**UTP's Residential College Booking System (RCBS)**

by

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14526

Dissertation submitted in partial fulfillment of

the requirements for the

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(Information and Communication, Technology)

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**CERTIFICATION OF APPROVAL**

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A project dissertation submitted to the

Computer and Information Science Programme

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Approved by,

---

(DR Lukman bin Ab Rahim)

UNIVERSTITI TEKNOLOGI PETRONAS

TRONOH, PERAK

JANUARY 2014

## CERTIFICATION OF ORGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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(NURUL HAMIZAH BINTI SAHAT)

# ABSTRACT

Moving towards developed nation in 2020, usage of technology in daily life is rapidly changing. Manual being processes are converted into computer-based processes. As a result, works become more productive plus time and energy consumption can be reduced. Several long hours works can be shorten into several minutes. The purpose of this project is to develop a Universiti Teknologi PETRONAS (UTP) Residential College Booking System (RCBS). It is a web based application system for UTP's Residential College department. RCBS is developed to computerize the current manual booking system. The methodology used in this project is prototyping model. Data and information are collected through interviewing and questionnaires to Residential staff and students. Despite its functional requirement to book a hostel, it has non-functional requirement which is usability. Usability testing was conducted to test the usability of the system through questionnaires to respondents. Future recommendation of RCBS is to have integrated database with other departments in UTP.

# ACKNOWLEDGEMENT

Alhamdulillah, praise to Almighty Allah SWT finally the author able to complete her Final Year Project course. However, this would not be completed without the help of other people throughout these two semesters.

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The author also would like to thank all the Universiti Teknologi PETRONAS's students and Residential College staff who cooperated so much in giving responds towards the project. Finally, the author would like to give a token of appreciation to her friends and colleagues that helped her along this Final Year Project course.

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## ABBREVIATIONS AND NOMENCLATURES

| | |
|---|---|
| **PRISM** | Portal for Integrated Student Management |
| **RCBS** | Residential College Booking System |
| **RCSU** | Residential College Support Unit |
| **UTP** | Universiti Teknologi PETRONAS |

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of Study

Moving towards developed nation in 2020, usage of technology in daily life is rapidly changing. Manual being processes are converted into computer-based processes. As a result, works become more productive and several long hours works can be shorten into several minutes. UTP is not excluded from taking the challenge to work together to achieve this 2020 Vision. Therefore, the initiative starts with all departments working efficiently.

One of the departments that still using a manual system is the Residential College. Most of the managerial tasks performed in the residential office are executed manually. The system is only used when data needs to be key- in. A need was therefore identified to develop a Residential College Booking System so as to overcome these issues as well as to reduce the burden placed on the Residential College staff. This management system will functioned similar as hostel registration system.

This project is a prototype of a hostel registration system for UTP's Residential College. This is for usage of UTP's students and Residential College supervisors. This system works as on online registration to ease students to register anywhere at any time.

## 1.2 Problem Statement

The current platform available for information sharing between the management and students, PRISM is not effectively used. Students can only register courses using that system. PRISM is the centre where students can communicate with the departments available in UTP including Residential College Department. Students can book a room and report a defect through the system. However, these features do not function properly and students find themselves having to personally go meet the office clerks in order to book and get a room.

There have been several complaints from the students relating to the existing system as many of them need to return to campus approximately a week earlier from their holidays to book a room. This is hard for the students who lived far away from Perak such as Sabah and Sarawak as well as international students to come to UTP for registration.

## 1.3 Objectives

This study will aim to achieve the objectives as below

- To develop an online hostel registration for UTP's Residential College
- To evaluate the usability characteristic of the hostel registration system for easy handling of the system.

## 1.4 Scope of Study

The scopes of study of RCBS are:

- This project requires an understanding of Residential College's daily operations.
- There are several villages inside and outside UTP for student's hostel. However, due to limited time, only one village (Village 2) inside UTP are used for this system prototype.

## 1.5 Feasibilities studies

Upon the completion of this project, the time taken is 28 weeks. The author was given about 2 semesters to develop this booking system. These 28 weeks compromise from the planning to the implementation phase.

The resources used are phpMyAdmin, HTML, ConTEXT, a personal laptop and AppServe as the local host. These resources are readily available and no cost involve.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 Computerized System

A computer system that is purposely developed to meet ones objective is called a computerized system [1]. Now, with the advancement of technology, most of the tasks are automated using computer system. All tasks that are earlier completed manually are now done by computers [3].

Manual data processing involves physical entering of data collection into a database. Due to this activity, the productivity of an activity is decreasing. This is because it cannot handle high demand of data processing and consume a lot of energy [3]. These could result in high amount of errors as humans are unable to work 24 hours and are prone to mistakes [4].

In this project, the author is expected to develop an online hostel registration system which could increase the productivity of Residential College Department in doing their tasks. The proposed system will enable students to book hostel online and the data will automatically be inserted into the respective database.

Therefore, by using computerized system, it is more efficient and effective for an organization to operate. Computerized system has the ability to reduce data errors and consume less time for data processing [3].

## 2.2 Usability

One of the key elements to design a software or product is to have their functional and non-functional requirements. Functional requirements explained the functions of the system and non-functional requirements define how the properties of a system. Non-functional requirements are quite important as it determine the behaviour of the system. There are lots of non-functional requirements and one of it is usability. For this project, the developed booking system will be using usability attribute as the non-functional requirement.

Usability is however a characteristic to measure the ease of use of a system [9]. In addition, usability is often related to human's behaviour towards the developed product. Usability measures the quality attribute of a system and related other non-functional requirements such as effectiveness, efficiency and satisfaction of the end users [11]. When tasks are carried out using the software, the user-learnability and acceptability are considered to measure usability successfulness [10]. In software product perspective, usability is used to measures how quality is the product by the user [10].

In this project, the usability requirement is opt to be implemented. This is because this system will be used by the management and mostly engineering students. Usability requirement is hoped to help the end users to use this system effectively and able to achieve its objectives at first.

As said by Lodhi, usability can be defined in several components. They are learnability, efficiency, memorability, occurrence of errors and user's satisfaction [9]. Usability of a system can be implemented in some of the software parts such as the properties of the interfaces, dialogue structure and specification of the system [10]. For this booking system, this usability will be used on the specification of the interfaces. As a result, it is hoped the first time users will not have any difficulties in using this system thus can smoothen their booking process.

To ensure the usability requirements achieve its objective, usability testing will be conducted. The usability testing will be conducted together when doing the system testing. This testing will help to identify any defects if occur that will give negative impact to the system [9] [11]. As stated by Bevan, Kirakowski and Maissel, there are three options to measure usability. They are through product-oriented view, user oriented view or user performance view [10] This booking system opted to take user performance view to measure usability. User performance view is by observing the user attitude towards the system. During the testing process, criteria that will be examining are how easy to use the system and user's acceptability on will the system be implemented in reality. [10] Another type of user assessment method is by questionnaires, surveys or observations. [9] These techniques are used to test the product on users and make evaluation.

## 2.3 Existing System

2.4.1. Hostel Registration Website for International Islamic University (IIUM), Gombak (Refer: http://prereg.iium.edu.my/regmahallah/)

