ONLINE DOCUMENT MANAGEMENT SYSTEM FOR ORAL EXAMINATION

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MOHAMMED RASHED ALI WARDAN

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Bachelor of Computer Science (Network & Security)

School of Computing
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FEBRUARY 2021

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DEDICATION

This thesis is dedicated to my family, who helped me and believed in me, and supported me. I would not have reached who I am right now without their continued prayers and love. It is also dedicated to my friends who always encourage me and supported me. I would also like to thank my supervisor, Dr. Siti Hajar Binti Othman. Your valuable guidance throughout my studies was essential to complete this project.

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ABSTRACT

Viva oral examination is a process whereby postgraduate students need to present their research or project result findings in front of examiners through oral presentation. Specific for the postgraduate students under the Master of Computer Science (MCS) program in the School of Computing,Universiti Teknologi Malaysia (UTM), their research viva is the result of the student's dissertation project. Commonly, the viva oral examination's procedures are performed in a traditional approach in which the viva's procedures management between the student and supervisor is executed through one postgraduate office clerk. However, due to the COVID-19 pandemic problem, the physical operation of the oral viva needs to be adjusted to virtual. Hence, the manual process which has been implemented before also needs to be transformed according to the new environment. Furthermore, before the COVID-19 pandemic, the students go through the procedures physically. For example, submitting the thesis, documents, presentation slides, selecting examiners. On the other hand, this project will conduct the viva's procedures to be online. Online Document Management System for Oral Examination will assist in the documentation submission and examiners selection processes. This proposed system will develop the processes of the viva's methods of giving the necessary files to overcome the current COVID-19 pandemic challenges.

ABSTRAK

Pemeriksaan lisan Viva adalah proses di mana pelajar pascasiswazah perlu mengemukakan hasil penyelidikan atau hasil projek mereka di hadapan pemeriksa melalui persembahan lisan. Khusus untuk pelajar pascasiswazah di bawah program Master of Computer Science (MCS) di School of Computing, Universiti Teknologi Malaysia (UTM), kajian mereka adalah hasil daripada projek disertasi pelajar. Lazimnya, prosedur pemeriksaan lisan viva dilakukan dalam pendekatan tradisional di mana pengurusan prosedur viva antara pelajar dan penyelia dilaksanakan melalui satu kerani pejabat pascasiswazah. Walau bagaimanapun, kerana masalah pandemik COVID-19, operasi fizikal viva oral perlu disesuaikan dengan maya. Oleh itu, proses manual yang telah dilaksanakan sebelum ini juga perlu diubah mengikut persekitaran baru. Selanjutnya, sebelum wabak COVID-19, para pelajar menjalani prosedur secara fizikal. Contohnya, menyerahkan tesis, dokumen, slaid persembahan, memilih pemeriksa. Sebaliknya, projek ini akan menjalankan prosedur viva untuk berada dalam talian. Sistem Pengurusan Dokumen Dalam Talian untuk Pemeriksaan Lisan akan membantu proses penyerahan dokumentasi dan pemilihan pemeriksa. Sistem yang dicadangkan ini akan mengembangkan proses kaedah viva memberikan fail yang diperlukan untuk mengatasi cabaran pandemik COVID-19 semasa.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

UTM	-	Universiti Teknologi Malaysia
HTML	-	Hypertext Markup Language
CSS	-	Cascading Style Sheets
RUP	-	Rational Unified Process

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

A lot of students have the ambition to complete their master's degree with the aim of better opportunities in their life. Stepping for a master's degree requires a student to go through several procedures for the completion of a master's degree. One of the essentials is an oral exam that master students are required to do during their degree which is known as "Viva". The viva voce is from the Latin meaning 'live voice' or oral examination in which a student or candidate answers questions from an examiner (Watts, 2012). Viva is a university examination type in which it is orally conducted and compulsory, in which a student answers questions in speech rather than writing. However, Viva provides a chance for a student to defend his thesis as well as justifying the thesis and show the engagements of a student in the academic discussion with examiners. Besides, Viva exam gives the examiners a certainty of the thesis and the report that they are the student's work and an opportunity to look at the thesis in more detail and explore any issues and will help to decide whether a student has met the requirements for the degree.

For instance, in the University Technology Malaysia in the school of computing, Master of computer science (MCS), Viva is necessary for every postgraduate student because it helps to examine, discuss, explore, and clarify if there is any ambiguity in the thesis. Viva's purpose is to ensure that the thesis belongs to the student, not someone else, and check if a student understands what he has written and can defend it verbally. However, almost all faculties at Universiti Teknologi Malaysia, all taught courses, mixed-mode, and research postgraduate students are required to complete viva during their degree. Completing the viva is important in ensuring student's requirements for the degree graduation. Viva is very important for every student as it assists in achieving the

degree and without the oral examination (viva), students cannot be graduated. Moreover, Viva is important to ensure that a student can claim his thesis and verbally defend it.

1.2 Problem Background

In every semester at Universiti Teknologi Malaysia (UTM), all taught courses, mixed-mode, and research postgraduate students need to complete the oral examination (Viva). Viva is a significant part for students who are doing postgraduate studies as it ensures that a thesis is examined, checked, clarified, and a student is legitimated for the master's degree. However, the process of going through the viva for students and examiners used to be conducted physically inside UTM. The 2019 year brought the pandemic covid-19 which impacted the whole world. Education is one of the big areas that is affected by the covid-19 and due to that the teaching and learning at UTM changed to be online. Postgraduate students cannot physically submit the oral exam viva's documents inside UTM due to covid-19 situations which means postgraduate students cannot enter the faculty and present the necessary hardcopy documents.

The problem is that the current approaches such as using google drive can lead to an unorganized method of getting the documents in which it can cause documents loos. Furthermore, during the viva, supervisors need to choose an internal and external examiner and in the current situation, it is done traditionally. Moreover, the examiner issues the date and time and undertakes the necessary arrangement in a traditional method. In addition, there is no checking of the student's identity to ensure that the thesis belongs to the student, not someone else.

Unfortunately, these procedures are not properly managed and organized and might have some flaws such as that the document might be lost, inappropriate file storing, retrieving the documents, and the document organization. This may affect the processes of viva and the processes might be delayed or not managed properly. An

efficient and better way of managing and organizing the oral examination (viva)'s procedures is required. Online Document Management System for Oral Examination. This project will introduce a fully online web-based system that would perform as a platform exclusively for handling viva's documents for the MCS UTM postgraduate students. Furthermore, this system will assist postgraduate students in delivering, uploading, and completing the viva's procedures in an easier and proper method. This system can be used by students where it allows them to upload all necessary viva's documents that are required from students and make the necessary procedures in the online system. Moreover, this system will assist the program coordinator, viva examiner, SC office clerk, and postgraduate MCS students on the entire process from the time students submit their draft, presentation slide, and form until students finish all the thesis submission process.

1.3 Project Aim

This project aims to develop an online management system that can assist the supervisor and student in managing the submissions of the essential viva's documents and to monitor the student's progress. Furthermore, to provide the supervisor the ability to select the chairperson and examiners for the viva examination.

