget, it is because the AWS provides student for educate account hence this project doesn't need extra fund from GMIT.

Poster

DongmingGuo-Developer

Problem

- Sometimes urgently need the help from others
- Most classmates only can meet in the class
- Want to make an appointment but don' t know how
- When post a piece of code but not highligt
- Shorten the time that get the right way to solve the problem

Solution

- Building a website as a forum to collect the question from students
- Questions will be ranked according its times that clicked
- Code will be displayed after highlighted
- RESTful API for Mobile end

Feature

- Code Highlight
- Fast response
- RESTful API
- High security of users' privacy

Implementation

- Flask, a light weight python framework
- Use Python as the main backend programming language, and HTML5, Mysql, jQuery for the website
- AWS as the platform to deploy this website
- Flutter as the programming language for developing the Mobile-end
- Mysql as the powerful tool to store users' data
- Bootstrap for generating front-end style

Test

- Test on the mobile-end browsers
- Test on the popular browsers
- App generated by the flutter is tested on the device
- Test the mysql connection
- Test the input if it can be received by the database

Content

1 Introduction

After years study in Software engineering, it is soon the time to finalise everything in GMIT, The purpose of doing this project is to show the ability of combining the idea with acknowledge that I acquired so far, meanwhile, it is also a challenge for me that how to plan a project from the very beginning to design each part so that the project can be developed on time.

It is a good time for examine the experience I had since finished the work-placement in Sidero Athlone. To be a software developer in the further life, obviously only designing the good code is not enough but having the vision to construct a proper project structure from the top to the bottom can also be necessary. Thus, here I am aiming to design a website including the part of backend and frontend.

1.1 Motivation

Its been a while that I noticed many students are facing the problem when they are in home to do their homework or assignment even for preparing their exams, they usually encountered the scenario that they need to get help from classmates or professor but they have nowhere to ask or get helpful information so that they can save their time and put more focus on the main thread for preparing or doing their work. Hence, I want to build a website for those who want to get help and want to have a place to discuss about the acknowledge they are confused, like the old saying in China " there is always someone to learn from". Originally, I think the core value of this website is to help people to save time and easily get the way for solving the problem, let students who are studying in GMIT would not feel alone on their academic.

Secondly, to some degree, coding as a skill empower me to make my idea to be true, and through building the project it can improve the quality of coding for me also improving the ability of logical thinking for creating a project.

Last but not least, like the TED always tell people. Ideas worth spreading.

2 Overview of the Project

Originally as I planed, I would like to build for both ends which are Mobile end and web end, However, this plan is too big to finish on time hence I realised I should put my focus on the website part it is because when the website is getting a mature product then the mobile end can be easily established.

In this Project, students and the professors will the target user, to students this website is offering them an efficient and useful way to exchange the acknowledge, get new friends, and help students to have a better way to solve the problem they are might struggling on. Another hand, to professor, they will have an another way to gather details about their course so that improve the quality of their course.

The structure of this website are as follows:

-Login page

-register page

-Forget password page

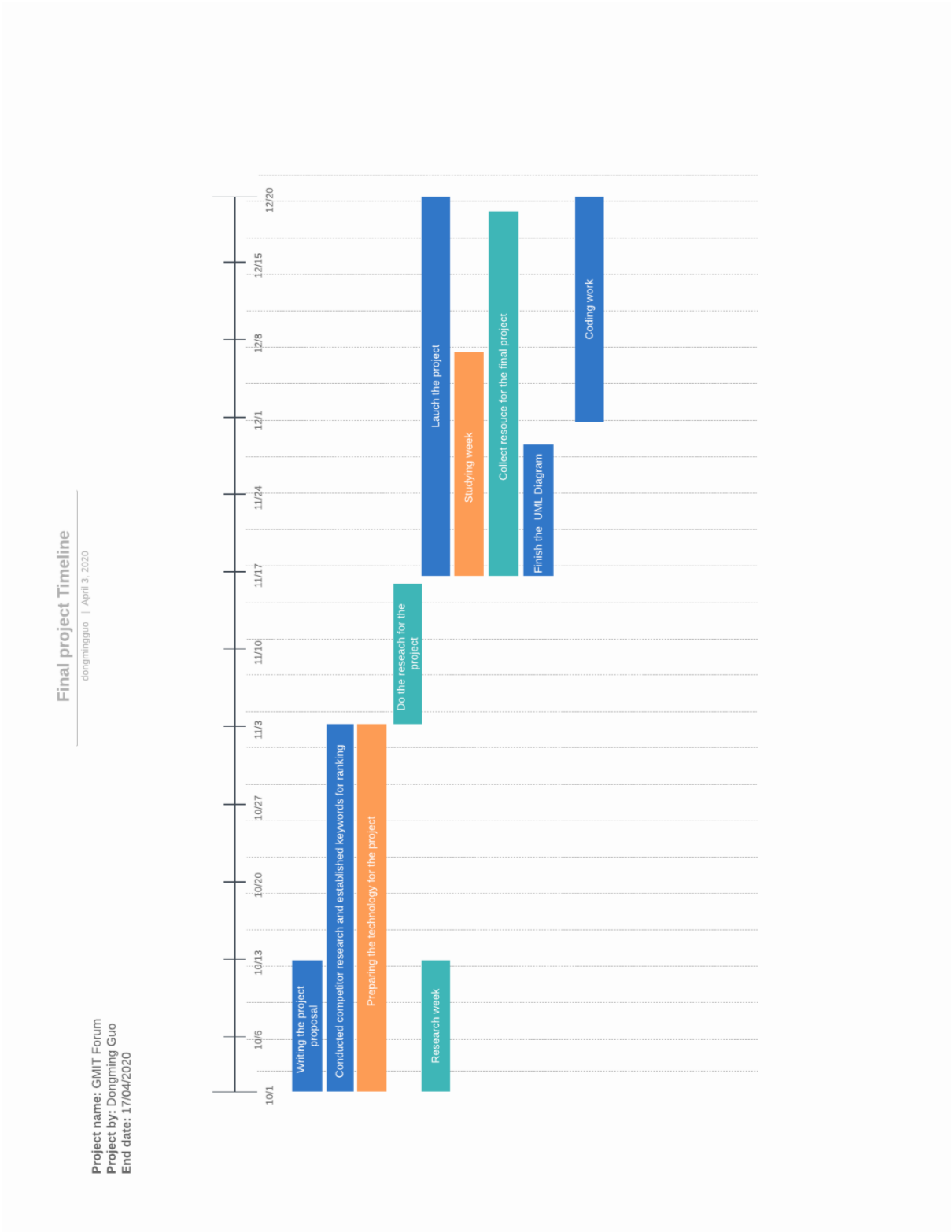
-Main page

-Write the post page

-Super user page

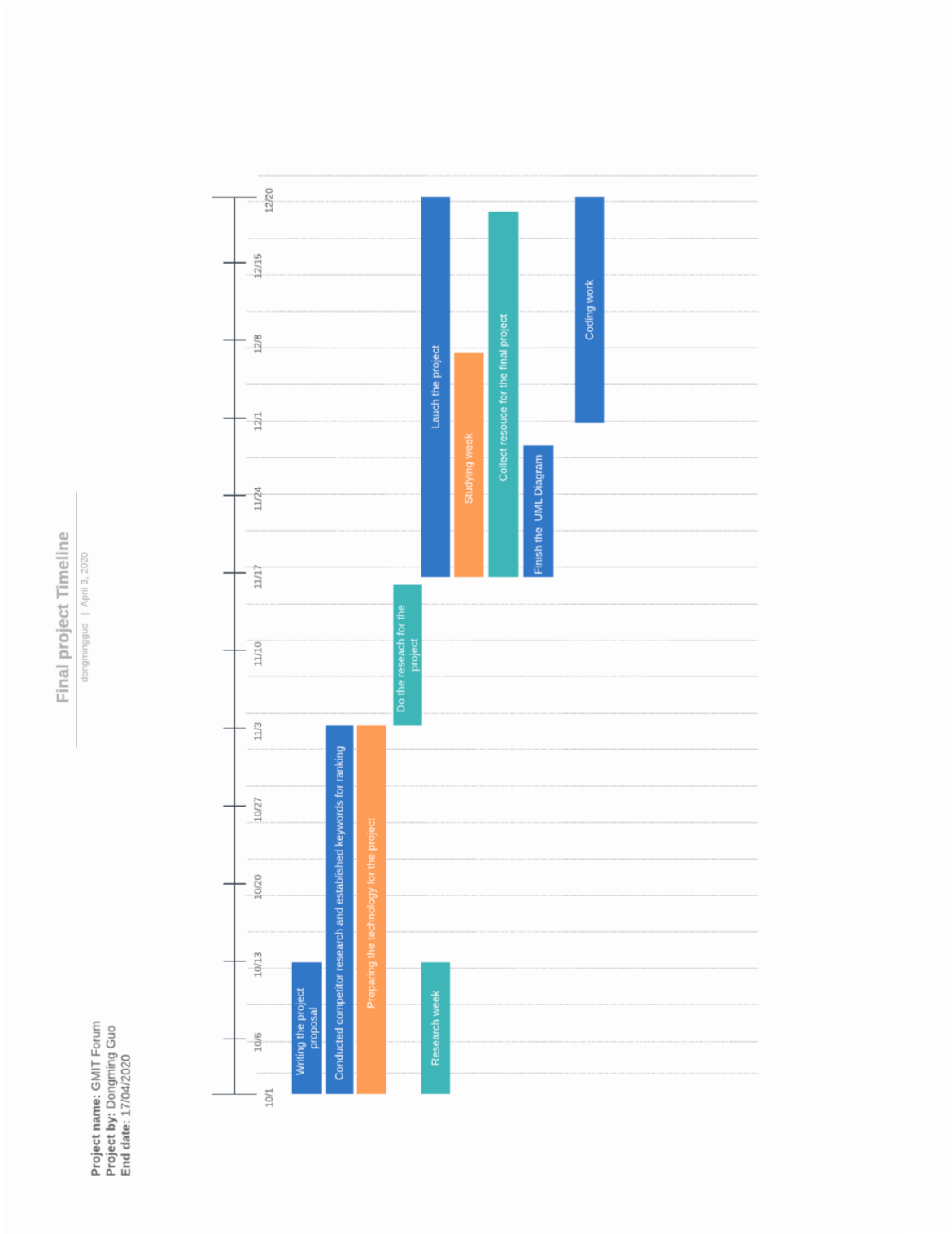
-Comment section

-Navigation bar


Final project Timeline
dongmingguo | April 3, 2020
Project name: GMIT Forum
Project by: Dongming Guo
End date: 17/04/2020
10/1
10/6
10/13
10/20
10/27
11/3
11/10
11/17
11/24
12/1
12/8
12/15
12/20
Writing the project proposal
Conducted competitor research and established keywords for ranking
Preparing the technology for the project
Research week
Do the reseach for the project
Lauch the project
Studying week
Collect resouce for the final project
Finish the UML Diagram
Coding work

3 Time management

3.1 First Semester



3.2 Summary of the technology

Front-End

-jQuery, HTML5, CSS3: these helps me to build the front-end and adjust all the style for the browser finally display, and jQuery the powerful Javascript library offers Ajax for the web pages to get data from the database from the server part.