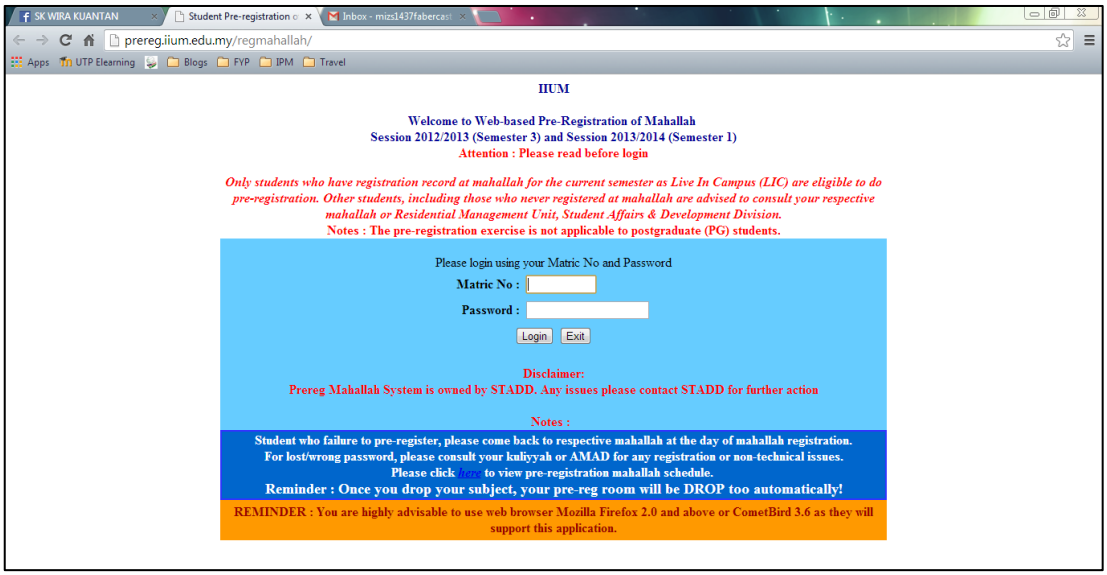


Figure 1: IIUM Online Hostel Registration Log in page

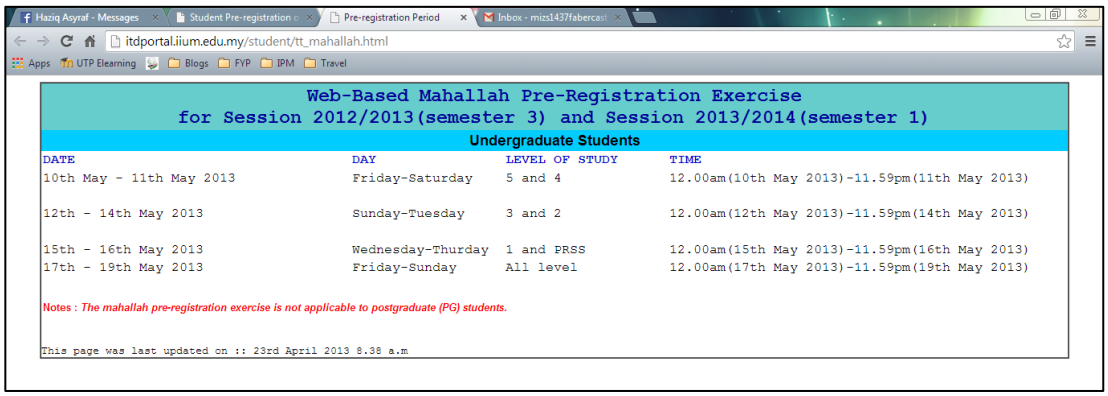


Figure 2: IIUM Hostel Registration Schedule

IIUM hostel registration online system has the functionalities for its student to register their hostel online. This system is integrated with IIUM main database. An online meeting was made with one of IIUM student having said that if their current students did not paid their summons or academic fees, they cannot register their hostel. IIUM online registration system promotes usability by dimming the room colour if it already booked. The schedule was done to avoid bottleneck traffic during the registration.

2.4.2. Hostel Registration Portal Universiti Teknologi MARA (UiTM). (Refer: http://simsweb.uitm.edu.my/SPORTAL_APP/SPORTAL_LOGIN/index.cfm)


Figure 3: UiTM Hostel Registration Homepage

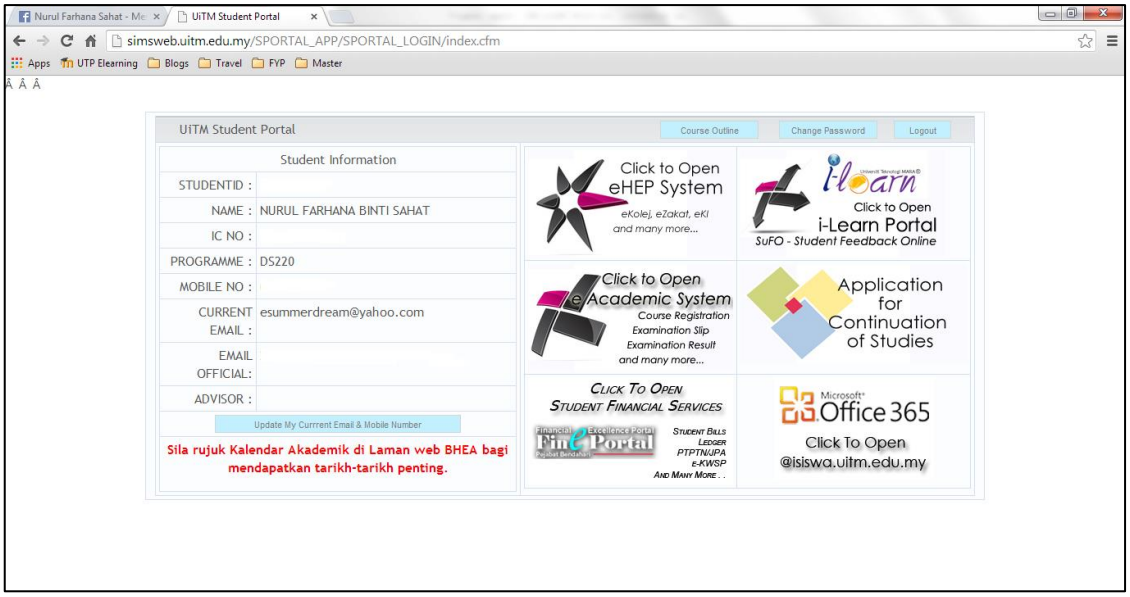


Figure 4: UiTM Single sign on Webpage

UiTM student used their student portal to book hostel. Once they log in into the student portal, (see Figure 5) they will be provided with six other systems to continue. Students can book their hostel through eHEP system. They need to key in their hostel's details and wait for conformation of successfulness in a specific date provided by the management. If it is not during the registration duration, online hostel registration cannot be access by the students. UiTM eHEP system promotes usability by having a wordy yet complete instruction. By that, students will know which option to click to proceed.

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.1 Project Methodology

The project opted to use prototyping methodology model to achieve its purpose. The prototyping involves creating a mock-up application of the system being developed [7]. The prototyping-based methodology is one in which the analysis, design and implementation phases are done at the same stage.

This was chosen mainly because of the interface of the system. The end users able to continuously work with the system and provide responds if there is any changes. [8] Prototyping is extremely good in building an excellent human computer interface system. [8]

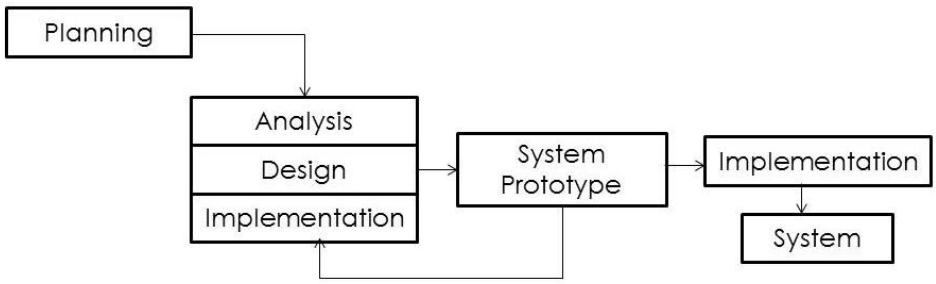


Figure 5: Prototyping-based model

### 3.2 Project Activities

To go into deep, below are the project activities during the development of RCBS.

a. Planning phase

The planning phase is done during the first and second week of Final Year Project (FYP) 1 course. During this first phase, the author was defining the actual problem that lead to the development of RCBS. The author detects some flaws and issues that posted in Students Representative Council (SRC) group by some of the students. Next, the requirements are gathered through observations and interview with the Residential College supervisor. The scope of the project is determined in the planning phase.

b. Analysis phase

In analysis phase which is during the third until thirteen week of FYP 1, the author made research about the current developed system regarding hostel registration and conduct literature review. The author refined and analyze the data gathered during planning phase to determine the requirement analysis for this project. As the output, the author came with a scope of study, functional and non-functional requirements of the system.

c. Design phase

During the design phase, the author designs the interface of the project. This phase started when the author enrolled in FYP 2 course during early second semester of final year study. The author first drafted and developed the Graphical User Interface (GUI) of the system.

d. Implementation phase

Since this project will use prototyping methodology, it will have 3 prototypes. Every build prototype will have its testing after building and before proceed to the final implementation. This phase consumed much times of FYP 2.