1.4 Project Objectives

i. To study and observe the requirements from current systems for the Online Document Management System for Oral Examination.

ii. To design and develop and integrate all system elements to produce an efficient, and reliable Online Document Management System for Oral Examination.

iii. To test and validate the developed system against users of the system which include the supervisor, viva examiner, and postgraduate MCS students.

1.5 Project Scope

The scopes of the project are:

i. The system will be an online web-based system with email verification.

ii. The system will be used by the supervisor, student, and examiner.

iii. The system will be used to manage the documents between the student and supervisor.

iv. The system will be used for selecting a chairperson and examiners.

v. Access Control, Authentication, Authorization, and hashing will be implemented to secure the system.

1.1 Project Importance

This project will make the submissions of the viva's documents to be conducted and managed online and will provide clear procedures to the supervisor, students, and examiners, students will get benefits such as the possibility to submit the documents online through the system, view what should be submitted, view examiners' information, choose an examiner, and edit their profile. Supervisors will also get benefits such as they can view and download the documents at any time after being uploaded, ask for essential files from the student through the system on a specific date, view the student information and progress. Finally, the examiner will be able to edit his information, approve or disapprove a student, issue the exam dates, view the student list.

1.6 Report Organization

The report is organized into 5 chapters. Chapter one covers the introduction of the project being proposed, which contains the introduction, problem background, the aim of the project, objectives, scopes, and purpose of the proposed project. Chapter two includes the literature review of the similar software or systems that are currently available. It also compares the proposed system to the available software or system. Chapter three discusses the methodology that will be used throughout the project. This chapter also includes the diagram and the procedure of the project development. Chapter four is where the analysis of the system and the user requirements including the essential diagrams, interface, and database design. Chapter 5 concludes this project and discusses the achievements and suggestions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Online Web-based systems are significant for our daily life and play an important role. Nowadays, online web-based systems are used in a massive variety of ways. For example, we use websites for ordering food, buying a ticket, watching a movie, using social media, and many.

A literature review is the objective of this chapter which will explore and offer an overview of the proposed online system. Furthermore, this chapter gives the reader a better picture of the project's core idea. A literature review is conducted to study the currently existing systems or applications that are similar to the proposed project “Online Document Management System for Oral Examination”. Moreover, to review and compare existing similar systems to the proposed project and to develop and improve the functionalities of the proposed online web-based system. In addition, this chapter is going to discuss the technologies used for the development of the system and the reason behind choosing them.

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2.2 Case Study

In UTM, at the faculty of computer science, postgraduate students need to do their voce viva exam. Voce viva exam is an important part for each postgraduate student that needs to claim his thesis. Viva is a vital aspect, as it ensures that a thesis is checked, evaluated, explained, and a student is also legitimized for the master's degree. Usually, students need to take several procedures that are being done in a traditional method. For instance, a student

needs to submit his proposal and then make an appointment with the internal and external examiners. Furthermore, a student should prepare his letter and be ready for the exam. Finally, a student needs to attend the viva exam. However, the process of submitting the thesis and documents is usually done physically by submitting it to the office. Nevertheless, the covid-19 pandemic brought the movement control order (MCO), in which the submission of viva documents changes by uploading in google drive so that the student's supervisor can have it, which is an inefficient process. However, these procedures have their limitations and flaws. This method wastes the supervisor's time by managing folders for students and this might result in a loss in the files. Furthermore, these procedures of what documents to submit can be ambiguous for students as there is no clear process of doing it. The current system is not efficient because time is wasted in trying to submit documents or nominate an examiner. In addition, when a student wants to choose an examiner, they have to select someone that has great experience on the same topic. When a student chooses an examiner from the list given by the supervisor, they find out that the examiner is already chosen. Currently, there is not an appropriate method to handle this issue of choosing a chairperson and examiners. However, with the pandemic covid-19, students submit their documents and files through google drive which is inefficient as documents are subjected to be lost or deleted since there is no database to store these files in a proper manner. In addition, there is no authentication of a person's identity specifically during the MCO where most students submit their documents in softcopy. Student's authentication is important for the integrity of viva's documents.

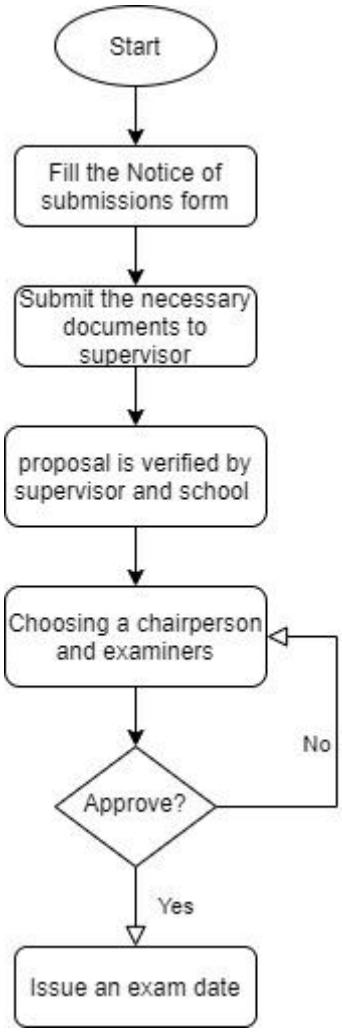

Figure 2.1: Viva Process Flow Chart

2.2.1 Viva Operation

The operations in the current system or procedures are manual except that during covid-19 and with the movement control order (MCO) the procedures little changed. Normally, postgraduate students need to submit their proposal, thesis, and other documents physically in hardcopy to the office at the faculty. Students do the necessary work to submit required documents such as proposal, thesis, presentation slides, presentation video, and other documents. However, during MCO this changed by uploading documents that are needed to google drive. Moreover, students choose

the examiners (internal and external) using a traditional way by selecting from a list that is given by the supervisor.

1.2 Current System Analysis

By having some investigation for the voce viva exam and how its procedures are currently being performed, it is necessary to analyze the proposed system and understand the user requirements. The outcome of the proposed project should be a new "Online Document Management System for Oral Examination". The completion of this project will bring new value to its desired environment. Current systems need to be evaluated to state their pros and cons. For making this possible, current systems should have a precise analysis.

The current system is considered traditionally, whereby the procedures are still performed in the same way that has been done before the MCO except with some changes. Nevertheless, when postgraduate students in all taught courses, mixed-mode and research who are doing master's degree want to accomplish the voce viva exam, they need to make several procedures. However, if a student thinks that he is ready and willing to do the voce viva exam then he should start the process. First, a student needs to fill the notice of submission form. Then he submits his thesis proposal. After a student has given a notice of submission, the student can set in motion for the appointment of examiners. Normally, there are two types of examiners one is internal and the other one is external. The Internal examiner is mostly a lecturer from the same faculty and could be some time from another faculty in the same university. The external examiner is an examiner that is usually from another university. Moreover, after setting the nomination date of the student with the examiner and the date is approved then the student can prepare for the actual voce viva oral exam.

2.2.2 General Knowledge about the domain

The study domain will be focused on the School of Computing Master of Computer Science (MCS) Postgraduate Programs. There are nearly 481 postgraduate

students that are doing master's degrees in the faculty of computer science. However, nearly 200 average postgraduate students will use the proposed system during the semester. Furthermore, there is currently no cloud database service that stores student's documents and files related to viva oral examination. In addition, the examiner's historical record is not stored and managed in an appropriate method. Finally, there is no authentication process of the student's identity currently exists during the MCO.