Back-End

-Bootstrap4(for style), Flask: Bootstrap is an open source toolkit for developing with HTML, CSS, and JS. Helps me to design the web page layout and reduce the repeat steps. Flask is a back end Framework based on the python helps me to accomplish the website functionalities.

Database

-Mysql

IDE

-Pycharm(Community Edition), sublime3

Cloud server

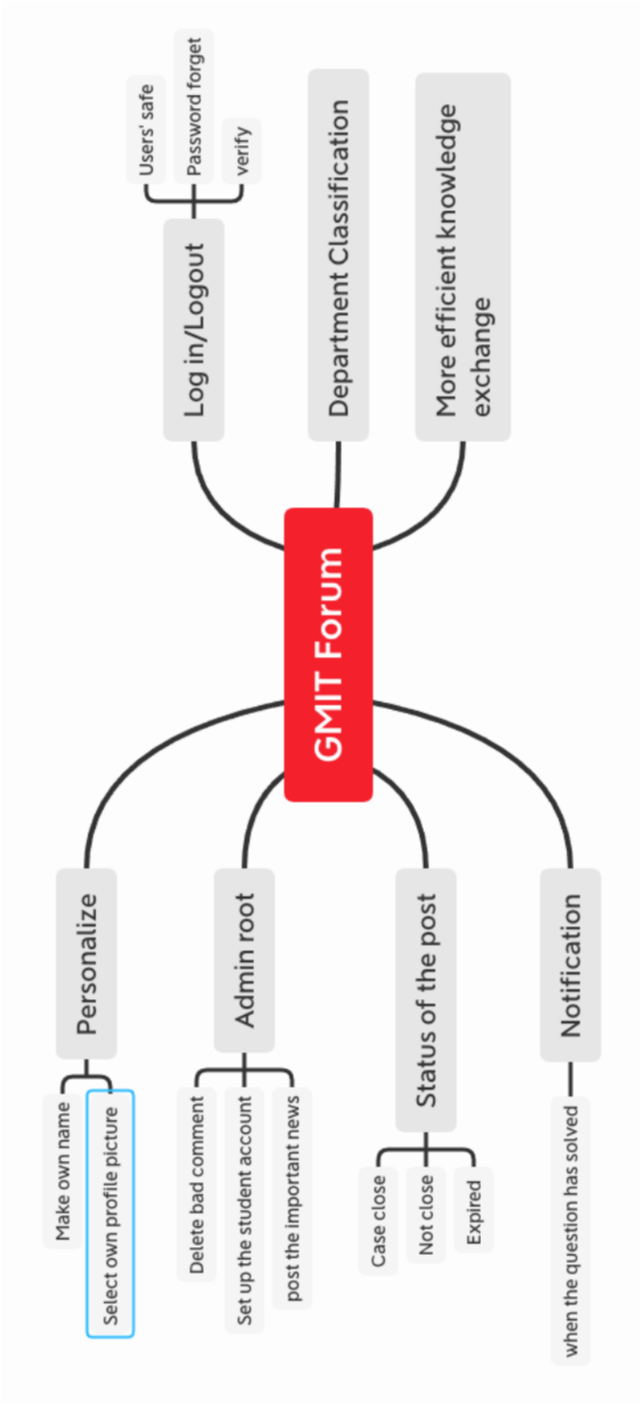
-AWS(EC2): Only for demo, I deploy this website on the AWS and take advantage of its EC2 service(Linux)