### 3.3 System Architecture

RCBS project will be using client-server architecture. Students of UTP as the client that will be using the system and send input to the database server. The system will collect the input from the user and store it into student database.

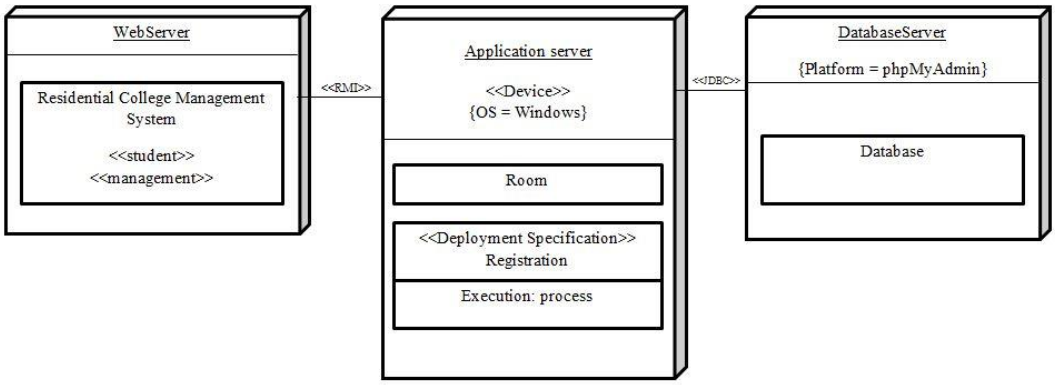


Figure 6: RCBS Deployment Diagram

### 3.4 Requirement analysis

#### 3.4.1 Stakeholders

The stakeholders of this system are:

- Students of UTP
- RCSU members
- Residential Village Supervisors and Manager

#### 3.4.2 System Requirements

RCBS will be built using several platforms to facilitate and enhance the development process.

**Hardware Requirement**

The hardware that will be used throughout the development of RCBS is Dell Inspiron N4110 with the specification as prescribe below:

Table 1: Personal Computer Specifications

| Items | Specification |
|---|---|
| Operating System | Windows 7 Home Premium |
| Memory | Intel ® Core ™ i5-2410M CPU |
| Disk Space | 4.00 GB |
| System Type | 64-bit Operating System |

**Software Requirement**

To build this system, handful development tools are used to assist the development process.

Table 2: Prototyping Development Tools

| Items | Programming Language / Platform |
|---|---|
| Programming Language and GUI Design | HTML, JavaScript, |
| Database | phpMyAdmin – MYSQL Database |
| Operating system | Windows 7 |
| Web Browsers | All |

### 3.4.3 Information Gathering

Data for this project will be collected by interviewing Residential College staffs, questionnaires to UTP students and survey from other university's Residential College.

### 3.4.4 Key Milestones

Table 3: Key Milestone

| Milestone | Completion Week |
|---|---|
| Progress Report submission | 6th February 2014 |
| Pre-SEDEX | 2nd April 2014 |
| Dissertation 1st Draft | 8th April 2014 |
| Technical Report and Dissertation submission | 11th April 2014 |
| VIVA | 23rd April 2014 |
| Hardbound submission | 30th April 2014 |

Table 4: Project's Gantt chart

| Activities | Week | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| **Planning** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Define problem, gather requirement, determine the scope | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Analysis** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Refine data collected | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Review previous research findings | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analyse data | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Come out with feasibility study | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Design** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Design RCBS interfaces | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Implementation** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prototype 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Testing 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prototype 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Testing 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Build final system | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Testing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project submission | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# RESULT AND DISCUSSION

## 4.1 Data Gathering and Analysis

The author had used interview technique to collect data. An interview was conducted with a Residential College supervisor, Mrs Idahwati to know how actually Residential College operates. Several questions had been asked to gather information.

During the interview done with Mrs Idahwati, the author obtained lot of information regarding the process of Residential College management operates. Current system of residential college is using manual system and there is no automatic system to store all the data. The problem faced by the Residential Collage Management now is everything is done manually at the office. They faced problem to arrange and organize everything until some information are redundant and misplaced.

The interviewee request if Residential College management could have a computerized system that could make student and management easy. A system that could have the student's booked from anywhere and the data will be directly updated into the system. Mrs Idahwati also would like to add if the staff can have a direct communication medium with the students to have their issues raised twenty-four hours a day, seven days per week as the objective of Residential Village Management is to comfort students.

**Residential College's Manual Business Process**

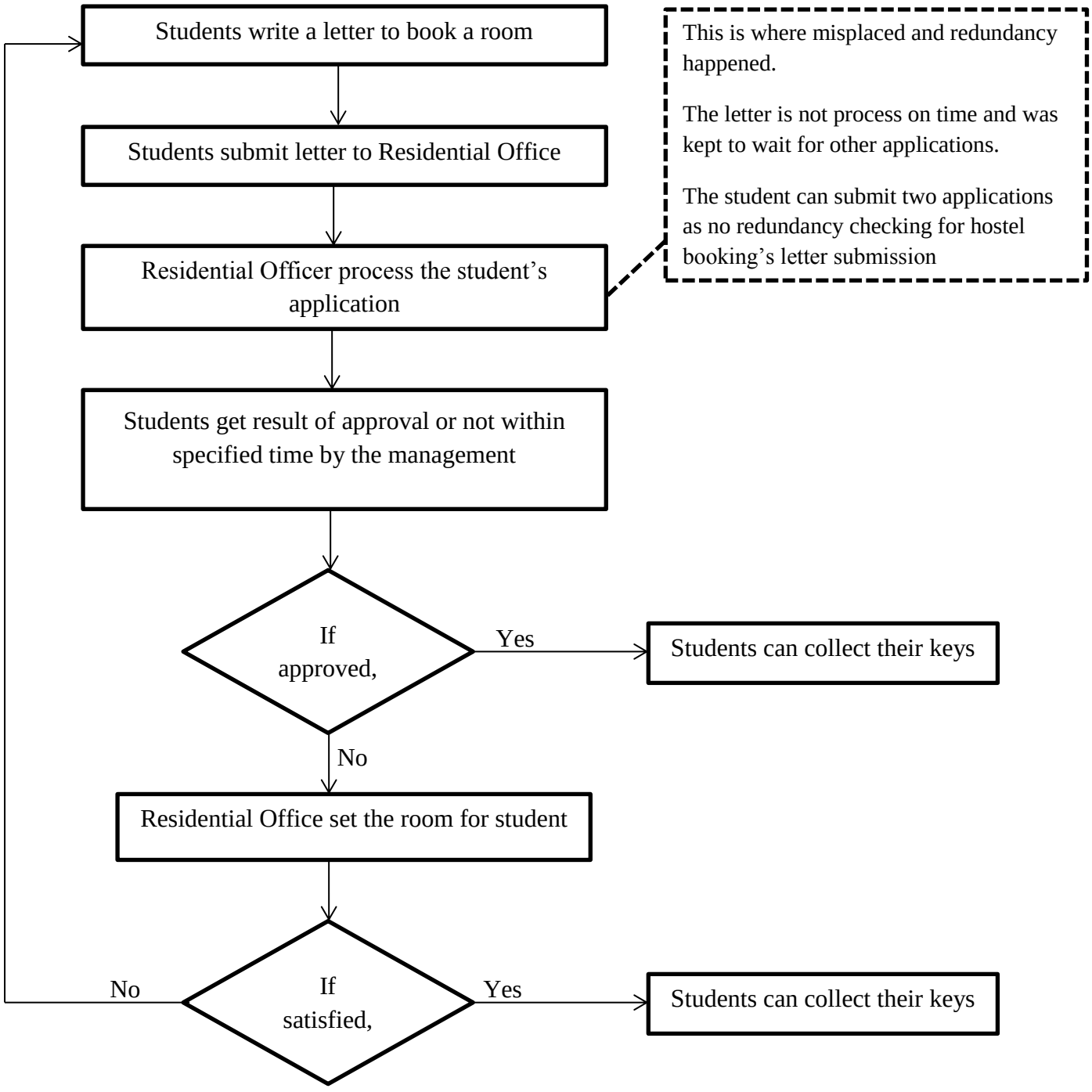


Figure 7: Residential College Manual Business Process

### 4.2 Functional Modelling

Below are the diagrams to explain the functionality of the system.

