Roommate App with MongoDB and Spring Boot

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Capstone Project Proposal

Grand Canyon University

Instructor: Professor Mark Reha

Revision: 2.0.0

Date: 02/11/21

**ABSTRACT**

Students at Grand Canyon University are often grouped with other students who make for incompatible roommates. Due to this incompatibility, the potential for roommate conflict is consistent at a level that requires the university to set aside resources—time, money, and personnel—to resolve these conflicts as they arise. Despite the student housing portal having a roommate preference questionnaire that students are required to fill out, this application lacks any convenient opportunities for students to select compatible roommates for on-campus housing.

This project seeks to solve this problem by allowing users to log into this app, fill out the questionnaire from the housing portal, and view each other’s answers and contact information much quicker than on the current student housing portal. This will allow students to develop groups with more compatible roommates much faster and more conveniently than through the current portal, and allow them to contact each other outside of the portal and bond as well as discuss plans for moving in. This reduces the potential for roommate conflict and allows the university to dedicate these resources to other projects, which will ultimately save the university money and allow for greater expansion rate.

This application will be a dynamic web application programmed with Thymeleaf, Bootstrap, and HTML for the frontend, Spring Boot for the backend, and MongoDB for the database server. The logical structure of the application will follow several common design patterns including MVC, N-Layer, Façade, and DAO design patterns. It will be deployed to the Heroku cloud platform.

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| History and Signoff Sheet |

**Change Record**

|  |  |  |
| --- | --- | --- |
| **Date** | **Author** | **Revision Notes** |
| 09/27/20 | Eric Moore | Initial draft for review/discussion |
| 02/11/21 | Eric Moore | Updated for frontend scope change |
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| **Overall Instructor Feedback/Comments** |

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| **Overall Instructor Feedback/Comments** |

**Integrated Instructor Feedback into Project Documentation**

Yes  No

**Project Approval**

Professor Mark Reha

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Project Overview and Project Objectives

**State the Problem and Background**

Students at Grand Canyon University (especially Freshmen) are often forced to room with students selected at random that are not necessarily compatible with one another, despite there being a roommate suitability questionnaire each student is required to fill out before selecting a room on campus.

This app will require these students to fill out a small except from the questionnaire and will allow them to view the profile information and questionnaire responses of other students. This will allow these students to make more informed decisions on who they might want to move in with and to contact each other more reliably than the Student Portal allows.

**Project Objectives**

* Develop functioning dynamic web app frontend
* Responsive design for desktop and mobile
* Hook web app to Spring Boot backend
* Connect to Mongo database

**Challenges**

* Organization
* Time management
* Learning how to build a large-scale application in Spring boot
* Focusing on achieving all the milestones with other classes and responsibilities that require attention.
* Learning how to build a front end with Thymeleaf
* Learning how to use MongoDB as a database for this project

**Benefits and Opportunities**

Students would find their housing situations far more comfortable having found compatible roommates, which will improve the reputation of the University, providing increased revenue through new students attracted by the perceived positive experience.

Project Scope

* **In scope**
  + Login/registration functionality
  + Questionnaire form functionality
  + Users display functionality
  + In-app User messaging functionality
  + User profile display functionality
* **Out of scope**
  + Roommate compatibility algorithm
  + GCU Student Portal integration
  + Social Media authentication API
  + Push notifications for inbox
  + Roommate group functionality
  + GCU housing map for student sorting

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| Work Breakdown Structure | | | | | | | | | | |
| ID | Task | Dependencies | Status | Effort Hours | Cost | Start Date | Planned Completion | Estimate to Completion | Actual Completion | Resource |
| 1 | Project Proposal Document | None | Completed | 4 | $0 | 09/15/20 | 09/27/20 | 09/27/20 | 09/27/20 | N/A |
| 2 | Functional requirements documentation | None | Completed | 5 | $0 | 09/28/20 | 11/01/20 | 11/01/20 | 11/01/20 | N/A |
| 3 | Technical requirements documentation | None | Completed | 5 | $0 | 09/28/20 | 11/01/20 | 11/01/20 | 11/01/20 | N/A |
| 4 | Wireframes | None | Completed | 6 | $0 | 11/16/20 | 11/29/20 | 11/29/20 | 11/29/20 | N/A |
| 5 | UML diagrams | None | Completed | 6 | $0 | 11/16/20 | 11/29/20 | 11/29/20 | 11/29/20 | N/A |
| 6 | Database design specifications | None | Completed | 6 | $0 | 11/16/20 | 11/29/20 | 11/29/20 | 11/29/20 | N/A |
| 7 | Create base application | None | Completed | 5 | $0 | 12/14/20 | 12/20/20 | 12/20/20 | 12/20/20 | N/A |
| 8 | Create login functionality | None | Completed | 2 | $0 | 12/14/20 | 12/20/20 | 12/20/20 | 12/20/20 | N/A |
| 9 | Create database and connect to app | None | Completed | 3 | $0 | 12/14/20 | 12/20/20 | 12/20/20 | 12/20/20 | N/A |
| 10 | Create user profile functionality | None | Completed | 6 | $0 | 01/04/21 | 01/17/21 | 01/17/21 | 01/17/21 | N/A |
| 11 | Create roommate preference questionnaire | None | Completed | 6 | $0 | 01/18/21 | 01/31/21 | 01/31/21 | 01/31/21 | N/A |
| 12 | Create Display-students page | None | Completed | 5 | $0 | 02/01/21 | 02/14/21 | 02/14/21 | 02/14/21 | N/A |
| 13 | User  messaging functionality | None | Not yet started | 10 | $0 | 02/15/21 | 02/28/21 | 02/28/21 | To be determined | N/A |
| 14 | Create and run unit tests | None | Not yet started | 20 | $0 | To be determined | To be determined | To be determined | N/A | N/A |
| 15 | Deploy app | None | Not yet started | 2 | $0 | To be determined | To be determined | To be determined | N/A | N/A |

