



Department of Electrical and Computer Engineering  
University of Puerto Rico  
Mayagüez Campus

## CIIC 4060/ICOM 5016 – Introduction to Database Systems Fall 2021

### Term Project – Backend System for Google Calendar-Style Service Phase I – Conceptual Design Due Date: October 12, 2021, 11:59 PM

#### Objectives

1. Understand the design, implementation and use of an application backed by a database system.
2. Understand the use of the E-R model for database application design.
3. Gain experience by implementing applications using layers of increasing complexity and complex data structures.
4. Gain further experience with Web programming concepts including REST and HTTP.

#### Overview

You will design, implement, and test the backend of an application used to manage a booking system (will use Google Calendar as reference). The data in the application is managed by a relational database system and exposed to client applications through a REST API. You will build the database application and REST API using **Flask**, which form the backend of the system. Your database engine must be **relational**, and you must implement the code in Python. The backend site will provide the user with the features specified in this document. In addition, your solution will provide a Web-based dashboard indicating relevant statistics that also specified below.

Your solution **MUST** follow the Model-View-Controller Design Pattern. In this scheme, your solution will be organized as follows:

- 1) View – applications, JavaScript pages, and HTML pages will handle all interaction with the users and will show results from operations performed on the database. This is the client code for the application. The client **MUST NOT** interact directly with the database. They must talk through the REST API
- 2) Controller – **Python** objects will act as controllers. Each object will get a request, create a business service object to handle the request, collect the results from the

methods in this business service object and forward the results to the client using JavaScript Object Notation (JSON).

- 3) Model – a set of business service objects that implement all tasks and access to the database system. **You cannot use ORM APIs for this layer.**

As IDE, I recommend the use of JetBrains tools that fit your technology needs. In this case, PyCharm and DataGrip, (There is a way to connect the database directly to PyCharm without using DataGrip if you have the student version. For details visit Moodle.)

You are required to use GitHub to manage and submit all phases' documents and code. You will be given access to a GitHub classroom link for this purpose.

### **Operations to be supported**

Your site will support the following operations:

1. Register a new user
2. Find an available room (lab, classroom, study space, etc.) at a time frame
3. Find who appointed a room at a certain time
4. Give all day schedule for a room
5. Give all day schedule for a user
6. Create a meeting with 2+ people in a room
7. Limit the access to rooms appointment and information according to person's authorization (Professor, Student, Department Staff)
8. Find a time that is free for everyone in the meeting.
9. Allow user to mark time space as "Unavailable"/ "Available" (By default it is all marked as available)
10. Only Department Staff can mark a time space as "Unavailable"/ "Available" for any type of room (By default it is all marked as available)
11. User Statistic
  - a. Most used Room
  - b. User logged in user has been most booked with
12. Global Statistic
  - a. Find busiest hours (Find top 5)
  - b. Find most booked users (Find top 10)
  - c. Find most booked rooms (Find top 10)

\*Additional Statistics could be given in latter phases.

### **Deliverables for Phase I**

In phase I you will use the repo provided by classroom to submit the following:

- 1) The E-R model, illustrating the data to be stored in the site. (PDF format)
  - a. You will provide two diagrams
    - i. ER
    - ii. Table Diagram

- b. OPTIONAL: If deemed necessary, provide description of relations and entities.
- c. To be submitted through GitHub Classroom (Details to be provided in class and Moodle)

**PROJECT PHASE I DUE DATE: 11:59 PM – October 12, 2021.**