#### 4.2.1 Use case diagram of RCBS

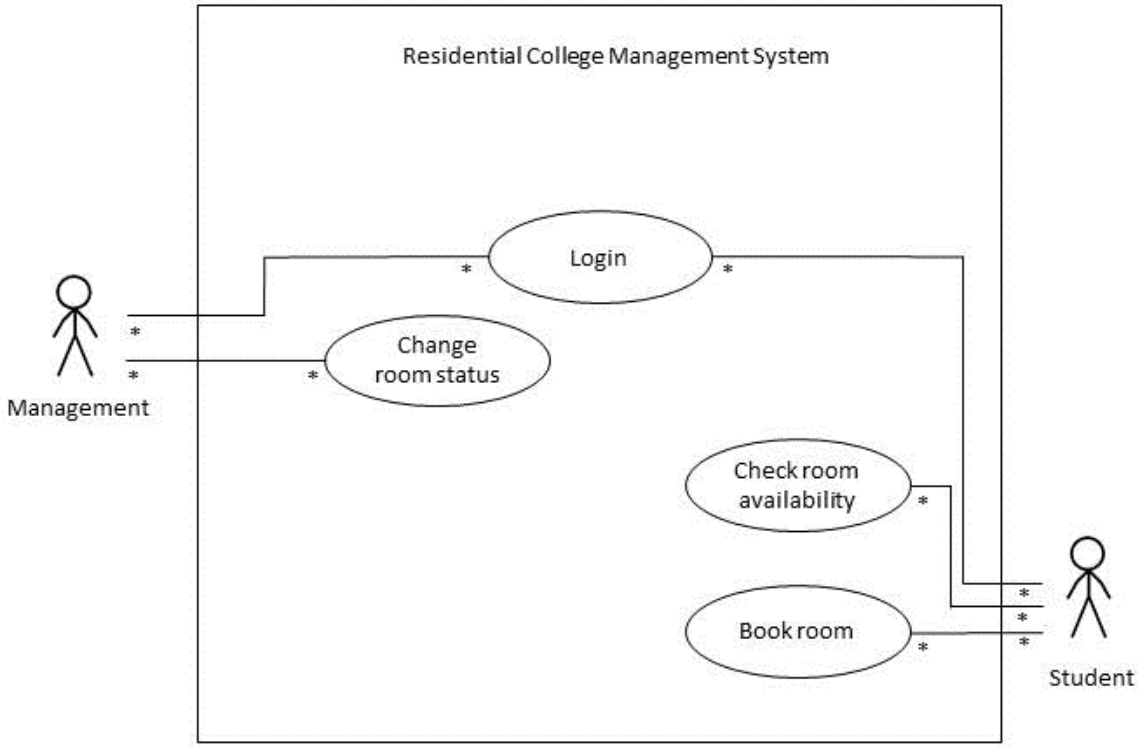


Figure 8: Use case diagram

The use case diagram shows the functionalities of the project. Two different actors are involved in this RCBS system. The actors are the Residential Collage management itself and the students of UTP.

Students have the ability to check the room availability and book a room in the system. Meanwhile, the management plays a big role. Management has the power to change the room status whether to make the room available or not for booking.

### 4.2.2 Sequence Diagram to book a room

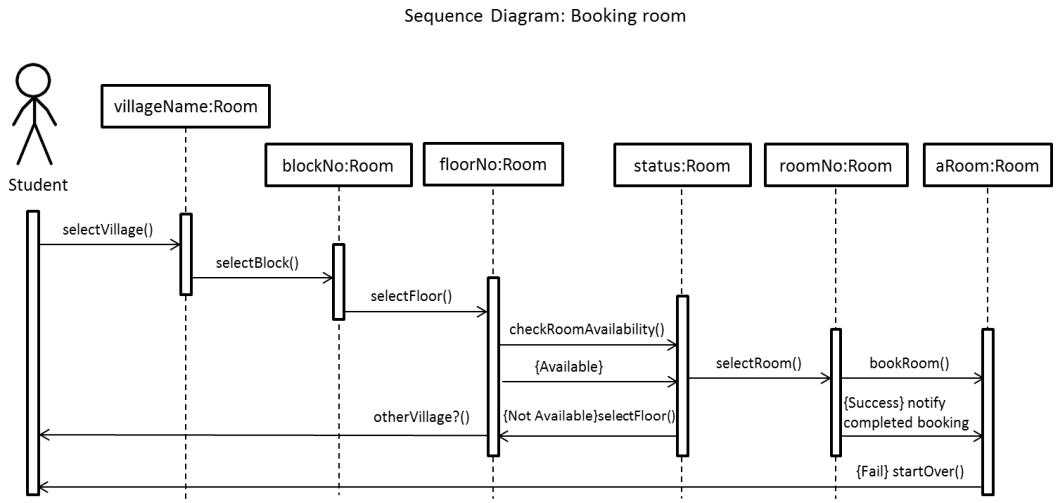


Figure 9: Sequence Diagram

In this sequence diagram, it shows that after log in into the system, student will be directed to a select village interface. Students are required to select their desired village and choose a block. After choose a block, the students will see a room layout to choose a floor and which room they would like to book.

If the room is available, the room colour will be coloured green and if occupied, the room will be coloured red. After successful booking, students will be directed to registration summary of their room booking. If fail, the students need to start over from selecting the village.

### 4.2.3 RCBS Activity Diagram

Using this diagram, it shows the process of RCBS and how usability works in the system. Usability is mostly used when user does wrong options and for checking conditions.

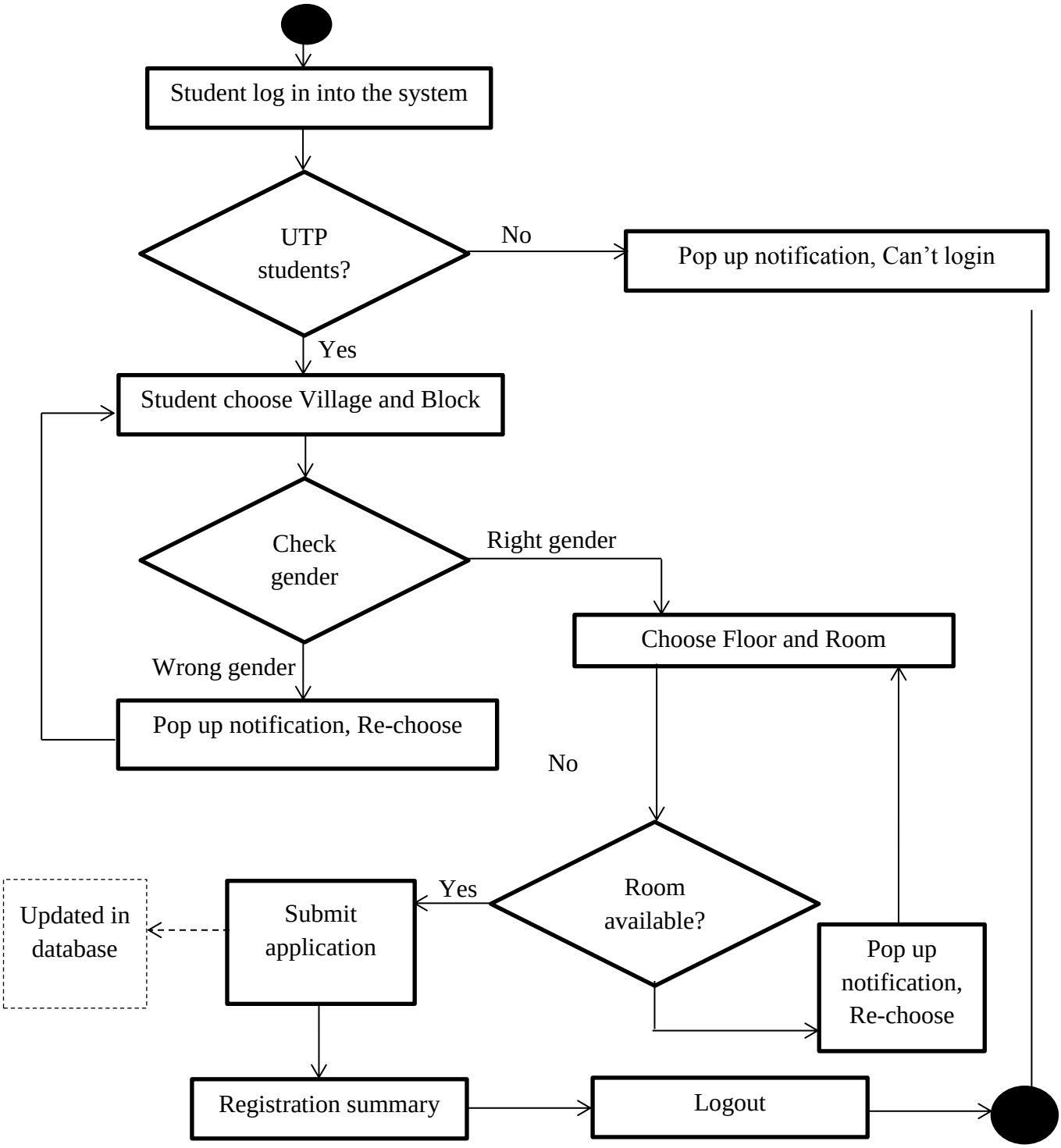


Figure 10: Usability requirement implemented in the system

### 4.3 Usability Testing

The purpose of these testing is to measure how far could this system help the users and to test the usability of this system.