Table 2. 1: Advantages and Disadvantages of Viva System

Disadvantages of viva's current system	**Advantages of the proposed system**
The system is manual except for the use of google drive.	The system will be an online web-based system.
The system does not have a database to record information about staff offices and students.	Centralized database to store information about staff office and students
The status of thesis examiners is being done manually.	The system will show the status of procedures.

2.2.3 Suggestions and improvements

In UTM, at the faculty of Computer Science, the current physical operations of submitting the documents and selecting examiners need to be adjusted to virtual. Furthermore, the current process needs to be transformed according to the new environment. Hence, the suggested system should be able to solve current problems and flaws. They are as follows:

i. The proposed system should provide unambiguous procedures to users such as postgraduate students, supervisors, and examiners.
ii. The system should have an authentication method to authenticate students.
iii. The student should be capable of submitting their thesis through the system.
iv. The student should be capable of seeing their thesis' status.
v. The supervisor should be able to select the chairperson and examiners.
vi. The system should provide a list of available examiners.
vii. The system should show the examiner's status whether he is chosen or not.
viii. The student should be able to submit all essential documents through the proposed system.
ix. Examiners should be able to book a date for a student's day of viva exam.

2.3 Comparison between existing systems

In this section, a comparison would be conducted between the existing systems of the voce viva exam to see their strengths and weaknesses. In addition, the characteristics that will be used for the proposed system. Most of the universities in the world apply voce viva oral exam to ensure the student's understanding of the field of the research that he is doing. Furthermore, to give the examiners a certainty that the thesis belongs to the student and afford an opportunity for the student to defend the thesis.

The University of Manchester

The University of Manchester, which is located in Manchester, United Kingdom. The University of Manchester is considered among the largest universities in the UK with more than 40 thousand students who are pursuing undergraduate and postgraduate studies in different fields and the university is ranked as the 36th in the world ("Rankings and reputation of The University of Manchester", n.d.).

In the University of Manchester, voce viva oral exam is being done by all postgraduate students (Master and Doctoral). The procedures of doing the viva oral

exam are by filing a notice of submission form which is done through the university website. However, the viva process of submitting the thesis is performed online using the university's progression monitoring system which is illustrated in Table 2. 2 ("Viva/oral exam | University of Manchester", 2017). Finally, the nomination process also is conducted through the university's progression monitoring system for selecting examiners and chairperson ("Nomination of Examiners & Independent Chairs for Postgraduate Research Degree Examinations Policy November 2016 (Revised Sep 2018) (The University of Manchester)", 2016).

University Malaya Pahang

The University Malaya Pahang is located in Pahang, Malaysia. University Malaya Pahang was established in 2002. UMP is considered a technical university. UMP campus has more than 10 thousand students for both undergraduate and postgraduate studies ("About | Official Portal - Universiti Malaysia Pahang (Malaysia University) - Public University in Pahang, Malaysia", 2009) However, in UMP postgraduate students need to complete their voce viva oral exam to obtain the degree.

However, in both universities The University of Manchester and University Malaya Pahang the viva notice of the submission form is being done electronically which is unlike UTM where students need to submit the form manually. Furthermore, the submission of the thesis and other documents is being done manually. But, during the Covid-19 pandemic, students can submit the essential viva's documents through Email or google drive depending on the university.

Table 2. 2: Compression between different systems

Voce Viva exam Procedure	The Proposed System	University of Technology Malaysia	The University of Manchester	University Malaya Pahang
System type	Online	Manually	Online	Manually
Notice of Submission Form	Online	Manually	Online	Online
Thesis Submission	Online	Manually	Online	Manually
Choosing chairperson	Online	Manually	Online	Manually
Choosing Internal examiner	Online	Manually	Online	Manually
Choosing external examiner	Online	Manually	Online	Manually
Viva Exam Date	Online	Manually	Online	Manually

2.4 Literature Review Technology Used

In this section, there will be a brief discussion about technologies that will be used for the proposed system. Below is the list of technologies for developing this project to make sure that it operates as needed without any future problems or interruptions. To start constructing the Online Document Management System for Oral Examination in the School of Computing Master of Computer Science (MSC) Postgraduate Program website. The technologies should be identified for the front-end and back-end.

Visual Studio Code

Visual Studio Code is Microsoft's free editor that can be used to program various types of software developments. Visual Studio Code is a small editor that combines the flexibility of the source code with great tools for development such as IntelliSense.

Front-End

The technologies that will be used for the front-end are HTML, CSS, JavaScript, Bootstrap, Chrome DevTools, and GitHub.

Back-End

The technologies that will be used for the back-end are Node.js and MongoDB. Node.js is a platform that will be used in this project to develop the backend of the web-based system which is appropriate to build high scalable, data-intensive, and real-time backend services. Since the system will need a real-time environment. MongoDB is a database management system that will be used for this project to store, manipulate, and manage the data files needed for the system.

HTML

HTML stands for Hypertext Markup language and it is the core and the basic content layer of the website page. HTML is the foundation structure of any website page. HTML is a common language among all websites on the web. However, to distinguish between different multiple types of contents tags are used in HTML.

CSS

Cascading Style Sheets provides the presentation layer and creates the style of web pages by using colours, layouts, and typography which will help in the website’s view. CSS should determine how a website's HTML elements should appear on the frontend page. CSS is responsible for the shaping and styling of the website page.

JavaScript

JavaScript is mainly responsible for handling the behaviour layer of the website page. JavaScript is a powerful programming language, and it is used almost on every website. JavaScript is a programming language that uses logic for modifying the content and the behaviour of a page.

Bootstrap

Bootstrap is a framework for mobile-first and front-end web development. Bootstrap contains CSS, JavaScript, and built-in design templates. Bootstrap will be used in the proposed project so that the Bootstrap technologies can be benefited from it.

Chrome DevTools

Chrome Devtools are tools that are built-in inside the Google Chrome browser. DevTools can help in modifying the webpage and assist in diagnosing issues in a smooth and faster way.

GitHub

GitHub is a platform for hosting software developments. GitHub assists people in uploading their projects' codes and putting them inside repositories. GitHub can let a group of people work on software from anywhere. GitHub can help in solving problems for individuals by giving the user the ability to open an issue and others can help to solve the problem.

Node.js

Node.js is an open-source and cross-platform runtime environment for executing JavaScript code outside of a browser. Node.js is a perfect for building extremely scalable data-intensive and real-time back-end services. Node.js is easy to be worked with and it is used for prototyping and agile development.

MongoDB

MongoDB is a non-relational database and a NoSQL database. MongoDB uses a collection of records rather than tables and rows. However, MongoDB stores the data in JSON-like documents which makes it easy to work with.

2.5 Security Elements

The security of the proposed online system is essential to ensure that the user's information is safe and cannot be accessed by other unauthenticated users. The security elements that will be implemented in this system are Access Control, Authentication, Authorization, and hashing. Access Control is significant to prevent users from accessing other user's information. Access Control authorizes the appropriate level of access and allowed actions that are associated with the user's id. Authentication is when verifying the identity of the user and will be performed using a username and password. Authorization is to control the user's actions in the system. For example, students should not be able to perform actions that are only specified to the supervisor or the examiner. As for hashing, it is essential to encrypt the user's password to protect them from attacks such as man-in-the-middle attacks.

