KIZ SERVICE SYSTEM

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ABSTRACT

Kolej Ibu Zain has the most modernized living environment, among amenities include fully furnished air-conditioned rooms with 24-hours water heater, cafeteria, futsal court and a stylish living hall. However, there are still some problems when it comes to the students' daily life in the Kolej. Such as missing the counter operation time because of the limit operation hour, and student often can't get their desired room for they came late to register the room at the counter, last but not least, students usually missing the important notice from the Kolej just because the notice only post on the Kolej hall on a single paper. This dormitory system is web-based system designed to solve those issues happen in KIZ. The system allows all UKM students to preserve or register the available room of Kolej Ibu Zain at any time, knowing the latest news and notices around Kolej Ibu Zain by posting on the website, and also online payment of rent and air conditioner deposit is included in this system. The system will be developed using incremental model and the architecture of the system would be using Model-View-Control (MVC). The expected outcome of this project is to create a KIZ service system that allow all UKM students to preserve or register the available room of Kolej Ibu Zain at any time, knowing the latest news and notices around Kolej Ibu Zain, and allow online payment of rent and air conditioner deposit for all residents live in Kolej Ibu Zain.

1   INTRODUCTION

Universiti Kebangsaan Malaysia (UKM) is one of the top-ranking universities in Malaysia according to the QS World University Ranking. There are 17,500 undergraduate students enrolled, and 5,105 postgraduate students of which 1,368 are foreign students from 35 countries   (*The National University of Malaysia, About Us Archived* 2020). With such large number of students, UKM provides total 12 residential colleges for students to live in. Among them, Kolej Ibu Zain has the most modernized living environment, among amenities include fully furnished air-conditioned rooms with 24-hours water heater, cafeteria, futsal court and a stylish living hall.

KIZ Service System is a web-based system that only serves for the Kolej Ibu Zain. This system will provide basic service to all residents live in the Ibu Zain. The system allows students to pay the rent online using online banking, besides, students also can check

the latest notice around the Ibu Zain. Other than that, student can check the staff information on the website to call for help. At every end of the semester, student can decide whether they want to keep live in Ibu Zain or not, if they want to keep live in here, they register a residential place for the next semester in the system, also they can suggest a desired room or block. If one is not a current resident of Ibu Zain, but he/she wants to live in next semester, they can also register through the system to preserve a place for the coming semester.

2   PROBLEM STATEMENT

With nearly one thousand students live inside the Ibu Zain, providing the satisfied service to all students has always been an issue for the college management. During the MCO period, the counter of the Ibu Zain only opened on Monday for 4 hours, if students miss that time, they miss the only chance to recharge the deposit for the air conditioner every week. What's more, Ibu Zain follows the principle of first come first served, normally the student who comes earlier get to choose the room and block they want. For those arrives relatively later, such as international student, they often don't have much option. Last but not least, some area of the college will under retrofit or maintenance sometime, and it will lead to power cut or toilet disabled. Such important matters will only be posted on the lobby which most student won't have the chance to check for they have been busy with the study. Without knowing the information of the power cut might have a huge influence for students' daily study life.

3   RESEARCH OBJECTIVE

The objective of this project is to create a KIZ service system that allow users:

·   To allow all UKM students to preserve or register the available room of Kolej Ibu Zain at designated period for each semester.

·   To allow all UKM students checking the latest news and notices around Kolej Ibu Zain.

·   To allow online payment of rent and air conditioner deposit for all residents live in Kolej Ibu Zain.

4   METHODOLOGY

Having a methodology is the increase of probability of success of a system development project, and there are various methodologies to choose, so choosing the most suitable one is crucial for the system development.