#### 4.3.1 Usability Testing Questionnaires

According to Nielson (2012) there are several aspects can be examined to test usability criteria of a system, which are learnability, efficiency, memorability, errors and satisfaction. The author plan to construct the usability testing plan based on the evaluation criteria in these five usability requirements.

Table 5: Usability Testing Questionnaires

| **Criteria** | **Points**<br>**0 – Very Bad, 5 – Excellent** | | | | |
|---|---|---|---|---|---|
| **Learnability** | 0 | 1 | 2 | 3 | 4 |
| Do you know how to use the system when you first log in? | | | | | |
| Does the information available help you to understand the booking operation? | | | | | |
| Do the notifications help you during the booking operation? | | | | | |
| How easy you were to complete the booking process? | | | | | |
| **Efficiency** | 0 | 1 | 2 | 3 | 4 |
| Is the time taken to navigate from one page to another is satisfactory? | | | | | |
| How fast you get immediate respond after you clicked an option? | | | | | |
| Can you easily accomplish task at your desired speed? | | | | | |
| Do all the information and graphics are displayed accordingly? | | | | | |

| **Memorability** | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Can you remember the commands and icons displayed during second log in? | | | | | |
| At what rate you need a second assistance to do the booking process? | | | | | |
| **Errors** | 0 | 1 | 2 | 3 | 4 |
| Do you get any notification when you make mistakes? | | | | | |
| Does the notification help you to recover from the error(s)? | | | | | |
| At what rate of errors you get when you use this system? | | | | | |
| How about the recovery process if you click a wrong option? | | | | | |
| **Satisfaction** | 0 | 1 | 2 | 3 | 4 |
| How interactive the website to you? | | | | | |
| How is the organisation of the information on the screen? | | | | | |
| Overall, at what rate of satisfactory to complete the booking process? | | | | | |

### 4.3.2 Usability Testing's Result

A usability testing was conducted to test the usability aspect of RCBS. 20 UTP's students and two staffs from Residential Office were asked as a respondent to use the system. There are several criteria being tested during the testing which is learnability, efficiency, memorability, errors and satisfaction.

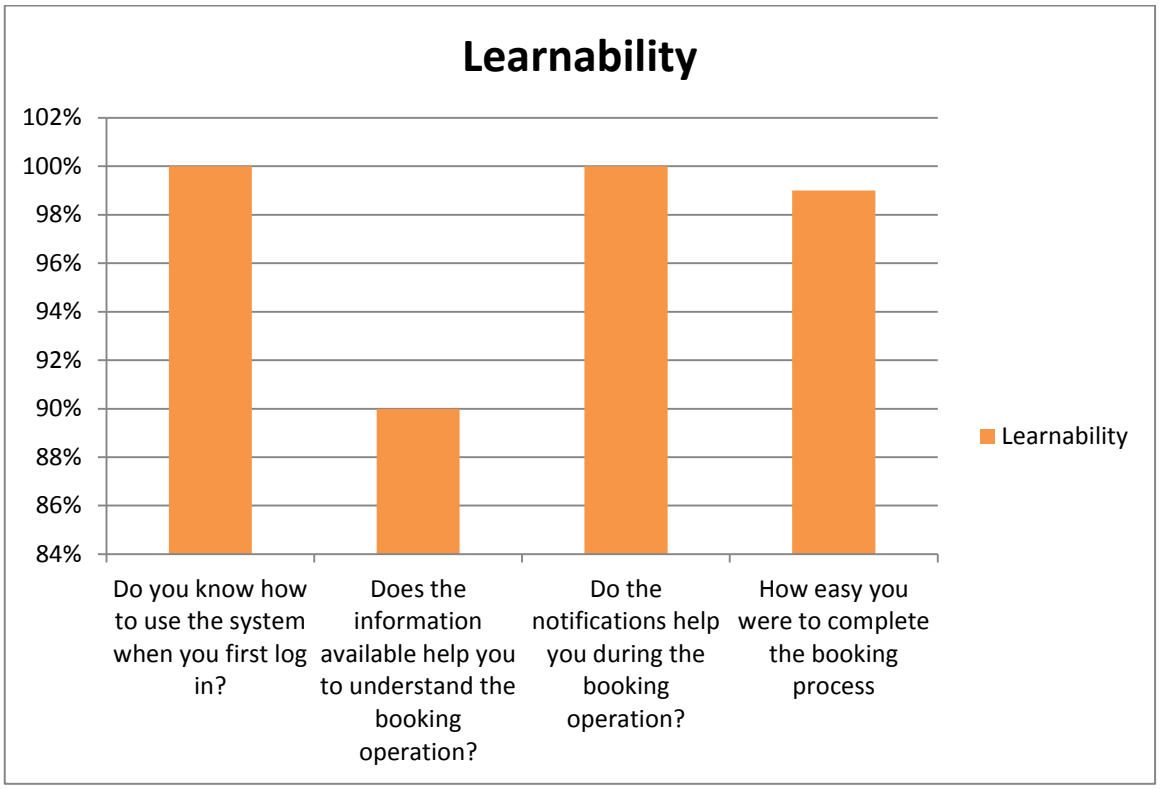


Figure 11: Result for Learnability criteria

Figure 11 shows the percentage of respondent's mark towards learnability criteria when using this system.

$$Learnability\ average = \frac{100\% + 90\% + 100\% + 99\%}{4} = 97.25\%$$

From the calculated average of learnability, 97.25% of respondents agree that this system is highly learnable. Users know what will be the next step once log in into the system and complete the booking process.

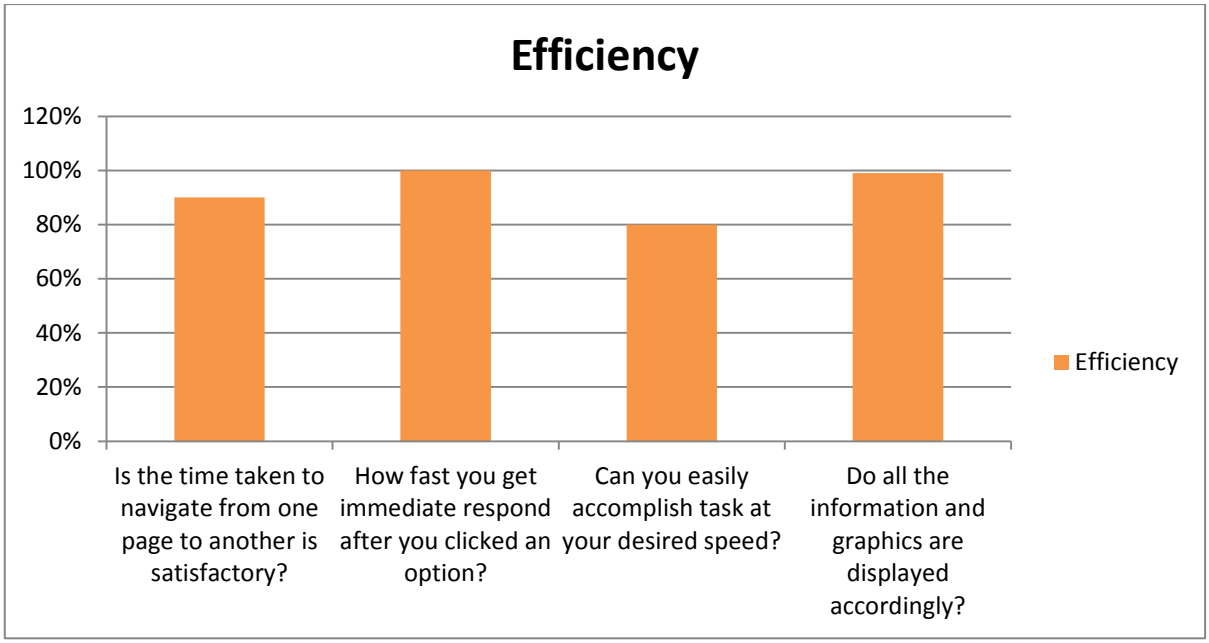


Figure 12: Result for Efficiency criteria

The above Figure 12 shows that more than 80% of respondents agree this system is efficient to use. Efficient is completing a task in a least time and effort.

$$Efficiency\ average = \frac{90\% + 100\% + 80\% + 99\%}{4} = 92.25\%$$

The users can move from first step to next step in three mouse click and complete the booking process within 10 minutes.