2.6 Chapter Summary

A literature review is a significant part of system development as it helps to research the current system and analyze it with different existing systems to understand the system's functionalities. This chapter illustrated the functionalities of the existing systems for the voce viva oral examination and compared them with the proposed system. Moreover, the current system was analyzed and explained. Analyzing current

system procedures shows that the existing system method has disadvantages, and a new online system is needed.

CHAPTER 3

SYSTEM DEVELOPMENT METHODOLOGY

3.1 Introduction

In this chapter, the methodology of the proposed system development will be discussed. For developing a project, traditional and modern approaches can be used. The methodology that will be used in the proposed system will be used to plan, design, and control the processes of the developing system. Moreover, the discussion will contain explanations and features of several different phases of the methodology. In addition, why the proposed methodology will be used and how it will be implemented during the development process. In fact, there exist several process models that are available in the system development of the project. For instance, Waterfall, Prototype, Incremental, Spiral, Rapid Application Development (RAD), Evolutionary Development, Iterative, and many more (Munassar, N. M. A. and Govardhan, A., 2010). Nonetheless, every methodology has its pros and cons. Therefore, a proper methodology model with the appropriate phases must be chosen at first. Rational Unified Process (RUP) methodology will be used in this project as the phases of the RUP approach are suitable in developing this project.

3.2 Methodology Choice and Justification

There are several methodologies for system development and these system development methodologies defined the main plan of the systems that are being developed. The methodology that is chosen has a significant impact on the project's success. Therefore, it is essential to choose the proper process model methodology for the proposed online web-based system. Picking the appropriate model can ensure the success of the proposed project. However, choosing the wrong methodology can bring a constant source of problems and could make the project fail. To be able to choose the right model, many factors need to be considered such as requirement

understanding, technologies used, the complexity of system, flexibility of system, reliability of system, expected lifetime, cost, risk, schedule constraints, and interaction with stakeholders.

3.3 Rational Unified Process (RUP)

RUP (Rational Unified Process) is a software engineering methodology that is iterative process development which was originally presented in 1988 as Rational Objectory Process. (RUP) gives a disciplined method for assigning the organization's tasks and responsibilities. The main aim of the RUP is to produce high-quality software that can meet the user's needs in a short time and low cost. The Rational Unified Process (RUP) was first developed by Rational software (Anwar, A., 2014). RUP is an excellent choice in case the requirements are clear. However, RUP does not focus on the stakeholders instead it focuses on the process itself which is the reason for not being affected when changing the development team structure (Bashir, M.S., and Qureshi, M.R.J., 2012).

The development process model of RUP for each phase will undergo requirements capture, analysis, design, implementation, testing and that is why the process is iterative which means the repetitions of the phases. RUP uses case driven which means that by using interactive UML diagrams the requirements will be derived (Heijstek, W., 2010). RUP processes model is divided into four distinct phases: Inception, Elaboration, Construction, and Transition. In the inception phase, the project's idea and scope are stated and determined if it is worth conducting by the project's team. As for the elaboration phase, is when evaluating the resources and application of the project. The construction phase is for the development of the project, the project should be designed, written, tested, and should be completed by this phase. Finally, transition phases are the phase for releasing the project to the public (Cobb, C.G., 2015). Figure 3.1 demonstrates the RUP four distinct phases lifecycle. Figure 3.1 shows that the RUP contains four phases of development. However, every phase is organized into several different iterations that need to meet scope, requirements, and objectives before going to the next phase.

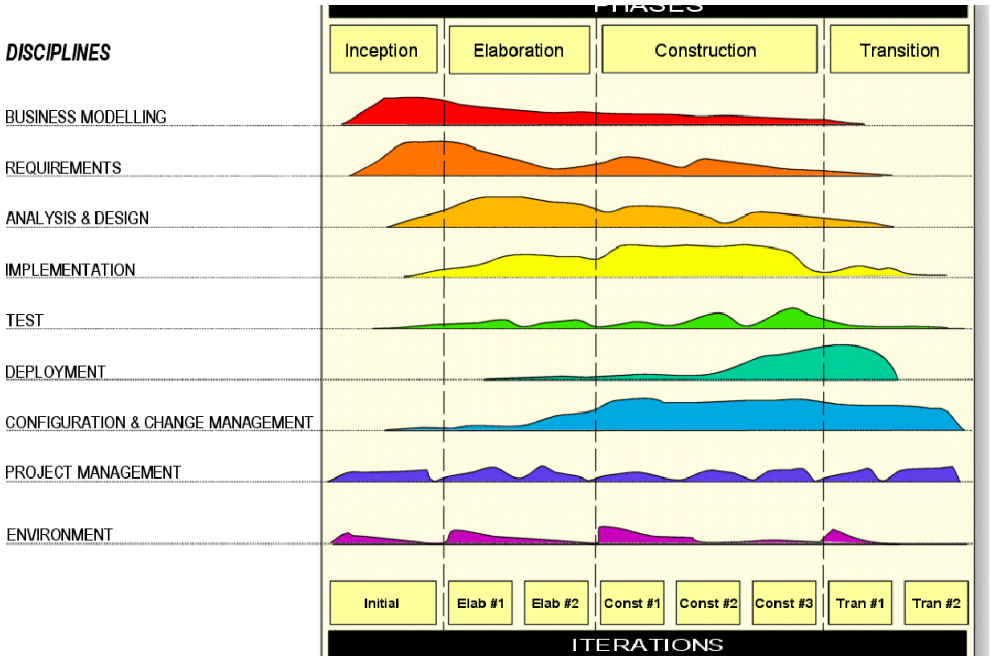

Figure 3. 1: RUP iterative lifecycle (Heijstek, W., 2010)

Table 3. 1: The advantages and disadvantages of RUP

Advantages	Disadvantages
Allow dealing with changing requirements	Hard to implement for beginners and relies on the ability of experts.
Focus on accurate documentation	The integration in the development process can also have an adverse impact on some more fundamental activates during testing phase
Force the integration to happen in the construction phase	Despite RUP excellent results, it consists of complex methods which make it challenging for small teams.
It supports the incremental build of the software project.	It takes a long time due to documentation.
Use the resources efficiently.	It is a costly methodology
Help to identify issues at an early stage.	

3.4 Rational Unified Process (RUP) phases

There are mainly four phases in the RUP lifecycle process model, and they are Inception, Elaboration, Construction, and Transition. Furthermore, each phase will be discussed along with the Viva management system development process.

3.4.1 Inception Phase

Figure 3.1 shows that the inception phase is the first phase in RUP development process. Inspection is a stage in which the proposed project goal of content, project resources, and project description are defined. This phase determines the scope of the project. the project must be validated for the budget to be approved and the requirements should be understood (Anwar, A., 2014).