The development methodology used for this Dormitory Service System is "Incremental Development", the idea for this method is to develop an initial implementation, then expose it to users for review and comments, and next is to refine it through many versions until complete. What's more, using this model can generates a system quickly and early during the development lifecycle, and it's easy to manage risk since risky pieces are identified and handled during its iteration.
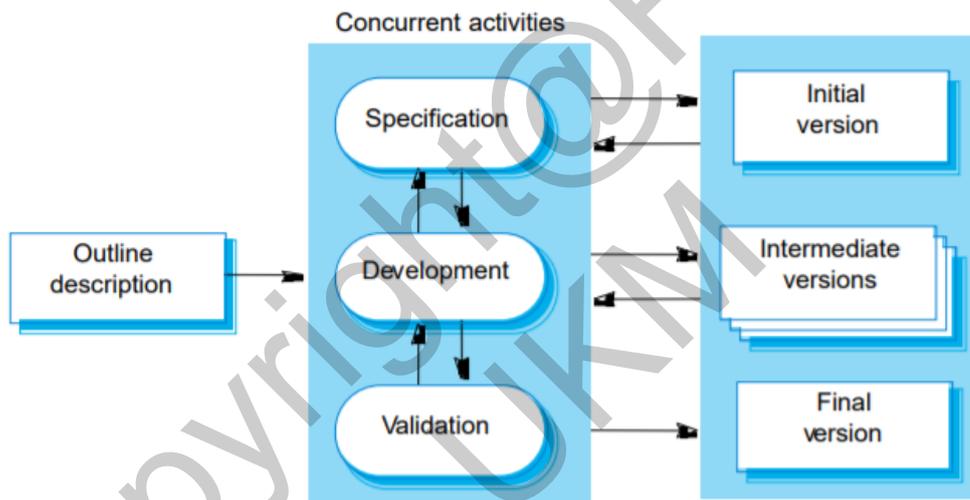

Figure 4.1: Incremental Software Development Cycle (*Iterative Design and Testing within the Software Development Life Cycle* 1997)

The figure shown up here shows the incremental development methodology life cycle. The beginning of the process is the description of the overall system, then procced to the designing and programming stage of the system. There will be several versions of the system during the development period, like the figure shown there are initial version, intermediate version, and final version. Each version of the system will go through whole activities from specification to development and then to validation, and each version will keep changing and upgrading base on the feedback from the users, at last the final version is ready to put into use in its target operational environment. For example, during the specification phase, the requirement of the system will be negotiated with the stake holder who would be the manager

of KIZ again and again till it's well-refined. And then when it comes to the development phase, the system will be modified several times till it meets all the scope of the project.

4.1 Planning Phase

For the planning phase of the project, 4 stages will be implemented including requirement analysis, software design, software development and software testing. At the first stage, the requirement of the KIZ service system will be elicited and validated, and as the outcome, a requirement specification will be written for the design of the system. Then during the software, the database and architecture will be prepared for the development stage of the system. After the completion of the software development, the testing stage will be followed to ensure the quality of the product before the final delivery. What's more, a Gantt Chart is used to schedule the project in order to make sure all works to be done in each phase are finished in time.

4.2 Analysis Phase

There are 4 tasks to be done for the requirement analysis stage, feasibility study, stakeholders' identification, requirement elicitation and validation. Feasibility study is to validate the possibility of the success for the whole project. Once the practicability of the project is ensured, stakeholders will be identified for gathering the requirements. There are 2 major requirement elicitation technique used for gathering the requirements, questionnaire and personal interview. Besides, 3 similar system are study as reference for the refinement of the requirement. There are android based mobile application designed by PengManMan (*The Design of Dormitory Management System for College Students Based on Android Platform* 2008), the "Online Dormitory Reservation System" developed by Adithya Mothe, Koushik Kumar Suragoni, and Ramya Vakity from Governors State University (*Online Dormitory Reservation System* 2010) and Another "Dormitory Management System" developed by LiFangHua from Jiangxi Science & Technology Normal University (*Research on Dormitory Management System in Colleges and Universities* 2010). After all the requirement elicitation is done, all the requirement will be validation to make sure all the requirement have no errors and ready for the deign process.