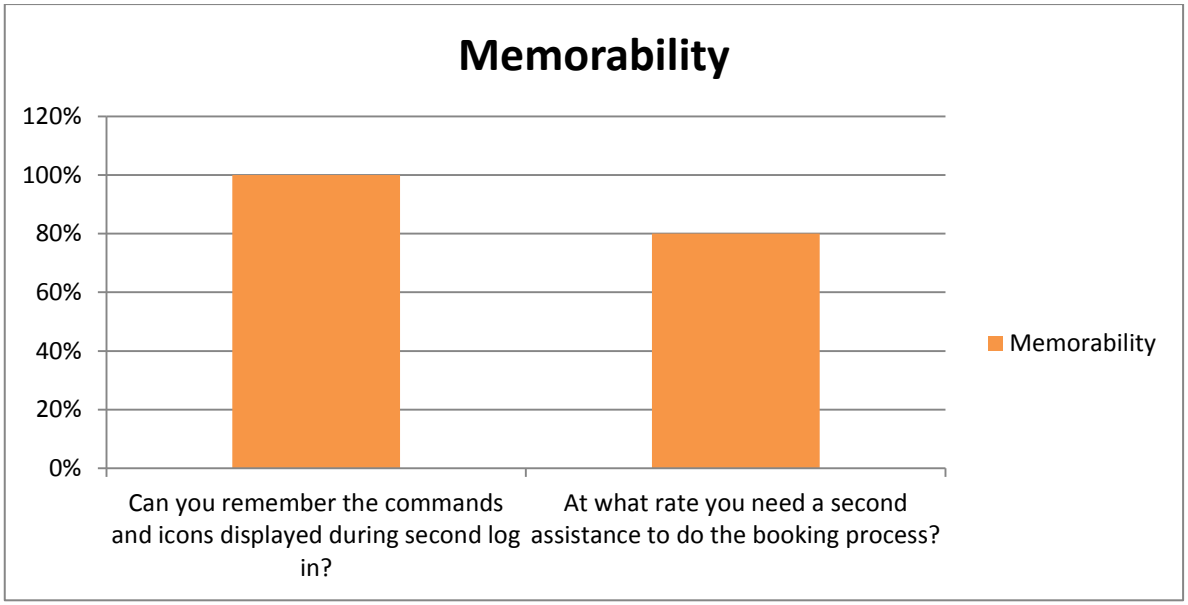


Figure 13: Result for Memorability criteria

Figure 13 illustrates that more than half of the respondents did not need assistance when doing second login and booking process. The icons and instructions provided can guide them to complete the registration process.

$$Memorability\ average = \frac{100\% + 80\%}{2} = 90\%$$

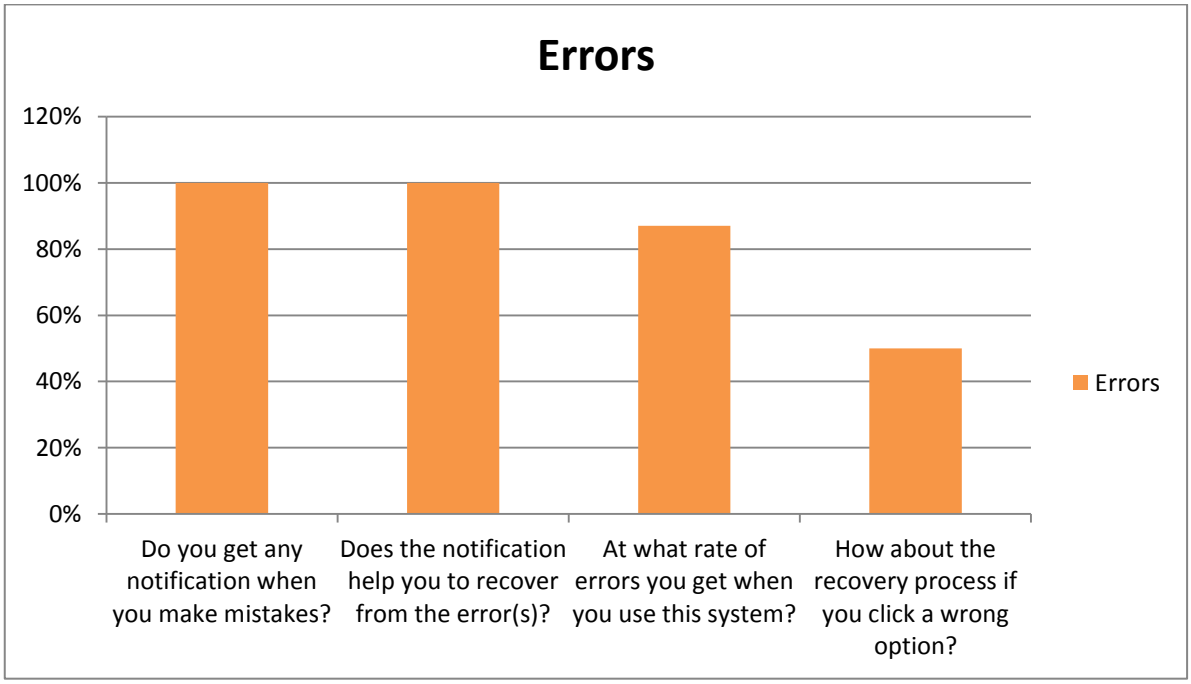


Figure 14: Result for Errors criteria

Figure 14 shows the result for error criteria when user using the system. 100% of users agree the notification popped-up help them to recover from error when they clicked wrong options.

$$Error\ average = \frac{100\% + 100\% + 87\% + 50\%}{4} = 84.25\%$$

As the average, 84.25% of the respondents believe this system has high error recovery criteria which reduced the frustration when using this system.


Figure 15: Result for Satisfaction criteria

$$Satisfaction\ average = \frac{60\% + 80\% + 90\%}{3} = 76.67\%$$

As shown in Figure 15, average of 76.67% of the respondents agrees they satisfied when using this system. The information is organized systematically and 90% of the respondent gives higher points that they are satisfied when using this system.