The Postgraduate proposed online system is being developed using RUP process model which means that UML diagrams can be changed later depending on the new requirements. This phase gives the developer a clue about whether to do the project or not. This phase must produce the goal, scope, and objectives of the project. Furthermore, the requirements should be determined. The use case of postgraduate online system should be completed. Finally, to define the technologies that are used in the system development. The Postgraduate online system is scoped within the Faculty of Computing University Technology Malaysia. However, the users that will be involved in the system are postgraduate students and staff of the faculty.

3.4.2 Elaboration Phase

The elaboration phase is the second phase of the RUP process model. However, this phase focused on the project's technical risks. In this phase, the project requirements that have been defined in the inspection phase are analyzed and designed. In the Elaboration phase, the project's user requirements are looked over in detail. Most of the use cases of the proposed project should be almost completed such as class, sequence, and activity diagrams. The Postgraduate project System architecture is

designed and explained. The prototype of the proposed project is implemented in real devices and the Gantt chart is produced for the development planning of the project.

3.4.3 Construction Phase

The system operations are made during this phase and the main objective of the construction phase is to develop the proposed project's components and features. In this phase, the system should be built and tested, and the implementation of the system design needs to be completed. In addition, the coding should be done by this phase. There should be an online web-based system that is executable and deployed for users. By the end of this phase, the Postgraduate proposed online System requirements and design are finished. Moreover, the project's objective should be met, and the project is tested and is running.

3.4.4 Transition Phase

In this phase, the system is the transition from a developing system to the production of an actual active system. The proposed system must meet end-user requirements and needs which is important in solving any issues that might arise. Moreover, the system is evaluated based on the feedback given by the users. However, in this system, the user's needs should be already met. By the end of this phase, all issues of the proposed system are fixed. Furthermore, a user manual should be written. Analysis and testing of the system are completed. A beta version of the system is released, and the system can be used by users.

3.5 Technology and Tools Implemented

In this section, the technologies that will be used to build the proposed system will be discussed. A brief description will be given for each technology and how those technologies are going to be used.

3.5.1 Visual Studio Code

Visual Studio Code uses several programming languages to build a variety of applications. It is a platform for developers to build and compile different applications. Visual Studio Code is considered one of the best choices for web development. Visual Studio Code provides the developers an easy and comfortable method to use its tools and features. What makes Visual Studio Code preferable is that it is very flexible with many extensions and has a lot of shortcuts. Visual Studio Code will be the base of this project and workflow. However, Visual Studio Code is free software that can be downloaded from Visual Studio Code's website.

3.5.2 Node.js

Node.js is an open-source server-side platform that uses an event-driven and non-blocking framework that allows users to build quick and scalable intensive applications. Furthermore, Node.js applications are real runtime environments that execute JavaScript code outside of the browser (Herron, D., 2018). Node.js is used to build the back-end services for the application programming interfaces and it is an appropriate for building highly scalable and real-time applications.

3.5.3 MongoDB

MongoDB is a document-oriented database that is non-relational that scales out the data in an easier way and makes development quicker because iterating can be done fast (Chodorow, K., 2013). MongoDB is one of the nonrelational database (noSQL database) types that is newly used by developers. Furthermore, MongoDB is very flexible to use, easy to learn and considered fast because it is noSQL document-based which means that the consistency guarantee is weak not as SQL. MongoDB uses a collection which is a group of documents that can be seen as tables in the relational databases.

3.5.4 MongoDB Authentication

Security is a significant part when building a web-application or web APIs to protect the project from unauthorized access. Moreover, authentication is a method to identify users that will try to gain access to the web application's resources (Varghese, S., 2015). MongoDB authentication will be used for the proposed project to provide a flexible and easy process for authenticating users. As for this project, postgraduate students from the faculty of computing need to be authenticated to use the web-application.

3.6 Heroku

Heroku is a platform as a server that eases the hosting of the system and provides services using Node.js. Heroku can be used to host the proposed system. The Heroku network will run the online system in a virtual container which will be executed on a reliable runtime environment. Heroku provides add-ons tools and services for developing, extending, and operating the website.

3.7 System Requirements Analysis

To make the proposed project obtain an efficient, flexible, interactive, affordable, and appropriate prototype for this project, there are some requirements for the software and hardware tools that are important in the designing, developing, and testing of this project.

The proposed online system will be scoped to postgraduate students at the faculty of computer science in UTM is a web-based application that will be run on devices that have a browser. According to table 3.2, there are some software and tools used for developing this proposed project. For instance, Visual Studio Code, HTML, CSS, JavaScript, Node.js, and MongoDB. As for table 3.3, these are the minimum requirements of hardware and software specifications for using the proposed web-application.

Table 3. 2: Software specifications for development

Requirements	Functions
Visual Studio Code (latest version)	The main software for programming, building, testing, debugging the developing API tools.
HTML, CSS, and JavaScript (latest version)	HTML will be the base of the web-app and CSS will assist in the app's appearance.
Node.js (latest version)	Node.js is a runtime environment to execute JavaScript code outside of the browser. Assist in the back-end services.
MongoDB (latest version)	Will be used to store data in the database.

Table 3. 3: Hardware/Software specifications

Requirements	Specification
Processor	1 GHz, 2GHz or more
Memory (RAM)	1 GB or more.
Operating Systems	Windows XP or newer. Mac OS X v10.7 or higher. Linux Ubuntu. And IOS v4 or Android 5.0.
Browsers	Firefox, Safari, Chrome, Opera, and Microsoft Edge.

3.8 Chapter Summary

To summarize, in this chapter there was a discussion about the system development methodology. RUP approach is used in the development of this project. The four phases of RUP were briefly discussed. In addition, the technology and tools that are used in this project were discussed. Moreover, to plan the project's development smoothly. Finally, the hardware and software minimum specification that is required in this project.

CHAPTER 4

REQUIREMENT ANALYSIS AND DESIGN

4.1 Introduction

This chapter demonstrates the design of the Viva Management System for postgraduate students in the faculty of computing in UTM. A detailed analysis of the project requirements will be performed. The requirement analysis will be started by presenting the overall system use case, and activity diagrams in which will provide the system's functionality and interface, and the system's database architecture. Furthermore, a discussion of the core design and data flow of the proposed system will be mentioned in the Data Flow Diagram. Moreover, this chapter will provide an explanation of the proposed system design and architecture by presenting the system's diagrams which illustrate how the system components interact with each other. However, all necessary studies that have been done in the previous chapters will be used as a guide to design the proposed system and to ensure that the system's design meets the requirements. Finally, the database design will be explained using the Entity-Relationship Diagram (ERD) and tables.

4.2 Requirement Analysis

The early development of this project is essential and requires the analysis of the system. However, in this section, the requirement analysis will be conducted on the proposed system. Furthermore, the user requirement in this project is divide into mainly four users, admin, student, supervisor, and examiner. The user who is an admin will represent the faculty management itself whereas the supervisor will represent the supervisor in the faculty of computer science in UTM. Furthermore, the examiner will represent the examiners that will be chosen for the viva's examination. However, the users who are students will represent the postgraduate students in the faculty of computer science in UTM.

Followings are the requirements for the admin:

i. The admin should be able to completely control the system.
ii. The admin should be able to fully manage the system.
iii. The admin should be able to add users or delete users.
iv. The admin should have full access to the database.
v. The admin can add and delete any information in the database.

