Internet Based Systems Architectures

- Project Assignment -

IST Room Booking

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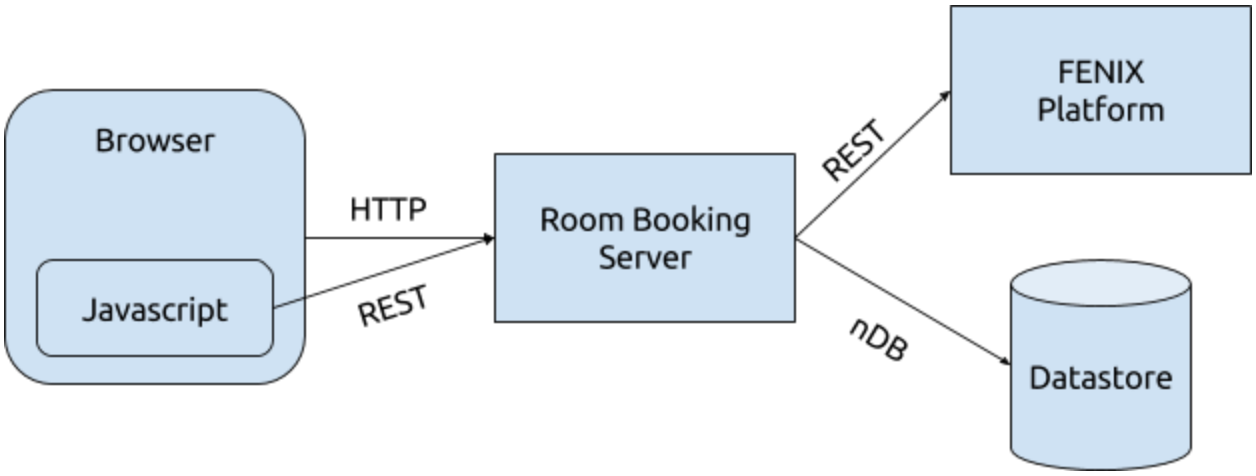
A. Introduction

Students at IST have difficulties regarding the space required to study while on campus. Such that, a way to manage this situation would be the creation of a system in which students can book their own space in a specific room. Such a system would be managed daily by admins which make rooms on campus available to students.

B. System Architecture



C. REST API implementation and Data persistence:

1. Web application framework AppEngine [2]: python [3] and bottlepy [4] - used to run the web application to run the server.

The programming language chosen to implement the server side of the web application was python. With the help of the bottlepy library it was possible to implement REST APIs to interact with the FENIX platform to get data (JSON) in order to display on the browser upon demand. Using the bottle class routes have been created in order to get or post data from or to the server.

2. Browser: HTML + JavaScript [5] + jQuery [6]

On the browser a number of forms (text input) and buttons (login, register, check-in) have been implemented for straightforward interaction with the room booking system. Javascript in conjunction with jQuery is used to dynamically interact with the server to reproduce data coming in as JSON on the browser. Moreover, several html templates (index. admin, student, entity, room) have been created to display for the routing of the web application.

3. Datastore [7] - is a database (persistent storage) for (Google) AppEngine. It has SQL-like language, basically limited to simple filter and sort. Internally the data is stored by a key order. This offers scalability (main reason for usage) and reliability without sacrificing performance of the application. Moreover, datastore provides consistency meaning that data is consistent among all database instances.

Two classes (Room and Student) have been implemented each modelling a individual room or student which is stored in the datastore with the following properties:

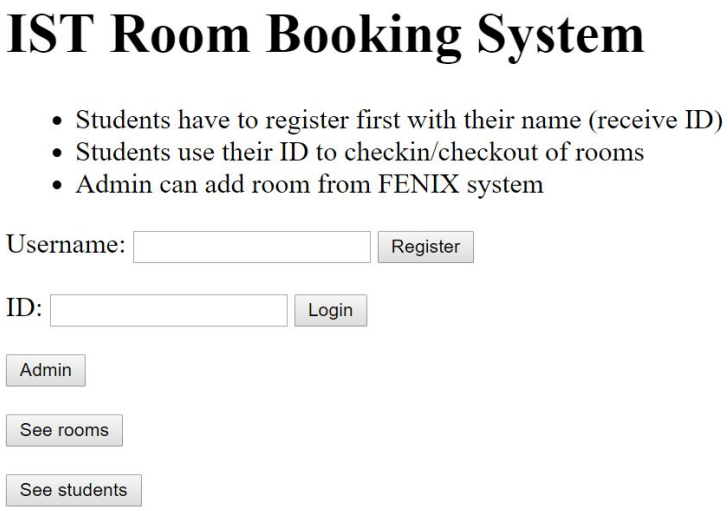
Room:

- Name (StringProperty) of room added when created
- Total capacity (IntegerProperty) specific to each room
- Occupancy (IntegerProperty) increments upon student check-in and decrements upon each check-out
- Students (PickleProperty) which are checked-in the room which are stored in a dictionary
- Date (DateTimeProperty) when the room was added to datastore

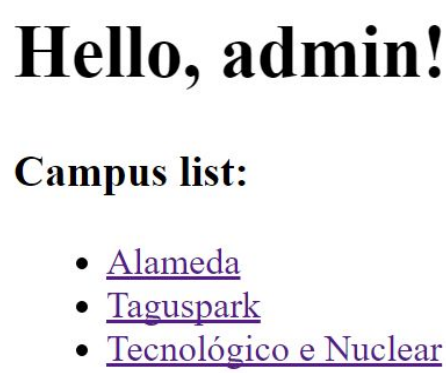
Student:

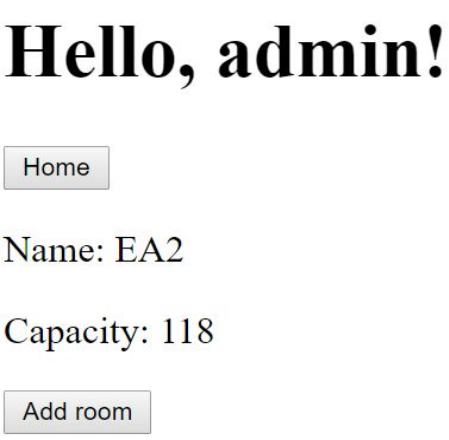
- Name (StringProperty) of each student registered
- Checkin (BooleanProperty) True or False if student is checked in or not
- Room (PickleProperty) stores the ID and name of the room which the student is currently checked in
- Date (DateTimeProperty) when student registered (added to datastore)

D. User interface



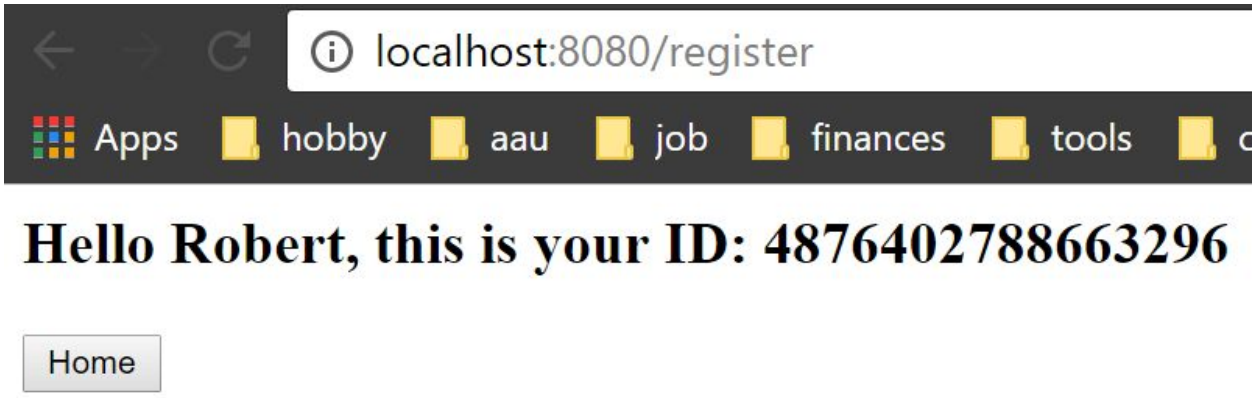
Admin: interacts with the FENIX platform [8] through a REST API to add rooms to the web application datastore to make them available for student booking. The walkthrough will be Campuses>Buildings>Floors>Rooms>Room as seen in the images below:



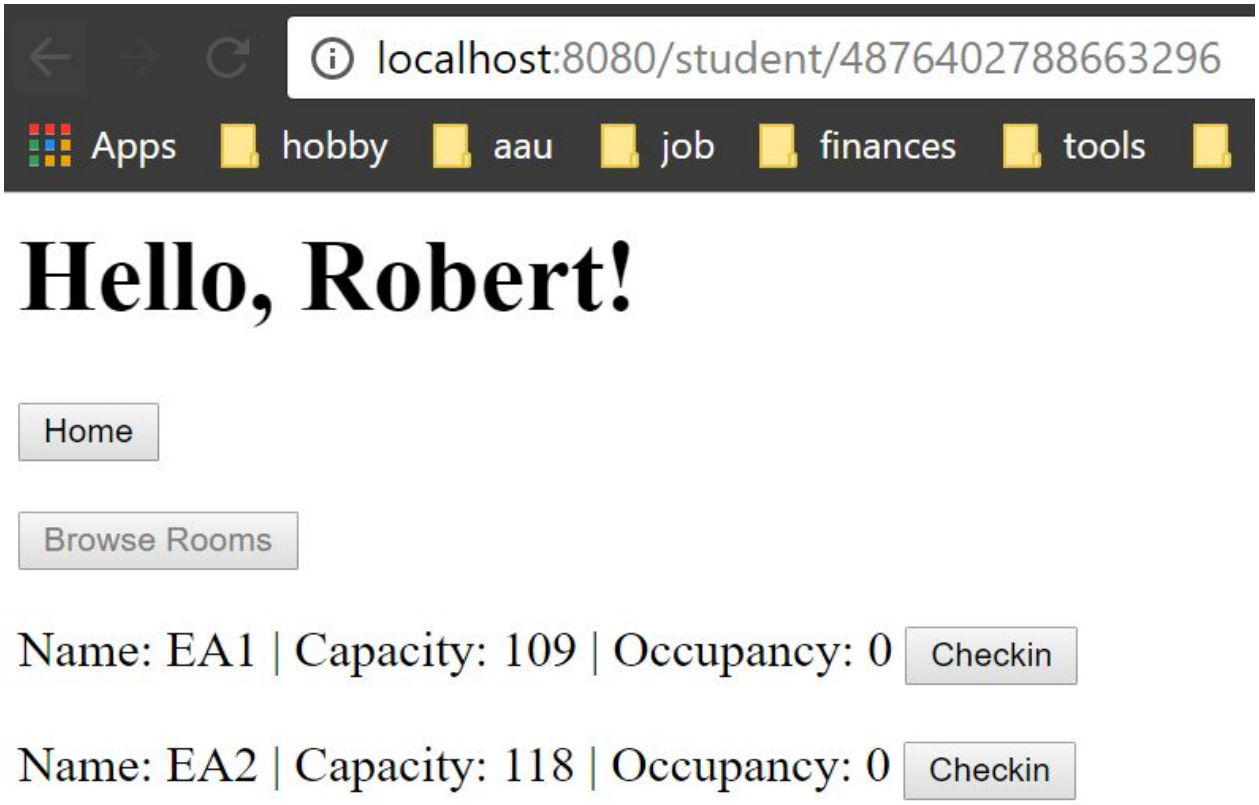


Student:

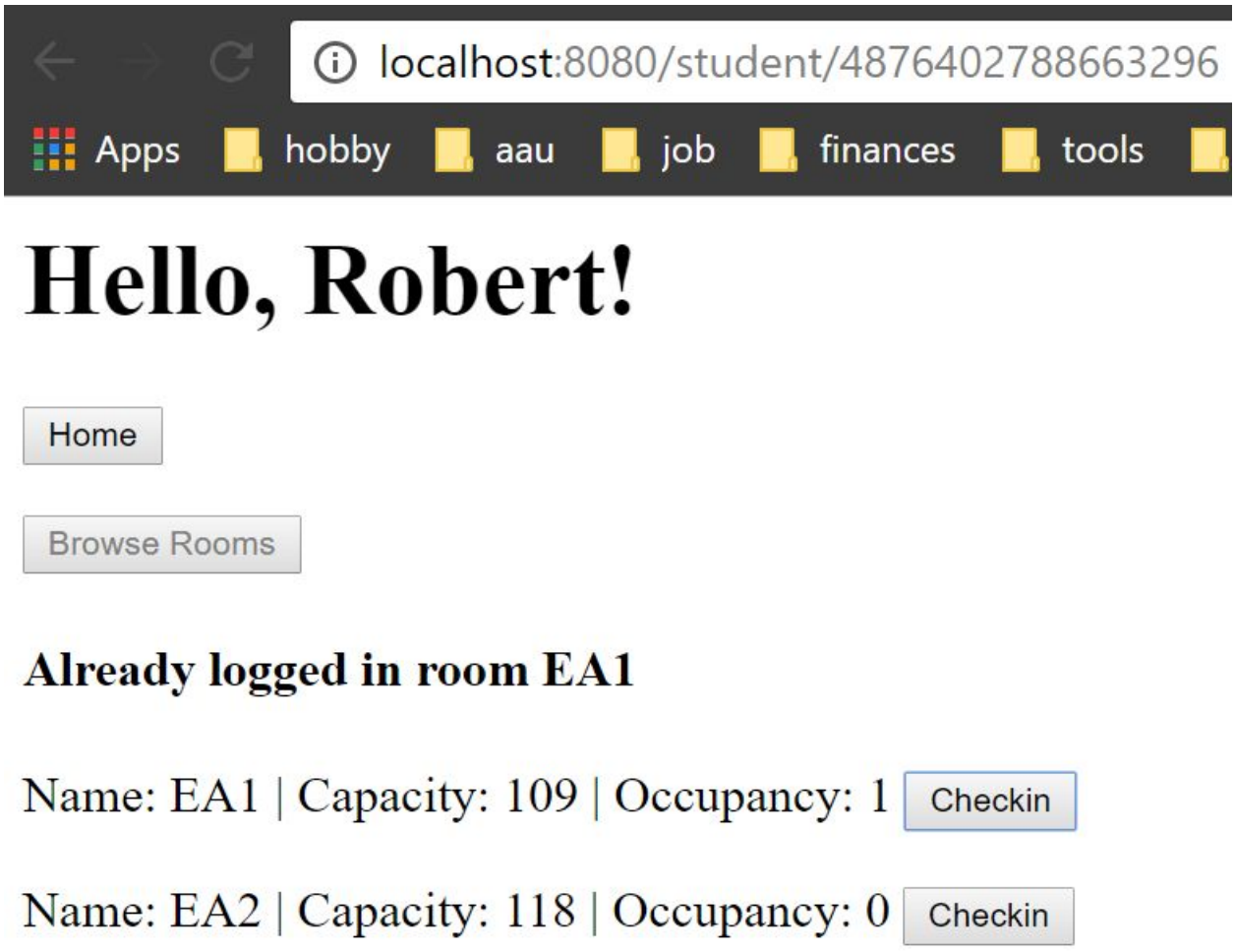
- first a registration (with full name preferably) is needed to interact with the booking system, in which a unique ID is assigned to each student



- login with the unique ID in order to check-in desired room



- students can be in (only) one room at a time, when someone check-in in another room, check-out will be made automatically



E. Challenges with the project

- New to python - I started working this semester with it and I am glad that I had this case to learn more.
- New concepts - in some cases it was hard to understand, but doing practical work made me realize things while doing the project.
- Work alone - me and my colleague tried working together, but after a while he gave up due to the complexity of the course/project.
- Overcoming some challenges was done with the help of the internet (googling) and discussion forums [9]

F. References

[1]: Course page
[2]: https://cloud.google.com/sdk/docs/how-to
[3]: https://docs.python.org/2.7/
[4]: https://bottlepy.org/docs/dev/
[5]: http://www.w3schools.com/
[6]: http://api.jquery.com/
[7]: https://cloud.google.com/appengine/docs/python/datastore/
[8]: http://fenixedu.org/dev/api/#get-spaces
[9]: http://stackoverflow.com/
[10]: My github: https://github.com/Robert-OP/rooms-webapp-project