Mindmap

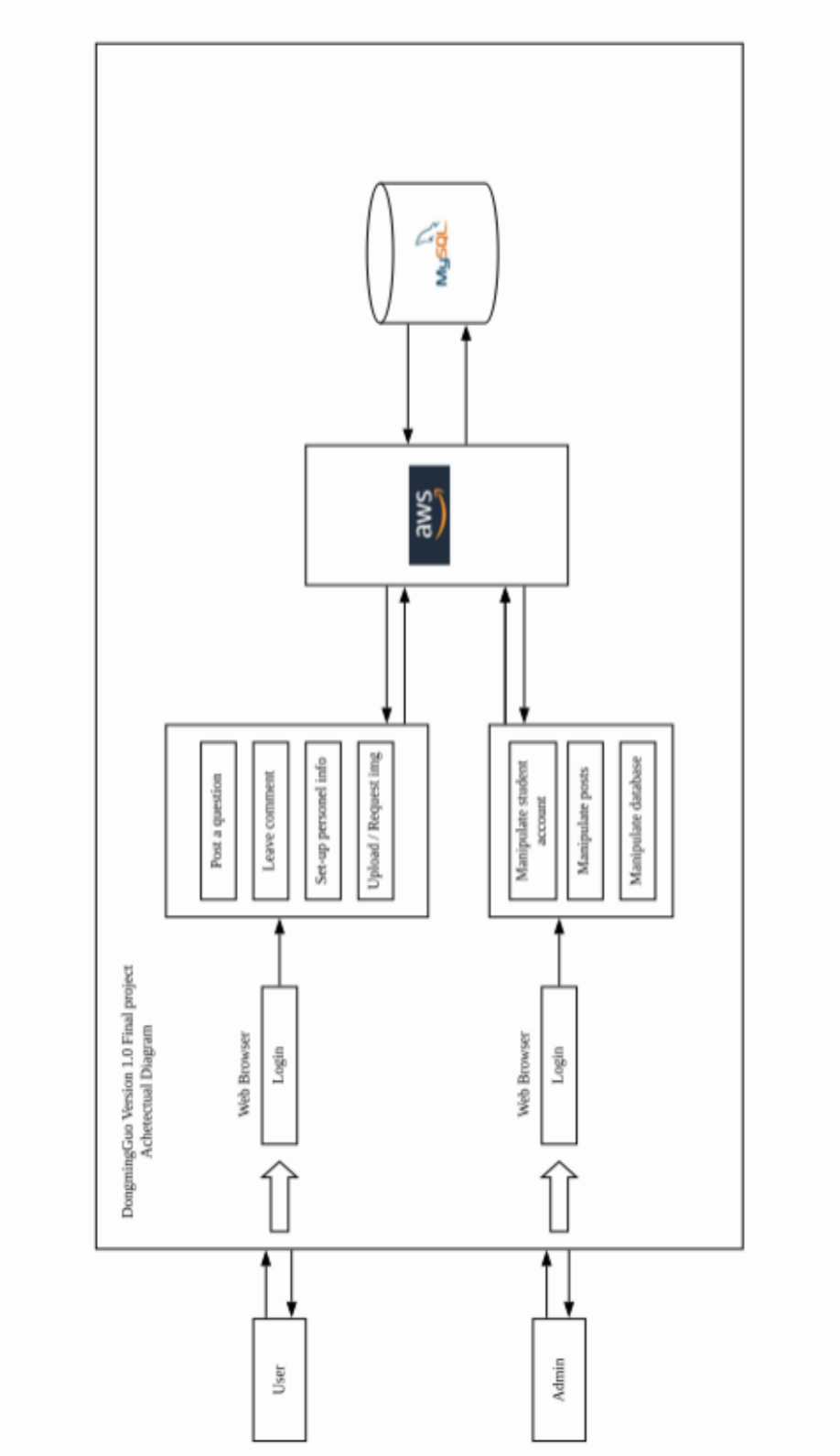
-Xmind

3.3 Mindmap

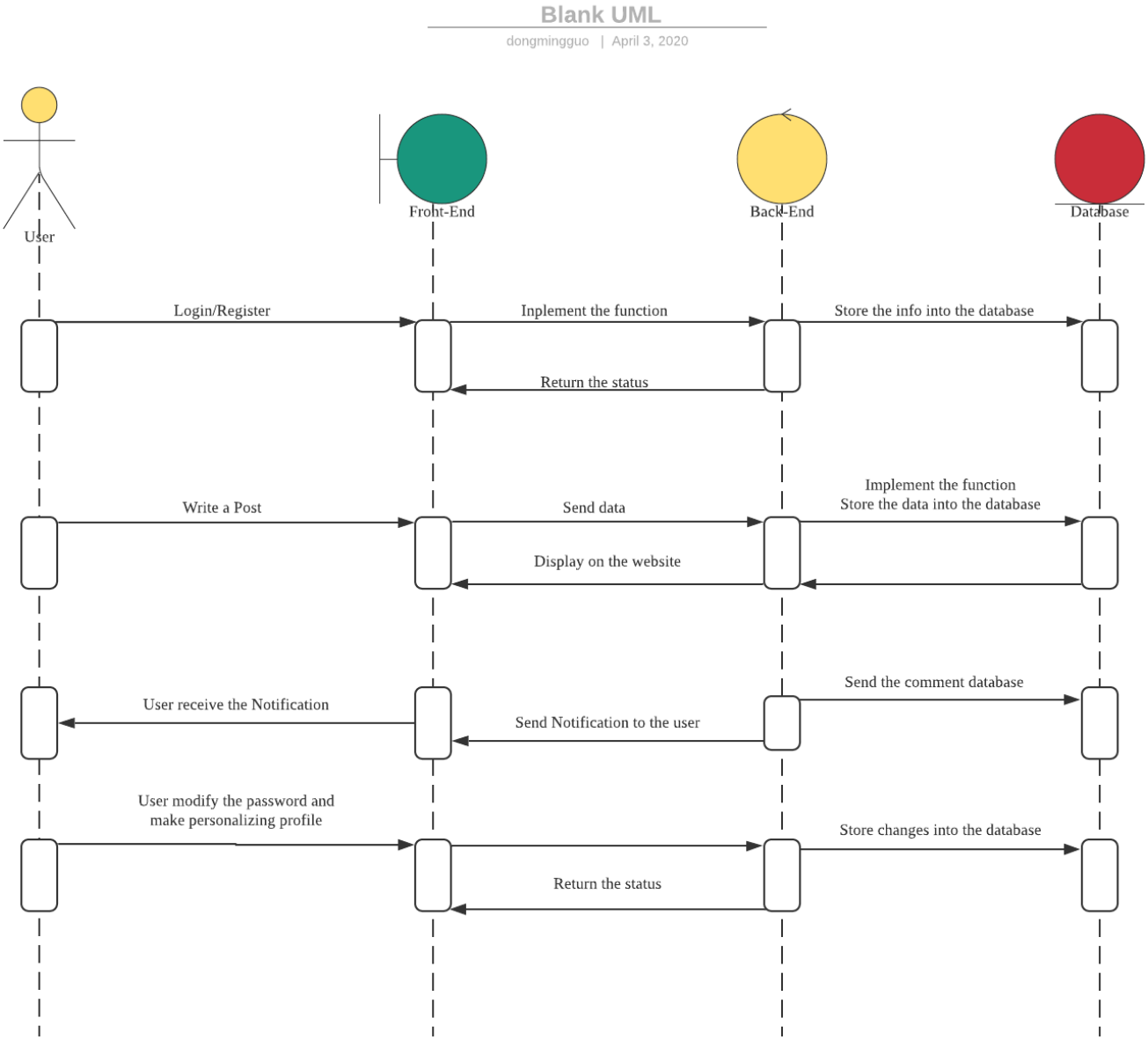
Orignial mindmap



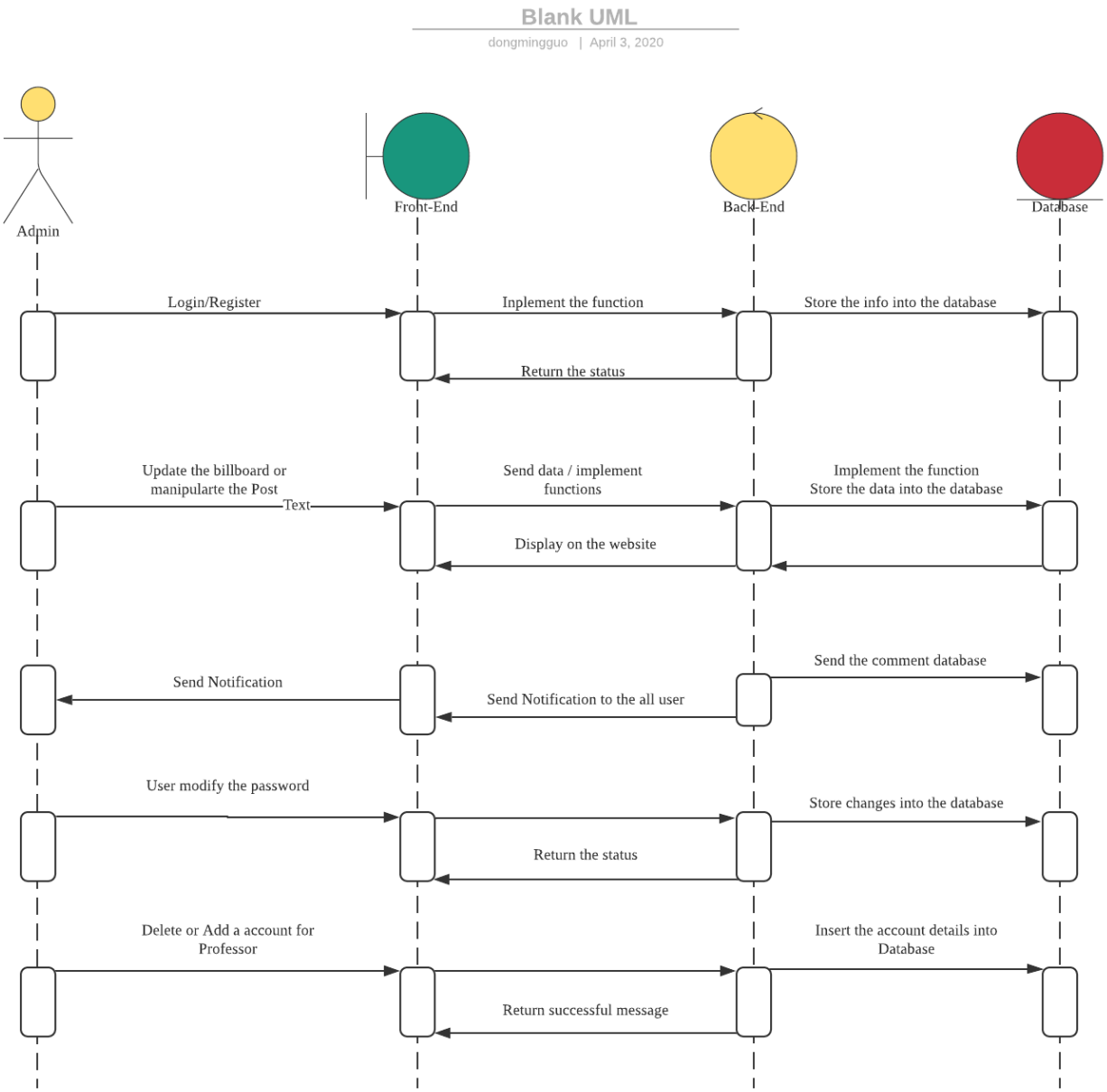
3.4 Architectural Diagram



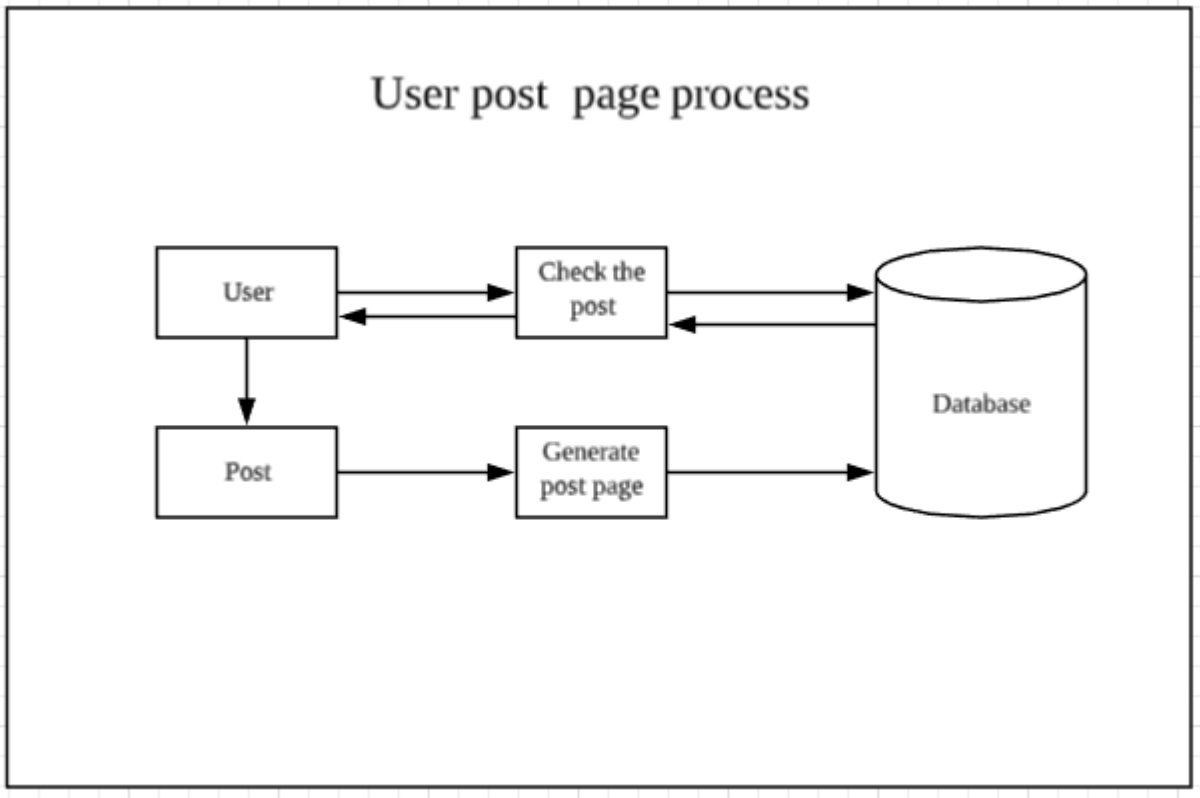
3.5 User Sequence Diagram



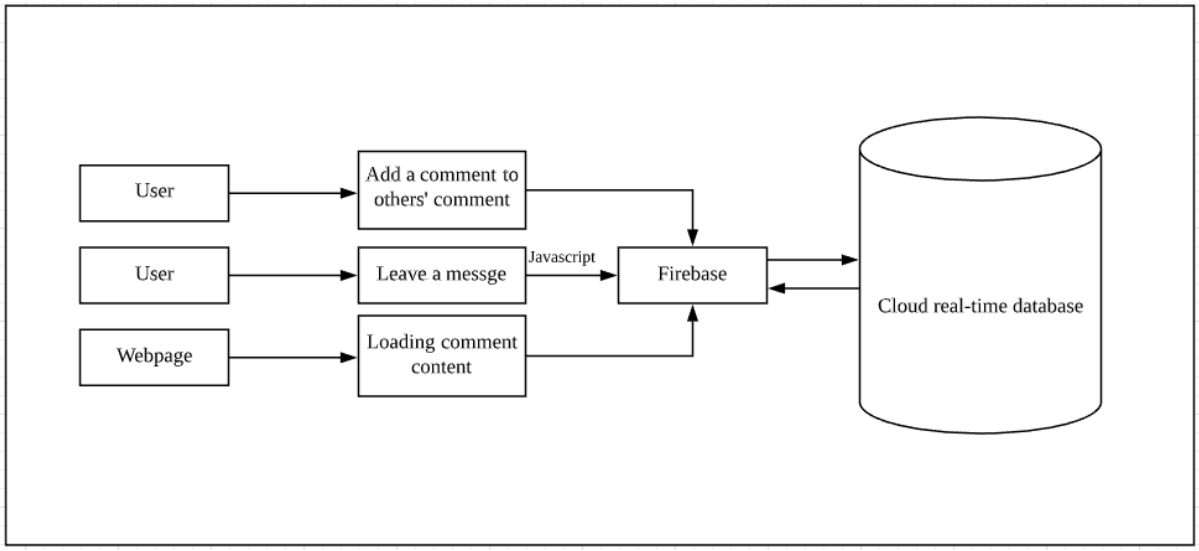
3.6 Admin Sequence Diagram



3.5.1 Post Diagram



3.5.2 Comment Diagram



3.6 Modules

3.6.1 User

The diagram showed above, it simply demonstrate the Architectural Diagram for the user and Admin.

User:

-Login/Register/Logout

For the login part, users privacy is important to protect. It is necessary to obey the GDPR this website is not recording users cookie. Users no need to worry about their privacy get hacked or the cookie will be used in third party companies. Once they graduate their account will be automatically erased.

-Create a Post

Creating a post functionalities will remain user's writing format and in the next version, the system will support users to use the markdown.

-Post send to the server and display

-Code auto-highlight

The next version, if a piece of code included in a post the system will recognise and highlight the code. Therefore it will make the content more readable.

-Make the appointment

The appointment functionality support user to send the request of making an appointment, in the future. I hope this website can have the api of reservation of the GMIT library study room so the students can directly booked the room through the appointment system.

-Make comments for the post and receive the notification

The user can comment below the post, to enter their answer to the question they are confident with.

-Setup personal info

3.6.2 Admin

Admin:

-Login/Register/Logout

The admin as the superuser will have the authority to delete users account or register another superuser account.

-Manipulate the Database

When dealing with not proper comment or the post, the admin user will have the root to delete the comment or post. Moreover the superuser can stop the common user to make a comment or post

-Delete the post

-Delete the bad comments

-Update the board

When the news need to be shared with the students, Admin user can edit the board content.

4 Diagrams for preparation

Taking a questionnaire before the kick-off, to know exactly the users' requirements becomes necessary steps for developing this project. Thus, that's the reason to list the User and Admin requirements to work as a guide for me to develop the project without any distraction.