Followings are the requirements for the student:

i. The student should be able to login to the website.
ii. The student should be able to edit his information.
iii. The student should be able to upload the documents.
iv. The student should be able to see the examiner's information.
v. The student should be able to see the progress.
vi. The student should be able to view the examination date information.

Followings are the requirements for the supervisor:

i. The supervisor should be able to login to the website.
ii. The supervisor should be able to choose a chairperson.
iii. The supervisor should be able to choose an internal examiner.
iv. The supervisor should be able to choose an external examiner.
v. The supervisor should be able to view the student's documents.
vi. The supervisor should be able to view the examiner's information.
vii. The supervisor should be able to see the student's progress.
viii. The supervisor should be able to print the documents.

Followings are the requirements for the Examiner:

i. The Examiner should be able to login to the website.
ii. The Examiner should be able to edit his information.
iii. The Examiner should be able to approve or disapprove of any exam.
iv. The Examiner, who is Internal Examiner, should be able to issue the examination date.
v. The Examiner should be able to view the students and supervisor who tried to select him as the examiner.

4.2.1 Use Case Model

This section contains the use case and activity diagrams. These diagrams are going to describe the system's interaction between the user and the online web-based system.

4.2.1.1 Use Case Diagram

The use case diagram explicitly specified to describe the proposed system by presenting the actors that are involved in the system and their interaction with the system. Furthermore, this proposed system will have four main actors that are Admin, Supervisor, Examiner, and Student. The actor who is an admin can manage the system and have full access to the database and backend services. However, the user who is a student will represent the postgraduate student in the faculty of computer science. Moreover, the supervisor performs most of the actions compare with the other users. The Examiner will be able to add and edit his information in the system as well as to approve the selection and issuing the examination date. Figure 4.1 demonstrates the use case of the system with all the actions that students, supervisor, examiner, and admins can perform.

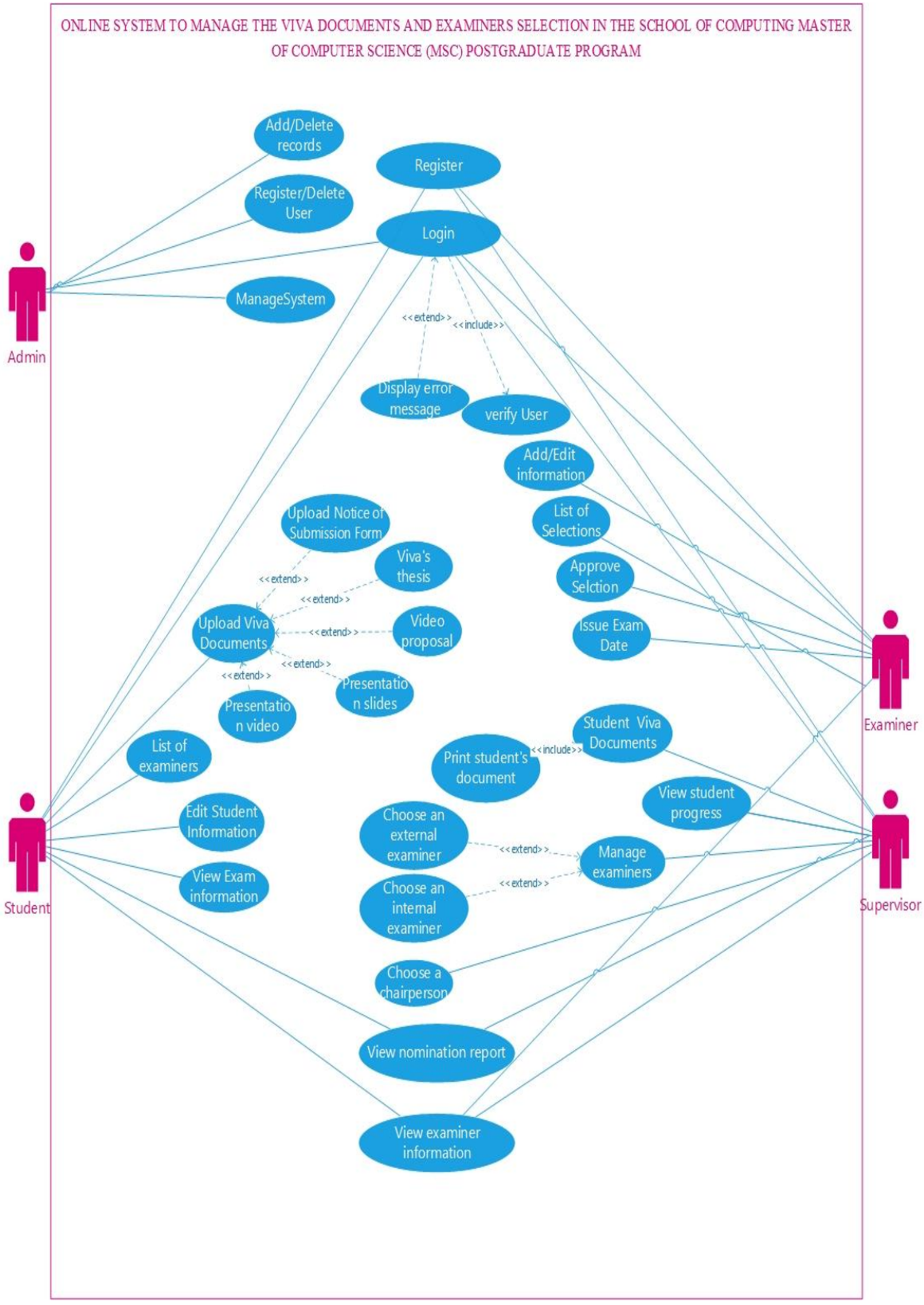

Figure 4. 1: Viva Management System Use Case Diagram

4.2.1.2 Use Case Description

Table 4. 1: Use case and functionality description

Use Case	Functionality Description
Registration	Supervisor, Student, and Examiner need to register to the web-application.
Register/Delete User	The admin will have the ability to add or delete any user from the system.
Mange System	The admin will have full access to the system and full control of the system.
Add/Delete Records	The admin will be able to add or delete anything from the database in the proposed system.
Login	The users which are students, supervisors, and examiners can login and logout from the system using their assigned username and password and can do several actions. The system will allow only authenticated users to use the system.
Verify User	An authentication process will be conducted to identify the identity of the users before they login.
Upload Viva Documents	The student can upload his documents via the system and the supervisor can view the documents.
Edit Student Information	The student will be able to edit his information.
View Exam Information	The student will be able to see the exam information such as date, time, and venue.
Choose a Chairperson	The supervisor can select a chairperson for the student viva examination.
List of Examiners	The student will be able to view the examiner's information.
Manage Examiners	The supervisor can select an internal and external examiner for the student examination.

Choose an Internal Examiner	The supervisor can select an internal examiner for the student viva examination.
Choose an External Examiner	The supervisor can select an external examiner. However, the supervisor should contact the external examiner before selecting in the system.
View Nomination Report	Both supervisor and student can see the nomination report.
View Examiner Information	Supervisor and Student can view the examiner's information and status.
Print Student's Viva Documents	The supervisor can print and download the viva documents of the student.
View Student Progress	The supervisor can see and view the student viva's progress.
View Student Information	The supervisor can view and see the student information.
Approve Student	After choosing the examiner by the supervisor. The examiner will have to approve or reject the selection.
List of selections	The Examiner will be able to view the selections that the supervisors made for the viva examination.