Table 4.1 below shows the user functional requirements that should be provided by the system.

Table 4.2: User functional requirements

Requirement ID	Functional requirement	Source
FR1	The system shall allow user to register an account with valid email, password and contact detail.	Existing System
FR2	The system shall allow users to edit their profile,	Existing System
FR3	The system shall display the latest news and notices around the college for students to check.	Questionnaire
FR4	The system shall allow dormitory management to post and edit the notices.	Stakeholder
FR5	The system shall provide serval ways of online payments for the dorm rental and air conditioner deposit. Students can make the payment online and check their payment history and details.	Questionnaire
FR6	The system shall allow students to make application to live in KIZ at current semester.	Stakeholder
FR7	The system shall allow students to make reservation for the next semester.	Stakeholder

FR8	The system should display an interface that contains all resident's information. The dorm management can search for, edit, print the relate information.	Stakeholder

4.3 Design Phase

Because of the software for the project itself is a multi-layer, multi-dimensional spectrum and its design has multiple intermediate steps therefore; different types of software level design. Therefore 4 sections will be included for the whole design phase, which is Architecture design, Database design, Interface design and Algorithm design.

An architectural pattern is a general, reusable solution to a commonly occurring problem in software architecture within a given context (*Advanced PHP, CRUD, OOPHP, MVC and CodeIgniter* 2020). And the architecture used to develop KSS is Model-View-Control (MVC) pattern. This pattern, also known as MVC pattern, divides an interactive application in to 3 parts as:

model — Contains the core functionality and data

view — Displays the information to the user (more than one view may be defined)

controller — Handles the input from the user

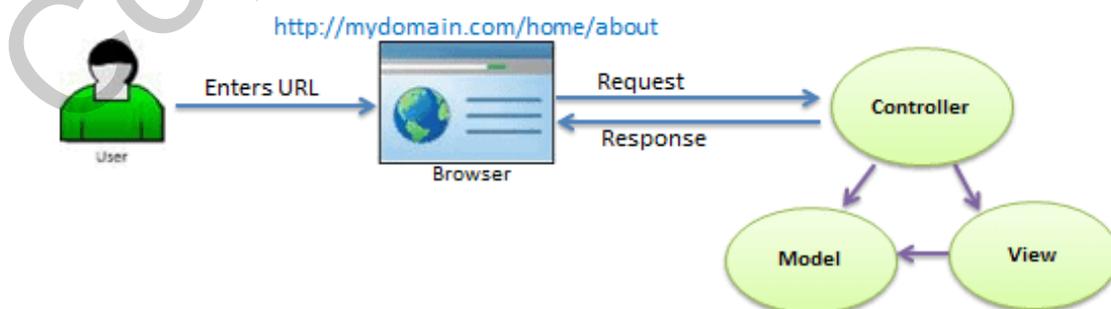The following figure 4.3 illustrates the flow of the user's request in ASP.NET MVC.

Figure 4.3: Request Flow in MVC Architecture (*Utilizing ASP.NET MVC in web development courses* 2012)

4.4 Testing Phase

Since exhausted testing is impossible, the testing phase will cover the crucial part of the system to ensure the final product fulfilling all the requirements. The scope of the testing covers both functional and non-functional testing. For the functional testing, only black-box testing technique, such as State transition testing (STT), Decision table testing (DTT), Equivalence partitioning (EQ), Use case testing (UCT). For the non-functional testing, only Usability testing will be included.