4.1 User Requirements

User Requirements	
Login/Register	Safely log in and protect users' privacy
Logout	The website should provide logout option and protect users privacy
Password reset	When password forgot or malicious attack the system should provide the method to help user to find back their account and set up new password
Privacy	The system should obey GDPR to protect everyone's privacy, Also here we need protect Database to make sure it won't leak
Send the post to the Forum	Post is the core functionality to this project, to help each user get improved no matter their academic or the ability to solve the problem
Specific department	The option should be considered, when user sends the post to the specific part so that this forum will be more efficient.
Code highlight	In the future, when the student/professor in Computer science field send the post, the code highlight will be helpful and save the time for them when they are seeking the answer to their problem.
Received the news	The table should be put into the forum, and Admin can take advantage of it to show the important news.
Upload image	Post supports upload the image
Set up the profile	User can set up their profile
Make/Reply the comment	Post pages support people leave the comment
View the appointment	The website has the appointment system for make an appointment with someone

4.2 Administrator Requirements

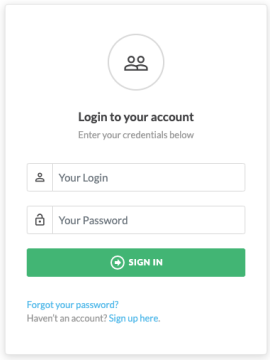
Admin Requirements	
Login/out	Safely log in/out and protect Admins' privacy
Register	Admin has the root to register a new admin user
Password reset	Admin can help normal user to find back their password or reset it
Privacy	Should protect Admin's privacy
Manage the post	When the post content is not proper, Admin has the root to delete it
Sort the post	Search engine for searching the specific user
Delete the post	Has the root to manage not proper post
Received the news	Can receive user's message
Upload image	Support image share and contain the image in the post
Set up the profile	Set up the profile
Make/Reply the comment	Post pages support people leave the comment
Post news from College	The website has the appointment system for make an appointment with someone

5 Front end Technology Analysis

5.1 Front-End

Here, I am going to discuss about the technology, which are implemented in the GMIT forum. In terms of the structure of this project, the front-end is the first part to do the analysis.

In the front-end part, the majority of the css style are from the Bootstrap 4, including the icons as well. The final work for the users login pare is as follows:



The BootStrap 4 is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites, meanwhile it is an open source library. But here should be noticed the Internet Explorer 9 not support it[1].

When designing the website pages, it is commonly scenario for the designer to define the style for the website and during this it would costs lots of time on figuring out the problem which cause the website unstable, web pages presents the wrong style. Hence, that's the point for the full-stack developer to use this kind of toolkit. In

expecting of reduce the css bug and quickly finish the frond end part so that having more time on developing the back end.

Obviously, in my final project, I am implementing the Bootstrap to design the GMIT forum. Inspired me through practicing some basic template from its official website. The way to import this powerful toolkit is amazingly simple, which only let the website embed its script. When it comes to the implementing part, the bootstrap 4 provides developer many layouts to choose and lots of pre-defined classes could let me no need to repeat the work that needs the same style.

5.1.1 jQuery

jQuery is a fast, small, and feature-rich Javascript library, greatly simplifies JavaScript programming[2].

In this project, the important part would be how to connect the front end with server, like the scenario, when the user clicked the page then the server will send back a response. It is a challenging process to explore the technology about this from the surface to the inside. Finally, this project takes advantage of the jQuery a javascript library to make lots of necessary functionalities happen but no need to do the repeat work, like the user will receive all the posts from server and User can make a comment to the post or manage the post and so forth.

For example, the flask framework through the app route to find the function which are going to be executed, and each page has the javascript section here Ajax is inside to receive the request then deliver to the server.

5.1.2 Comment widget - Firebase

Firebase is a mobile and web application development platform developed by Firebase[3].

In the GMIT Forum, with using the cloud real time database from the firebase, the comment can be easily stored in the firebase with the format of json. It is a good solution for the small forum to create the comment part, because it can simplify the procedure to load comments for each post. Once the firebase is set up, and a javascript code will be generated, furthermore, through embedding the Javascript code section, each post web page will have its own comment part. All the comment part can be controlled by the superuser through firebase platform.

6.0 Back-End Technology Analysis

6.1 Flask

Flask is a lightweight WSGI web application framework[4]. It is designed to make getting started quick and easy, with the ability to scale up to complex applications. It began as a simple wrapper around Werkzeug and Jinja and has become one of the most popular Python web application frameworks[5].

Using the Flask, which base on the programming language python, I can start my project quickly and the procedure is easy and simple, hence I can easily to make the very basic website function soon happen. For instance, in this website, the core functionalities are including post send to the server, posts display on the each user main page. Only these functionalities finished, can the next step move on. Additionally, this framework is friendly to the starter like me to design the website back end and also can choose other tools and libraries to make the project much more better.

6.2 Database and SQL Toolkit

The MySql is chose to be the database for my project, and it is a rational database management based on the SQL(Structured Query Language)[6]. what's more, the python SQL toolkit and Object Relational Mapper that gives application developers the full power and flexibility of SQL[7].

As for the SQL CRUD in the project, I used SQLAlchemy to deal with each request to the database. The reason why to take advantage of this toolkit is the SQLAlchemy can simplify the process of CRUD and it is designed for efficient and high-performing database access.Reference. Through built the class for the database session, the server can just invoke the class to do each time the CRUD request which will save lots of time and reduce the repeat step like build the connection with database.

6.3 Web page toolkit - Jinja2

Here, Jinja2 was being used for building the web page design, it is a modern and designer-friendly language for the python, firstly, in this project I am using the feature of ninja which to make the webpage easy to debug. Line number of exceptions directly point to the correct line in the template. Like once the user logged in and their main page will automatically display its username, the way to make it happen is through setting the template first and waiting for the call after user logged in successfully.