4.2.2 Activity Diagram

To illustrate the system's activities, an activity diagram is conducted. An activity diagram is used to detail the various actions that are sequentially performed by different components. Furthermore, as for this system, four main entities are involved which are admin, supervisor, examiner, and student.

4.2.2.1 Activity Diagram for Student

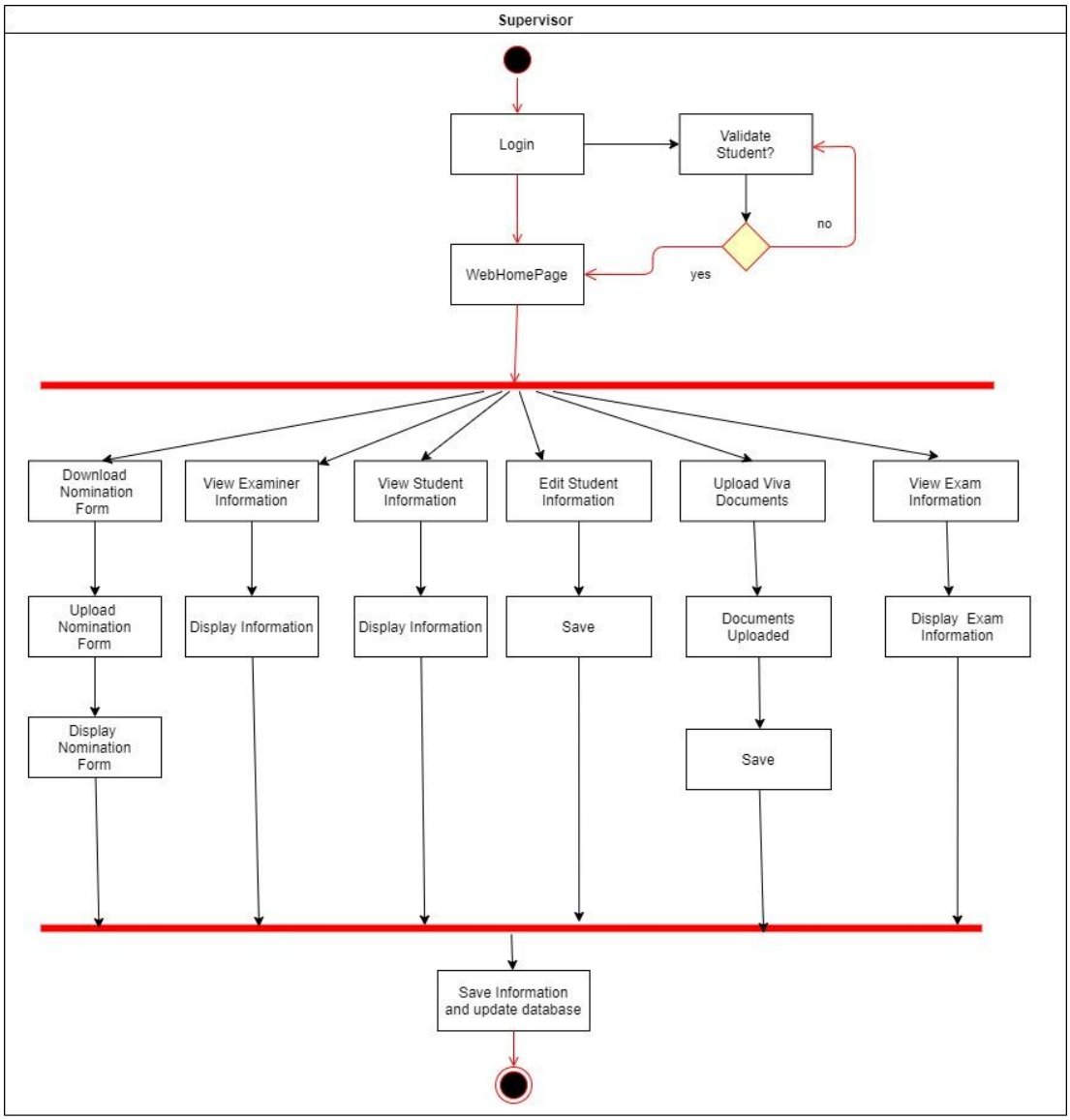

Figure 4. 2: Student Activity Diagram

Figure 4.2 represents the activity diagram of the user who is a student. Furthermore, the diagram explains the actions that a student can conduct. Based on figure 4.2, students can firstly login into the system and their username and password will be verified. After successfully logged in the homepage will be shown to the student. The homepage will have the necessary elements of the viva exam procedures such as nomination form, examiners list, view, and edit student information, and

upload documents. Students can take the necessary action then press save and then the database will be updated.