Equivalence partitioning is used to test the "approve application & registration" function which divides the input data of a software unit into partitions of equivalent data from which test cases can be derived, and each partition will be tested once. State Transition Testing is a black box testing technique which helps to analyze behavior of an application under test for different input conditions. Testers can provide positive and negative input test values and record the system behavior. Decision table testing is a software testing technique used to test system behavior for different input combinations. Use Case Testing is a software testing technique that helps to identify test cases that cover entire system on a transaction-by-transaction basis from start to end. As for the usability testing, 10 KIZ resident will be selected as members for the beta test of KSS, after test the basic function of the system, they will be required to fill the SUMI and SUS questionnaire. The SUMI (*Standardized Usability Questionnaire* 2013) is a 50-item questionnaire that measures users' perception of the Efficiency, Affect, Helpfulness, Control and Learnability of a system. The System Usability Scale (SUS) provides a "quick and dirty", reliable tool for measuring the usability. It consists of a 10-item questionnaire with five response options for respondents; from Strongly agree to Strongly disagree.

Item pass / fail criteria defined when a test item or feature has passed or failed. All the test item or feature must meet the requirements specified in the document. If does not achieved the expected outcome, the test item or feature will define as fail. The system must satisfy the following criteria to pass:

      i. All test cases must be passed.

      ii. 0% calculation error in any function involving a monetary transaction

      iii.   No deadlock during operation.

5 RESULTS OF THE STUDY

As the result of the testing, all functions in the KIZ service system works perfectly fine, and all the requirements have been fulfilled. And in this chapter, the major functions of the system will be demonstrated.

5.1 Login

Base on the design of the system, there are two level of users of the system. One is UKM students, another is Admin. At the login page, the system required users to enter their email as account number and password. If users haven't created an account yet, they can click the 'Register here' link which will direct them to the registration page. However, the Admin and UKM students share the same login page, the system will authenticate the user by an attribute call 'is_admin', by default the value is '0', which means the account is normal level user, creation of the Admin account can only be done through the database by changing the 'is_admin' from '0' to '1'.

After the user click 'Login', the login controller will validate whether the 'is_admin' attribute is equal to 1, if true, then the system will direct to the admin home page, if not, the system will direct to the normal user page. Besides, if a normal user tries to access the admin home page by directly enter the URL, the system will redirect the user to normal user home page and pop up with error message.

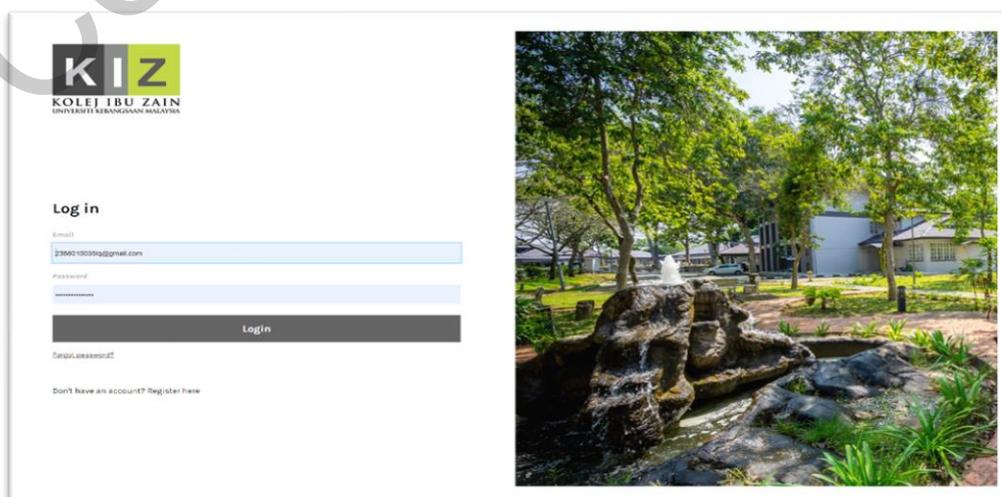The following figure 5.1 shows the interface for login function of the system.

Figure 5.1: Login Page

5.2 Approve Application

In the admin panel, the admin will be able to view and approve or reject the application for room made by the students. The 'application()' function in AdminController will return all the application info with dorm and user info to the application table. The table will display all the applications that status is 'pending' ordered by 'ID'. Then the function 'appinfo()' will find the 'id' of the specific application which will direct the admin to the application detail page after admin click 'View' button.