6.4 AWS Platform

AWS(Amazon Web Services)

This project finally will be deployed on the AWS platform for demonstrating the achievement I made for the final year project. The reason why I am using the AWS are as follows:

-the AWS provides student $100 for trying the services of it

-AWS EC2 has a stable performance for running the web service on

-AWS supports me to expand the amount of server at any time, and it is much more safer than using self-server

-Through using the AWS, I could get familiar with the AWS plat form so that I could benefit from it for my future work

-AWS if flexible for the user

The AWS EC2 service provides flexible charge strategy. I could expand my server with very simple step. In addition, AWS Educate account provides students $100 to use the products from AWS. Hence I choose to deploy this website on AWS

6.5 Software development version control— Github

Github address: https://github.com/Dongmingguoguo/FP.git

Github is a US- based global company that provides hosting for software development version control using Git(A distributed version-control system for tracking changes in source code during software development.).

In this project we pushed all the source code to the Github and established a repository for it, this project can benefit from the GitHub like, when the code structure is broken I can simply recover the project to the version that I pushed latest time. Secondly, it is a good way to share the project with my supervisor and according to the git log, all the project history could be tracked. By the way the public repository is free of charge.

Conclusion

Through the procedure of building this project, I learnt a lot from it and meanwhile acquire a deep understanding about how design and build a project. That is because when design a project, every aspects need to be taken into account. The more we considered, the less we don't need to change after we finished.

At the very beginning, have a better time management is necessary and helpful to the project, the proper time management would make sure every part has enough time to design and develop so that the quality can be guaranteed.

Also, understanding programming language is important for me when using programming language to make planed functionalities happen, and simultaneously it helps me to get touch with many libraries which are very useful to the project for instance, in this project we take advantage of the library -sqlachemy to do the most part of mysql tasks and it simplifies the process compared with directly using the sql statement and it reduces errors occurs as well.

Dongming Guo

郭东明

10/ 05/ 2020

Appendix B: Part Code of the project

Database

```
from sqlalchemy import create_engine
from sqlalchemy.ext.declarative import declarative_base
from sqlalchemy import Column, String, Integer

engine = create_engine('mysql+pymysql://root:994410@localhost:3306/books')
Base = declarative_base()

class Admin_User(Base):
    __tablename__ = 'Admin'
    id = Column(Integer, primary_key=True)
    username = Column(String(64), nullable=False, index=True)
    password = Column(String(64), nullable=False)


    def __repr__(self):
        return '%s(%r)' % (self.__class__.__name__, self.username)

Base.metadata.create_all(engine)
```

Post page

```
@app.route('/post', methods=['GET', 'POST'])
def post():
    t_db = datetime.now()
    t_db2 = str(t_db)
    t_db2 = t_db.strftime("%Y-%m-%d %H:%M:%S")
    usertitle = request.form.get('title')
    userdepart = request.form.get('depart')
    username = request.form.get('name')
    content = request.form.get('pcontent')
    filename = '/Users/dongmintian994410/PycharmProjects/FinalProject/Myflask/static/prod/'+t_db2+".html"
    filename2 = str(filename)
    print(filename2)
    q = render_template('prac/template4each.html', title=usertitle, content=content)
    ff = open(filename, 'w')
    ff.write(q)
    ff.close
    urladd = '/static/prod/'+t_db2+'.html'
    ed_title = User2(title=usertitle, name=username, depart=userdepart, ctent=content, time=t_db2, url=urladd)
    session.add(ed_title)
    session.commit()
    session.flush()
    return redirect('homepage')


@app.route('/logout')
def logout():
    return render_template('/login.html')
```

Main function

```
from werkzeug.utils import secure_filename
from flask import Flask, render_template, jsonify, request, make_response, send_from_directory, redirect
from Myflask.strUtil import Pic_str
from Myflask.dbconnection import User
from Myflask.admindbconn import Admin_User
from sqlalchemy import create_engine
from sqlalchemy.orm import sessionmaker
from Myflask.postdbconnection import User2
from Myflask.dbComment import Comment
import datetime
import os as os
import json
from datetime import datetime


app = Flask(__name__)
UPLOAD_FOLDER = 'upload'
app.config['UPLOAD_FOLDER'] = UPLOAD_FOLDER
basedir = os.path.abspath(os.path.dirname(__file__))
ALLOWED_EXTENSIONS = set(['png', 'jpg', 'JPG', 'PNG', 'gif', 'GIF'])
engine = create_engine('mysql+pymysql://root:994410@localhost:3306/books')
Session = sessionmaker(bind=engine)
session = Session()
loadsource_userinfo = session.query(User.id, User.username, User.password).all()
loadsource = session.query(User2.title, User2.name, User2.depart, User2.time).all()
load_len = len(loadsource)
```

Register

```
@app.route('/register_db', methods=['GET', 'POST'])
def register2():
    if request.method == 'POST' and 'user-name' in request.form and 'password' in request.form:
        username = request.form.get('user-name')
        password = request.form.get('password')
        repss = request.form.get('repeat-password')
        email = request.form.get('email')
        q = session.query(User).filter(User.username == username).all()
        print(len(q))
        print(password)
        print(repss)

        if password == repss and len(q) == 0:
            new_usr = User(username=username, password=password, email=email)
            session.add(new_usr)
            session.commit()
            session.flush()
            print('I am here')
            return redirect('/')
        else:
            return render_template('register.html', status='Repeat password')
```

Reference

[1] https://getbootstrap.com/

[2] https://api.jquery.com/

[3] https://firebase.google.com/docs/auth

[4] https://pypi.org/project/Flask/

[5] https://github.com/pallets/flask/releases

[6] "MySQL 8.0 Release Notes". mysql.com. Retrieved 28 April 2020.

[7] https://dev.mysql.com/doc/