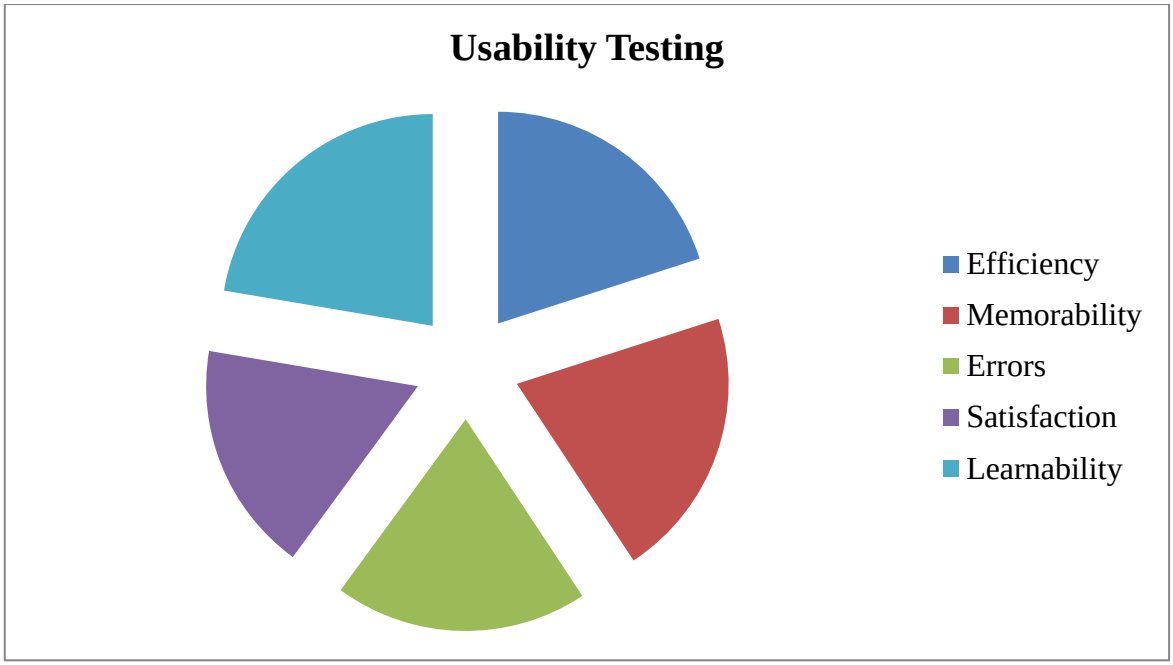


Figure 16: Usability Testing Overall percentages

$$Usability\ testing = \frac{87.25\%+90\%+92.25\%+76.67\%+97.25\%}{5} = 88.68\%$$

As we can see, when usability testing was conducted, the score points from 22 respondents using this system is 88.68%. The percentage is more than 80% which indicates that the system is usable and eases for use to the users.

## 4.4 System' Prototypes (Student's Point of Access)

### 4.4.1 Log in page

In the login page of the system, the students are required to enter their student ID and password. This is to make sure only authorized student of UTP can log in into the system and book a room.

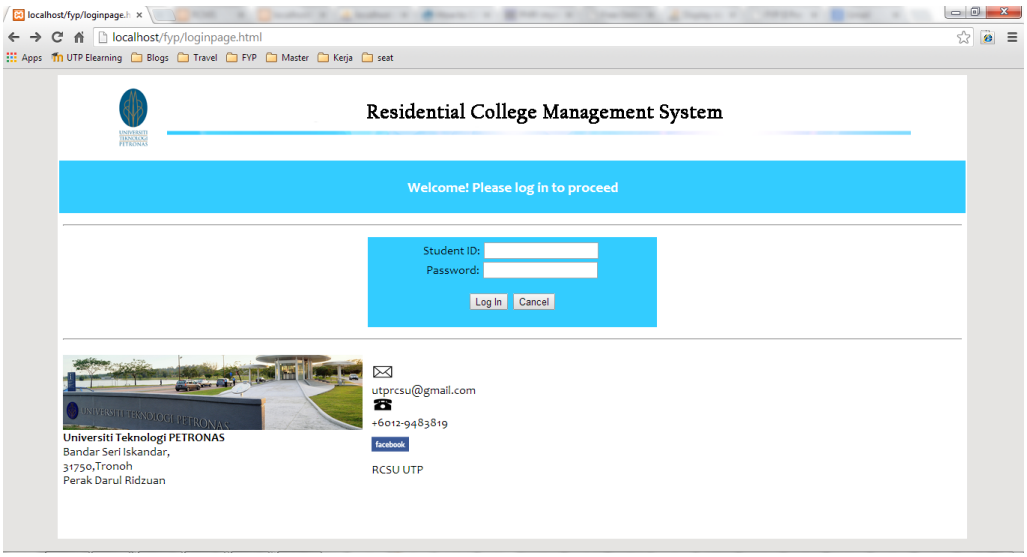


Figure 17: Student's login page of RCBS

### 4.4.2 Homepage

During the homepage interface, user will be provided with the 'Choosing Village' and 'Choosing Block' option after log in.

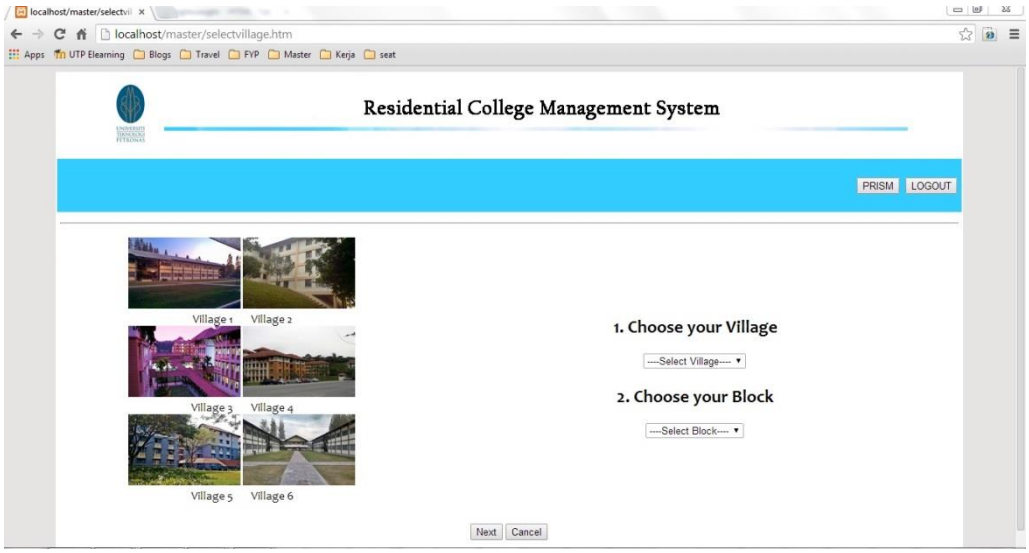


Figure 18: RCBS Homepage

### 4.4.3 Choosing Floor and Room

Here, in this interface, students can choose their desired floor and room. Red coloured box indicates that the room is occupied and the green coloured box indicates the room is still available and ready for booking.

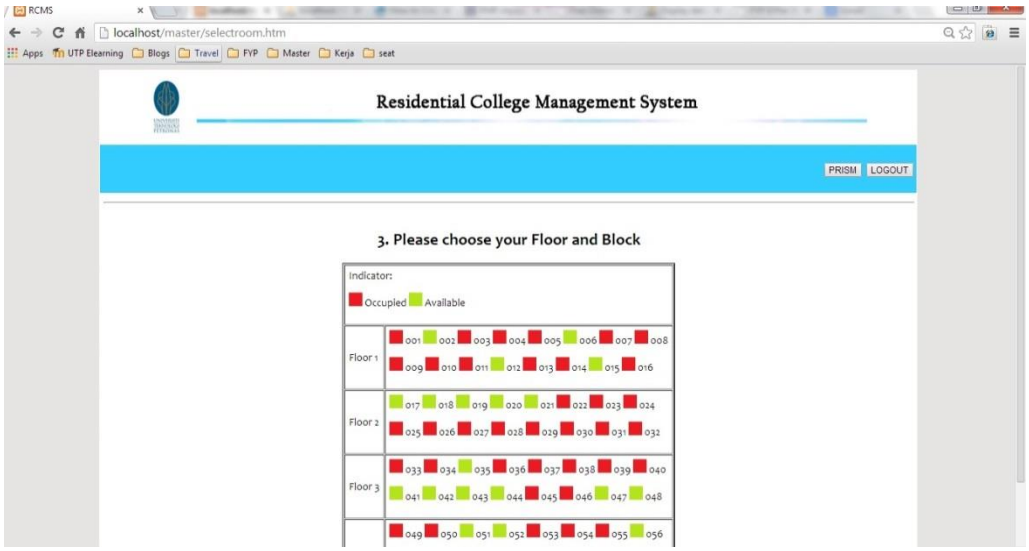


Figure 19: Interfaces to choose floor and room

### 4.4.4 Registration summary

In the Registration summary interface, student can have their summarized booking operation before submit confirm button to complete the registration. Students will be given receipt when they clicked ‘Confirm’ to book.