In the function 'approve', the 'id' and the 'act' value from the form will be acquired. If the admin click approve button which 'act' is 'approve', the system will update the application attribute status from 'pending' to 'approved', also update the 'users' table attribute 'resident' from '0' to '1', '0' means the user is not a current resident, '1' means the user is a current resident. After that, the system will redirect to the application table page with 'approved' message. Otherwise, the system will update the application table attribute 'status' to rejected, and redirect with the 'rejected' message.

The following figure 5.2 shows the interface for approve application function of the system.
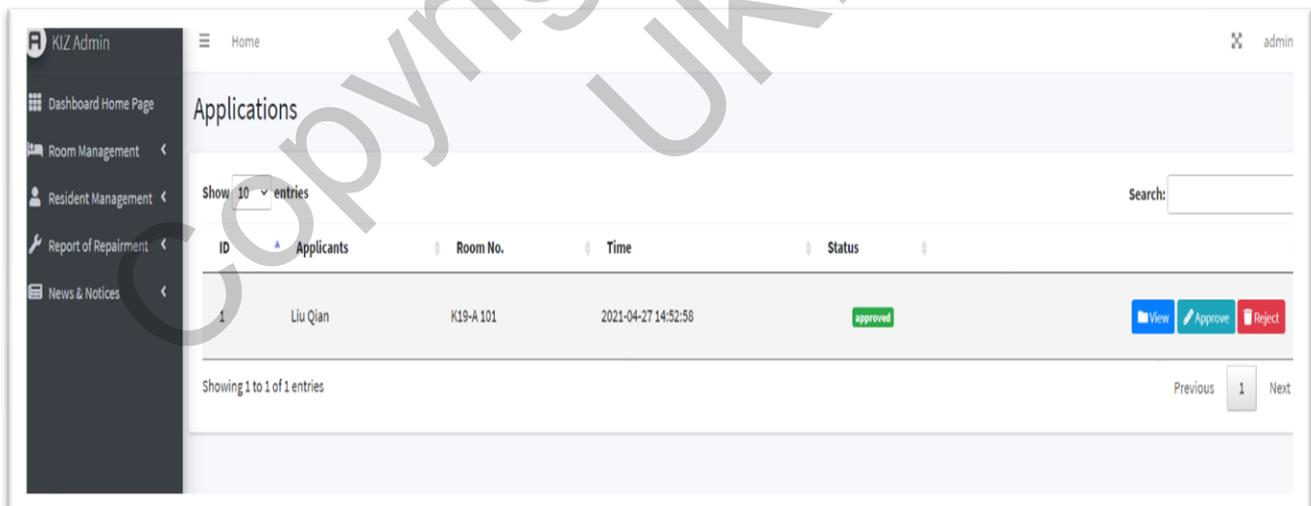
Figure 5.2: Application table

5.3 CRUD of the Room

The system allows admin to add new rooms into the system. In the 'addRoom' function from the 'DormController', the controller will get all the dorm data from the submit form of 'add room', the '$dorm = new Dorm' will crate a new row of dorm data, save the data get from the 'add room' form. Then the system will redirect to the room information table with success message. The admin can manipulate the dorm information in the room information table.

The admin can either select edit the room info or delete the room info, and the 'roomUpdate' function in the 'DormController' manage the update info function for each room, the 'Dorm::Where()' statement will get the 'id' for the room admin edited. Then the controller will request all the relevant data in the 'room edit' form and update the row of data in database. Next, the page will redirect to the room information table with success message.

The following figure 5.3 shows the interface for Create Room function of the system.

Figure 5.3: Create Room Page

5.4 Room Application

The table display in room application page for students is using the 'databtable', by directly implement the cdn-datatable-css file, the table will display like the interface picture above, it has search function, pagination and also allow user to order the data by different attributes.

