Department of Computer Science and Electrical Engineering CMSC 447: Software Engineering – I

Individual Assignment

Due Date: March 26, 2024 **Points: 35**

Purpose of the assignment:

This assignment will be done individually. In this assignment you will get an opportunity to obtain hands-on experience with the Flask Framework and the React JS setup. You need to learn about the following. Hopefully, you already know about some of them. We also give the liberty to use any technology or framework other than suggested to implement this assignment. The idea here is that you can make sure to utilize this web app development experience in your project as well.

Flask, Python, React, JavaScript, HTML, CSS, NodeJS

Every student will submit the assignment in Blackboard as directed. In your submission you should also include brief directions on how to run the application.

Description of the Assignment:

You will create a CRUD (Create, Read, Update, Delete) web application using React, Flask, Python, JavaScript, HTML, and CSS.

Structure:

Your application's database will need to support the following entities with the following attributes:

- A student contains a name and number of credits earned
- A course contains a course title, and instructor
- An instructor contains a name, and course department
- You will also need to store information about which students are enrolled in which courses
    - There is a many-to-many relationship between a student and a course; in other words, a student can be enrolled in an unlimited number courses and a single course can have an unlimited number of students enrolled in it
    - You will need to include the grade (represented as an integer) that each student earned in each course

Functionality:

Your application should be able to do the following:

- Modify, add and delete data in the database tables from the user interface.
- Add and drop students to a class using the interface.

There is no need to make it fancy. You will just provide the necessary buttons and text boxes to do the operations as mentioned.

You will also need to include an Entity-Relationship (E-R) diagram showing the design of your database. You are welcome to draw the diagram by hand and submit a picture of that or use other software to draw it for you. Be sure to indicate your primary keys and foreign keys in your diagram; they are critical to the understanding of this assignment and relational databases altogether.

You will also need to include instructions on how to run your web application. This includes how to install any libraries or other open-source technologies that you used. This should be included in a file called README.md in the root of your directory. If you do this another way and we cannot find your instructions, you will lose points.

Hints:

- You can assume that the IDs are unique
- Flask supports all major database software, so use whichever you are comfortable with
- Connect backend/API calls to the database (fetch, update, insert)
- Utilize React and Flask integration for server hosting with Flask
- We have included sample test data at the end of this document for you to use
- If we cannot run your code, including screenshots or video recording demonstrating the effectiveness of your application will work to your favor when assigning partial credit

Guide for setting up Flask for your reference:

1. Install Python 3.6+ and PIP
2. Install virtualenv (https://pypi.org/project/virtualenv/)
3. Create Project directory
4. Create virtual environment
5. Install required packages (flask, databases)
6. Do the rest of react-app setup

What to submit:

You should submit a zip file containing all relevant files for your assignment, including:

- A README file
- An E-R diagram (Image or PDF format)
- recorded video demonstration of working application
- All source code files
- Any other files necessary to include to run your project

Sample Test Data:

Students:

Student ID	Name	Credits Earned
387	John Walker	93
209	David Jameson	87
101	Emma Wells	57

190	Nisha Singh	92
978	Jack Thompson	100
350	Ben Joseph	79
270	Kate Jimpson	68

Instructors:

Instructor ID	Name	Department
456	Jim George	Statistics
589	Kevin Mathews	Information Systems
821	John Sullins	Health Sciences
954	William Robertson	Physics
673	Sandra Wilson	Biology
535	Donna Joseph	Computer Science
990	Natalia Smith	Chemistry

Courses:

Course ID	Course Title	Instructor ID
9076	Software Engineering	535
1028	Organic Chemistry I	990
7654	Health Informatics	821
8721	Database Systems	589

GRADING RUBRIC:

Database design/ E-R diagram: **10 points**

- Use of proper notations and symbols ***2 points***
- Determining the entity relationships ***5 points***
- Indicating primary and foreign keys on the E-R diagram ***3 points***

Functionality of the application: **10 points**

- Modify,add, delete data in the database tables from the user interface ***5 points***
- Add and drop students to a class using the user interface ***5 points***

Source Code Quality: **5 points**

- Using proper naming conventions ***2.5 points***
- Including comments and making the code clean and readable ***2.5 points***

Unit Test Cases: **8 points**

Including README.md in the root of your directory: **2 points**