Project Success Measures

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| --- |
| Project Completion Criteria |
| 1 – App is fully functional. |
| 2 – App passes all unit tests. |
| 3 – App successfully functions to in-scope specifications. |
| 4 – App meets 95% of functional project requirements. |

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| Assumptions and Constraints | | | | | |
| ID | Description | Comments | Type | Status | Date Entered |
| 1 | Assume Spring Boot is similar enough to Spring framework that relatively little time will need to be spent in Spring Boot research. | None | Assumption | Unresolved | 09/22/20 |
| 2 | The functional and technical specifications document must be submitted by the end of October. | None | Constraint | Unresolved | 09/27/20 |
| 3 | The design phase submission must be turned in for review by the end of November. | None | Constraint | Unresolved | 09/27/20 |
| 4 | The first draft of the development phase must be submitted by the end of the semester. | None | Constraint | Unresolved | 09/27/20 |
| 5 | Assume Thymeleaf and Bootstrap will be used for the frontend. | None | Assumption | Unresolved | 02/11/21 |
| 6 | Assume the Spring Boot Framework will be used for the backend. | None | Assumption | Unresolved | 09/27/20 |
| 7 | Assume the MongoDB technology will be used for the database server. | None | Assumption | Unresolved | 09/27/20 |

Project High-Level Solution

**Introduction**

University students are often grouped with complete strangers when being moved into their respective dorms. These students are often not compatible with each other despite being required to fill out a compatibility questionnaire. Students must take the time to do their own individual research to determine which rooms contain students they are compatible with, which can take hours. This frustration leads students to settle for incompatible roommate groups which increases the potential for roommate conflict and requires the university to spend more resources on roommate conflict resolution. Having access to an application that will allow the students to more efficiently discover compatible roommates will lower the potential for roommate conflict and allow the university to divert some of the conflict resolution resources to other projects, improving the satisfaction of students for the university and saving the University money.

**Solution**

The primary objective of this application is to allow students to take the same compatibility questionnaire as from their student housing portal and allow them to view the answers of other students to quickly assess their compatibility and contact each other to plan move-in situations. This will include, at bare minimum, the ability for the user to create and sign into an account, the ability for a signed in user to take the roommate preference questionnaire, allow the signed in user to change their own answers to the questionnaire, allow the signed in user to view a list of other students and their answers to the same questionnaire, and allow students to post their social media handles on a student profile to allow others to reach out to them online. Out-of-scope additions to this application may include a personal account inbox, social media API integration for sharing students’ online interests, and including an algorithm that will generate a “roommate compatibility score” which will enable a user to quickly form a roommate group with students who have compatible roommate preferences.

The following is a block diagram of the proposed application design.

Diagram

Description automatically generated

Project Controls

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Risk Management | | | | |
|  | **Risk Probability** | **Risk Impact** |  |  |
| **Event Risk** | **(high, medium, low)** | **Risk Mitigation** | **Contingency Plan** |
|  |  |  |  |  |
| Unfamiliar with Spring Boot | Low | Project stagnation | Learn and develop proof of concept for Spring Boot. | Switch to Java Spring. |
| Unfamiliar with React Native | Low | Project stagnation | Learn and develop proof of concept for React Native. | Switch to web browser application. |
| Unfamiliar with MongoDB | Low | Project stagnation | Learn and develop proof of concept for MongoDB. | Switch to MySQL. |

This chart contains the issue that have come up so far in development.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Issues Log | | | | | | | | |
| **ID** | **Description** | **Project Impact** | **Action Plan/Resolution** | **Owner** | **Importance** | **Date Entered** | **Date to Review** | **Date Resolved** |
| 1 | None | None | None | None | None | None | None | None |
| 2 |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |

These are the changes made to the document since its first submission.

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| Change Control Log | | | | | | | | | |
| **ID** | **Change Description** | **Priority** | **Originator** | **Date Entered** | **Date Assigned** | **Evaluator** | **Status** | **Date of Decision** | **Included in Rev. #** |
| 1 | Material UI / React Native pushed out of scope. Replaced with Thymeleaf and Bootstrap on a dynamic web application | -1 | Eric Moore | 02/11/21 | 02/11/21 | Eric Moore | Resolved | 02/11/21 | None |
| 2 |  |  |  |  |  |  |  |  |  |

Appendix A – References

*No references currently applicable.*

Appendix B – Copyright Compliance

All technologies and dependencies for this project are open source technologies with licenses that allow for both recreational and commercial use.