

## Criterion A: Planning

### Table of Contents:

#### **The Scenario**

|   |          |
|---|----------|
| <i>Description of the Problem .....</i>           | <i>2</i> |
| <i>Description of the Existing Solution .....</i> | <i>2</i> |
| <b>Proposed Solution and Rationale .....</b>      | <b>2</b> |
| <b>System Requirements .....</b>                  | <b>2</b> |
| <b>Success Criteria .....</b>                     | <b>3</b> |

## The Scenario

### Description of the Problem:

Ms. Aparna Ramchandran – my client – is the head of residential life of our school. In the beginning of every school year, she oversees the allocation of student dormitories. Our school is a residential school that has students coming from all parts of the world – more than 60 countries, and “diversity” is amongst the core values. Therefore, when allocating student rooms, it is ideal that in each room there are students from different countries and continents. However, more than a quarter of the total students are from India, and about half of the students are from Asia. Therefore, it poses difficulties for the Ms. Aparna to achieve a **full-scale diverse room allocation** using manual allocation method. For example, it happens that in some rooms all 4 students are from Asia.

### Description of the Existing Solution:

During the initial interview with Ms. Aparna, I was informed of the current solution<sup>1</sup>. Currently all students are allocated manually. Ms. Aparna takes the list of all first-year students, and allocated them one by one to random rooms, and manually to avoid the clashes of same country or continents. This method usually starts off with good result because the pool of unallocated students is large, but as the pool gets smaller when it reaches the end, some clashes become unavoidable and causes students from the same country to be allocated in the same room.

## Proposed Solution and Rationale

The proposed solution is a **room allocation software** that replaces the manual allocation system. The software will take the input of the data of all students from the user and store them into a database, and after all preset data are ready, a **Genetic Algorithm (GA)** will run to optimize the allocation of students for diversity. By implementing this software, not only Ms. Aparna’s workload can be reduced, the efficiency of room allocation can increase. Also, a login system will be installed so that the security of student data can be ensured.

## System Requirements

Java 9 with JavaFX will be used to design and program this software. Therefore, JRE needs to be installed in the system to run the software. I am selecting Java because it is a cross-platform language as long as JRE is installed, and no purchase of special hardware or software is required. So, it will be cost efficient for the client.

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<sup>1</sup> Refer to Appendix A: Client Interview

### Success Criteria

- A **login** system is included.
- The client can **input** student and dormitory data into the software easily.
- All the data can be **stored and maintained** in a database.
- The client can **update** the student and dormitory data in the software easily.
- The client can **check** if a student is already allocated.
- The client can **find** where the students are allocated.
- The allocation of students can be **visualized**.
- The client can **load** different allocation files.
- Students are allocated to **optimize** for diversity in all rooms.
- The file allocation can be **exported** to a spreadsheet.

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