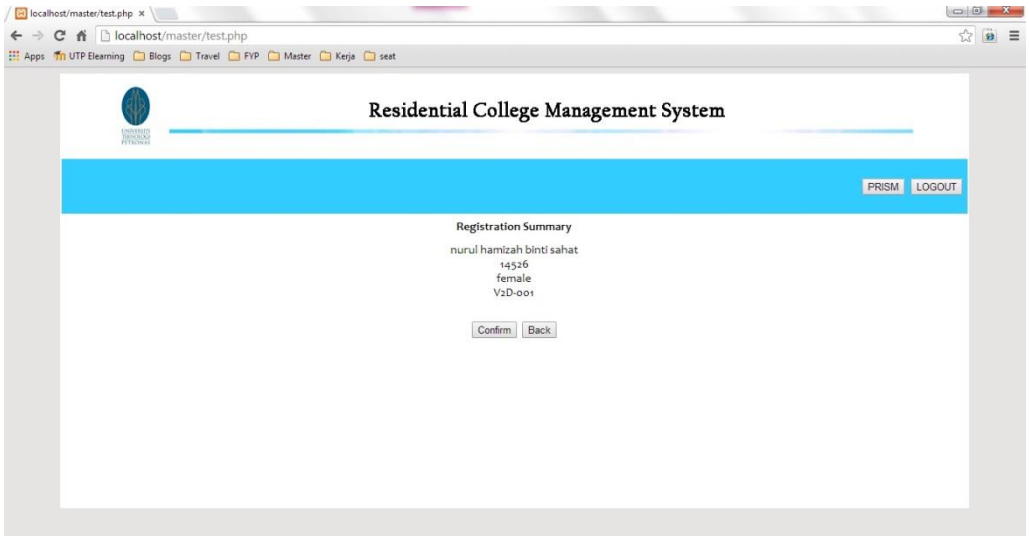


Figure 20: Interface for registration summary

### 4.5 Database of a system

The database system being used is phpMyAdmin. In this system, the author used three tables to be linked together. The tables are Login, Student and Villages.

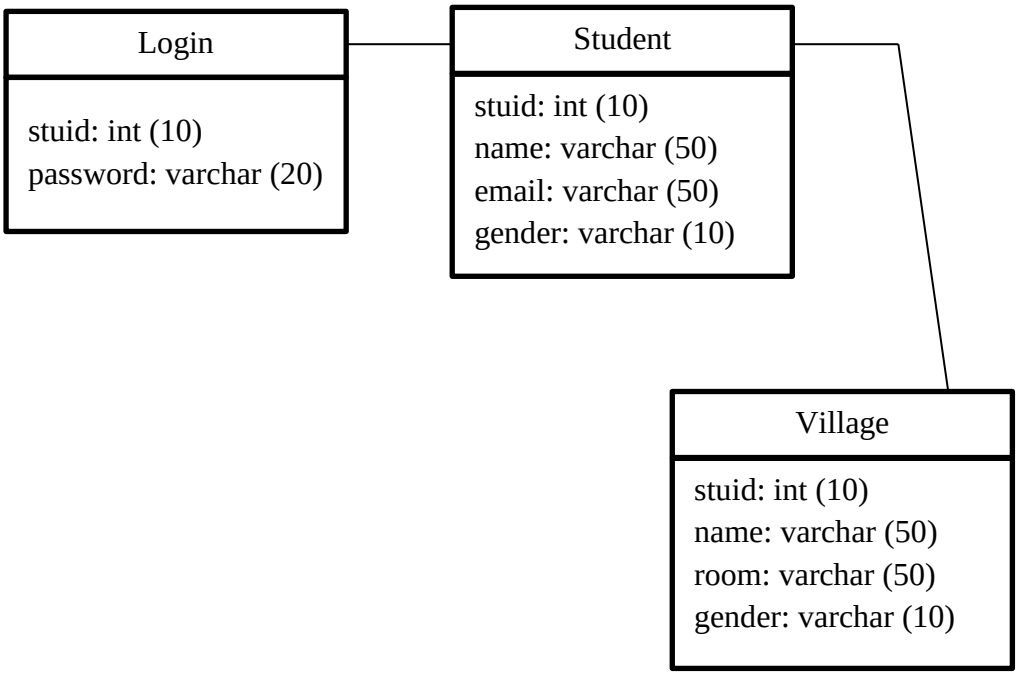


Figure 21: Relationship of RCBS database

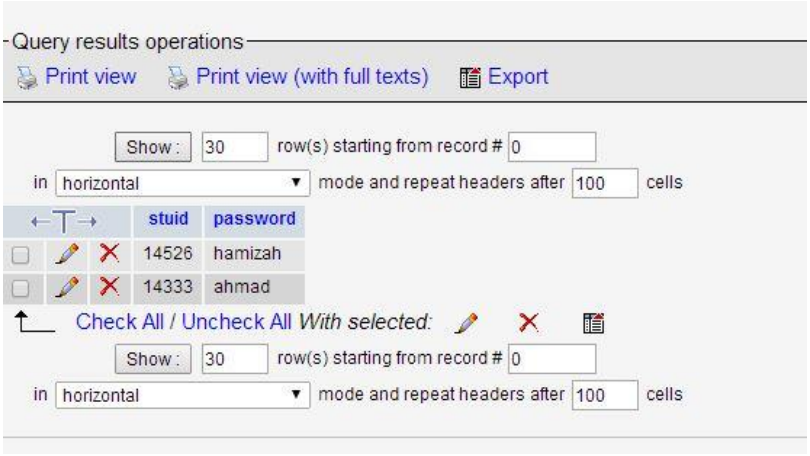


Figure 22: Records of Login Table

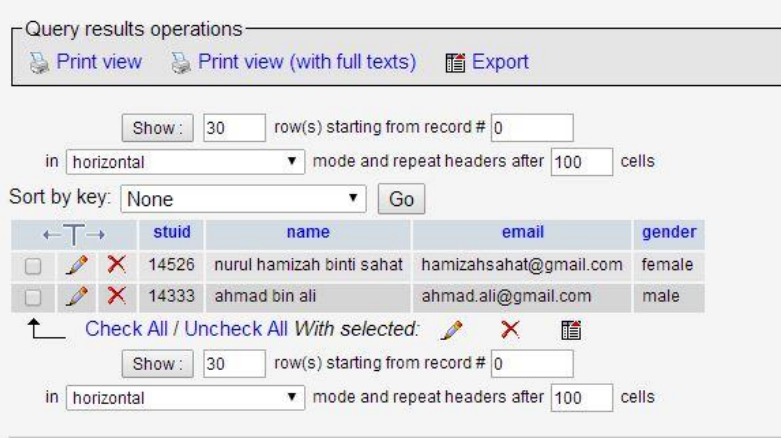


Figure 23: Records of Student Table

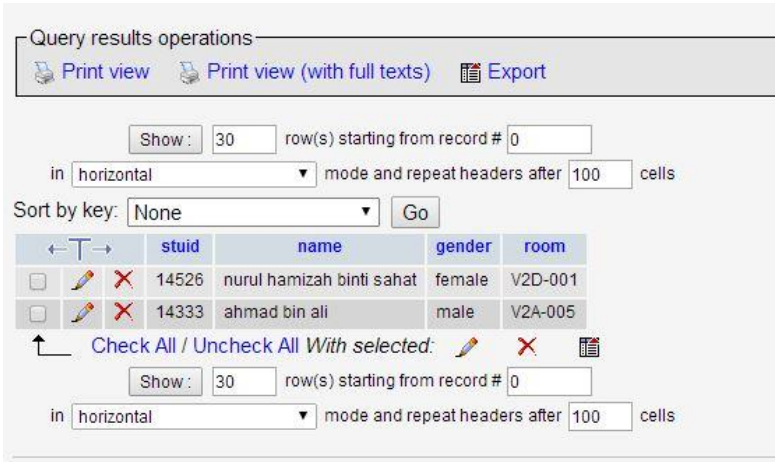


Figure 24: Records of Village Table

# CHAPTER 5

# CONCLUSION AND RECOMMENDATIONS

## 5.1 Conclusion and Recommendations

As the conclusion, the author believes this RCBS could benefit the Residential College Department specifically and enhance UTP's management productivity generally. For future recommendations, more features can be added into the system such as defect report. As for the non-functional requirement, focus can be given to the security and maintainability of the system. An integrated database between Residential College and other departments in UTP also can be implemented to reduce the issue of redundancy and synchronization of UTP's administration.

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