University of Pisa
MSc in Computer Engineering
Concurrent and Distributed Systems

Project proposal

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1 Introduction

The purpose of this project is to develop a web application that allows users to reserve a time slot in a library in order to consult books, use the various services offered by the library or just to study in a quite place.
The library consists of multiple rooms and each room can be accessed by a limited number of people during two different time windows: morning and afternoon. In this way, no crowds are created within the library.

2 Functionalities

The web application consists of two different actors able to interact with the system:

- The **administrator** shall :
  - modify the capacity of the rooms
  - make rooms unavailable (due to inventory or maintenance)
- The **user** shall :
  - login and logout
  - reserve a time slot inside a room
  - delete a reservation

3 System architecture

The web application will be developed as a **Java Enterprise Edition** web application and the system will be built according to the three-tier architecture. In particular, the following will be used :

- **JavaServer Pages** for the development of presentation logic, in order to provide dynamic contents in HTML format.
- **Glassfish** as application server that is supporting other technologies such as Servlets (used to handle requests, process them and reply back with a response) and EJBs.
- **Java Persistence API** to map, store, update and retrieve data from relational databases to Java objects and vice versa.
- **MySQL** as relational database.

4 Concurrency issues

The web application will be deployed focusing on all the problems related to synchronization and coordination that can occur due to the use of the web application by multiple users at the same time.

The system must guarantee that the number of users who have made a reservation for a given room, on a given day in a given time slot, is consistent with the maximum capacity for that room. When the maximum capacity has been reached, the system must not allow other reservations, marking the room as completely full.

Updates to the web application must be consistent with user actions relating to the creation of a new reservation or the removal of an old one.