After student have decide their desired room, they can click 'apply' button which the system will direct to the application confirmation page. For the function store in PostController, it will create a new row of data in application table once the students

confirm and make the application. The attribute 'status' will automatically saved as 'pedning' since the application has just been created. And also, an attribute in the 'users' table 'apply' will be updated to '1', and '0' means the students haven't made any application, '1' means the user already made the application and it's processing. When students trying to make an application, the controller will check the 'apply' attribute if it's equal to '1', the system will deny the application request since the students already made one, and if it's '0' the system will proceed with the students' first application.

The following figure 5.4 shows the interface for Room Application function of the system.

Figure 5.4: Room Application Page

As a result, all the functions for the KIZ service system are error-free and well performed. All the objectives of the project are achieved.

6   CONCLUSION

In today's fast developed society, the IT involvement in our daily life is getting more and more prevalent. From the tiny thing in our daily life to the complex management in a big company, everything is simplified by the involvement of the IT. The KSS is not an exception, not only it brings the convenient to all the residents, but also improve the efficiency of the work process in KIZ.

The completion of the whole project took a year, the first half year focus on the requirement elicitation and design of the system, a well design of the system provides with sufficient detail and information to the future development, enabling the whole consistence of the project. The followed half year is the development of the system, the most famous framework Laravel is used to develop the whole system. It provides features like template inheritance and displaying data that adds flexibility to the web development process (*What makes Laravel framework the best choice for PHP Web Development* 2021). Since the system is used MVC architecture, views and manipulation of the data are completed separately which highly improved the effectiveness of the development process.

The testing process is implemented simultaneously with the development of the system. Even though exhaustive testing is impossible, all the important module of the system are being tested, the following debugging process and improvement made sure the system is well-refined.

However, there are many possible enhancements for the KIZ service system, one of the most important future enhancements of the KSS is that adding a messenger function between user and KIZ staff, this way the user can directly ask for help or have some enquires through the system, not bother to add a contact number and communicate on WhatsApp or Telegram. Currently, the KSS is a web-based system design for KIZ, but maybe in the future, a mobile APP could be developed to provide those services more conveniently. Through this way, user can receive and check the notification send from the system on time. Last but not least, the user should be able to login in using siswa account to KSS in the future, since all the residents of the KIZ is UKM students or staffs.

Saying the project is a process of development is not good to say it's a process of learning. Numerous difficulties and problems occurred during the development of the KSS project. Some took time to ponder, some leads to an area of unknow knowledge. Fortunately, all the problems encountered are solved eventually by learning online and consulting supervisor.

7   REFERENCE

The National University of Malaysia, About Us Archived, 17 October 2007, About Us Archived at the Wayback Machine.

Bor-Yuan Tsai, Simon Stobart, Software Quality Journal, 6(4) December 1997, 295-309, Iterative Design and Testing within the Software Development Life Cycle.

Dr. Mohammad Faidzul Nasrudin, Demcember,2020, Advanced PHP, CRUD, OOPHP, MVC and CodeIgniter

Pranshu Gupta, Ramon Mata-Toledo, Morgan Monger, Journal of Computing Sciences in Colleges, Volume 27, Issue 3, January 2012, Utilizing ASP.NET MVC in web development courses

Manman PENG, Xinni XIE, 2008, Hunan University, The Design of Dormitory Management System for College Students Based on Android Platform.

Adithya Mothe, Koushik Kumar Suragoni, Ramya Vakity, 2010, Governors State University Online Dormitory Reservation System.

LingFang Hua, Jiangxi, 2010, Science & Technology Normal University, Research on Dormitory Management System in Colleges and Universities

Adrian Garcia, 2013, UX Research | Standardized Usability Questionnaire, User Research (https://chaione.com/blog/category/user-research/)

SURABHI SHUKLA, 2021 "What makes Laravel framework the best choice for PHP Web Development?