4.2.2.2 Activity Diagram for Supervisor

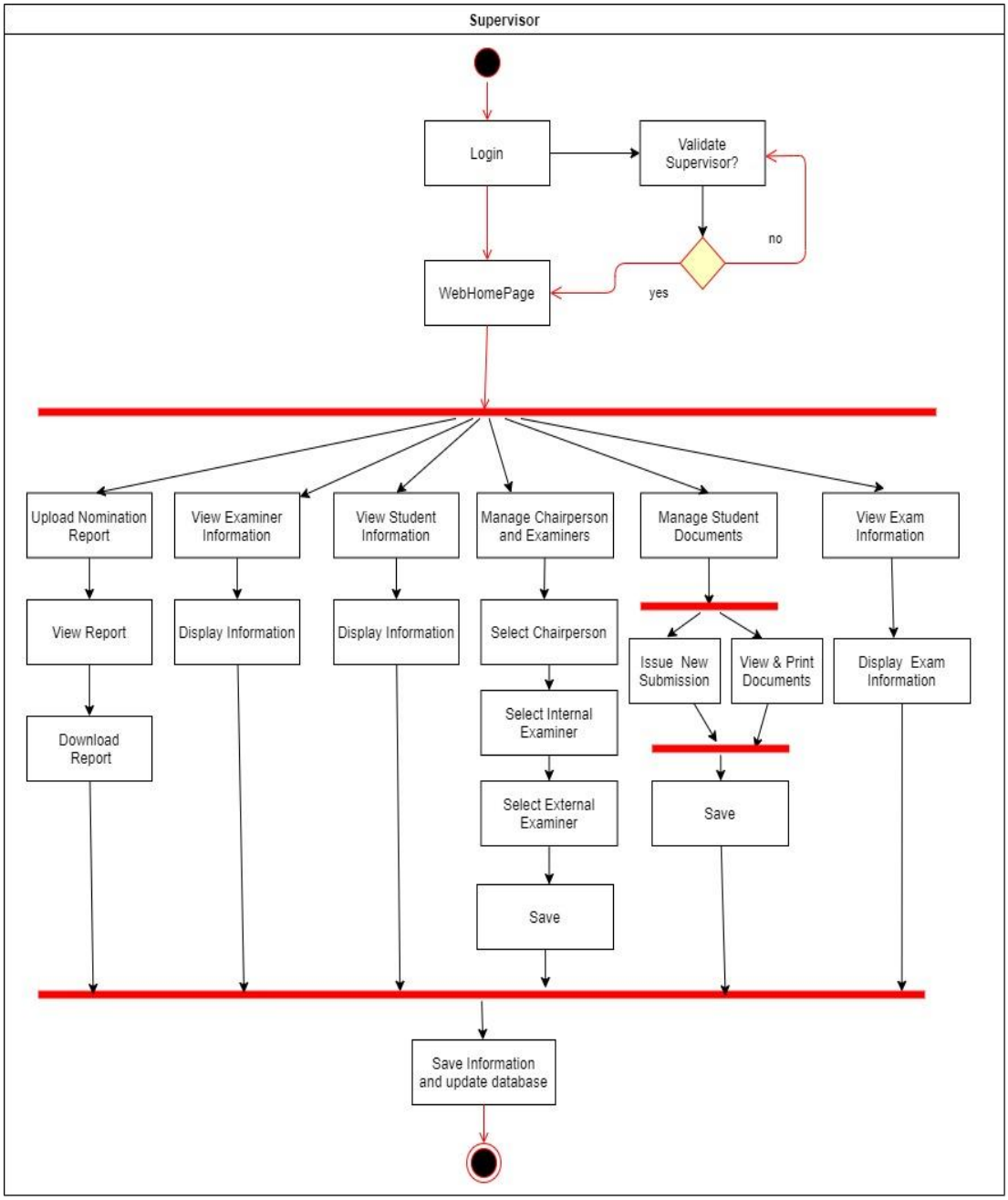

Figure 4. 3: Supervisor Activity Diagram

Figure 4.3 represents the supervisor activity diagram. However, the user who is a supervisor in the faculty of computing in UTM can login to the online system. The system will authenticate the supervisor for identification. Furthermore, the supervisor will be redirected to the homepage of the system and several elements will be shown to the supervisor. The supervisor will be able to conduct several actions on the homepage such as view nomination report, view examiner information, view student information, manage the nomination report and manage the student viva uploaded documents. The supervisor will be able to choose a chairperson, internal examiner, and external examiner for the student viva examination. However, the supervisor must contact the examiners before selecting them in the system.

4.2.2.3 Activity Diagram for Examiner

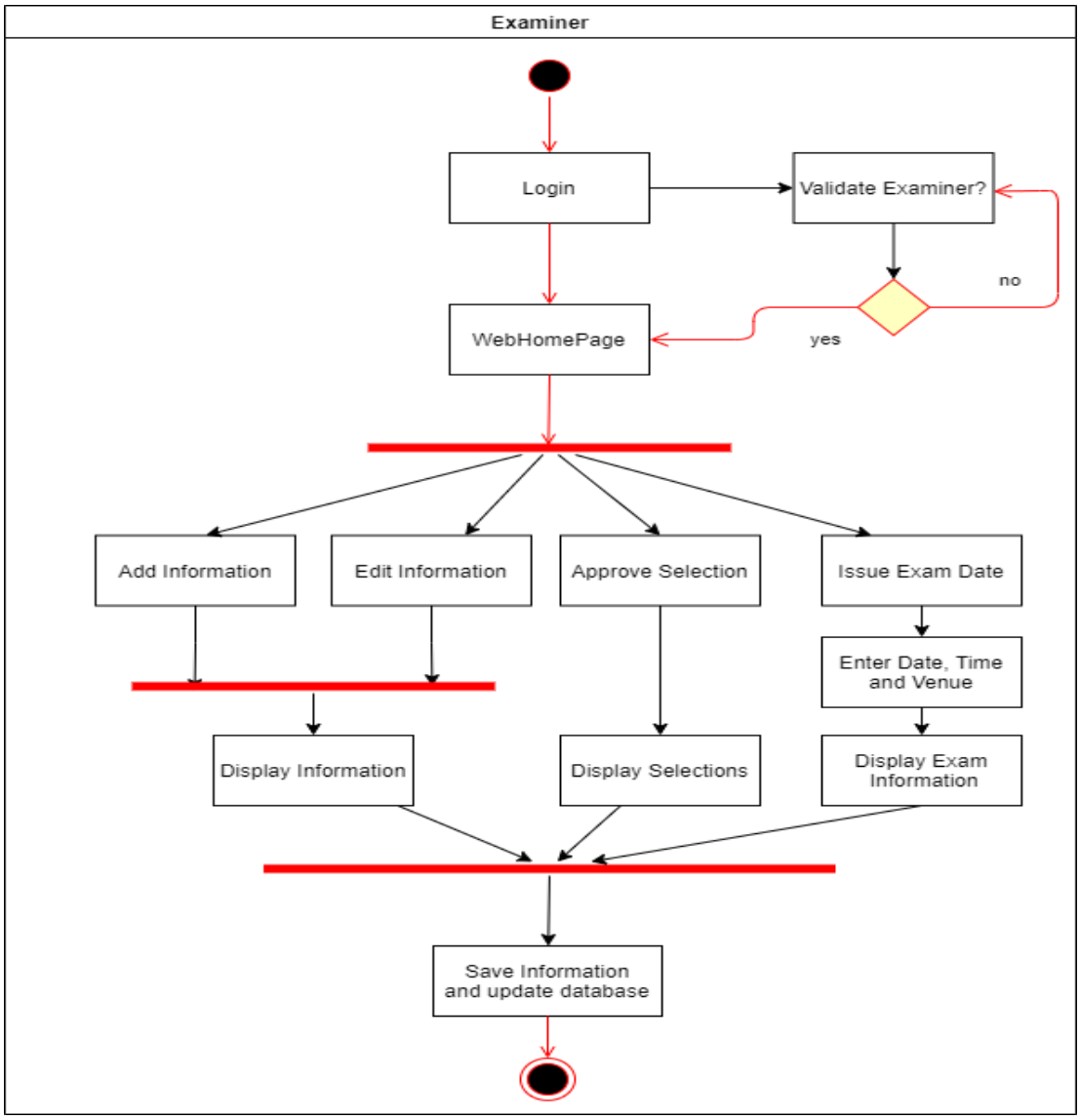

Figure 4. 4: Examiner Activity Diagram

Figure 4.4 illustrates the activity diagram for the examiner. As shown in the diagram, the examiner will have to log in to the system and add his information and then the information will be added to the database and the student and supervisor will be able to access and view this information in the system. The examiner will be able to add, change, and delete his information. The examiner will be able to edit information, display his information, approve a selection, and view the student list of

students who will be examined by the examiner. The examiner then will be able to issue the student's examination date by entering the examination essential information such as date, time, and venue. Moreover, after saving the information, the student and supervisor will be able to look at that information from their accounts.

4.3 Project Design

In this section, a discussion on the overall architecture and design of the proposed system is conducted. The data flow of the system will be detailed and described using the DFD diagram. However, the system's processes will be explained, and the system's overall design will be presented.

4.3.1 Data Flow Diagram

The data flow diagram illustrates how several elements of the data move through the system by showing the processes of the system with the input and output data flow of each process. Furthermore, the diagrams will explain the data flow between different entities of the proposed system.

4.3.1.1 Context Data Flow Diagram

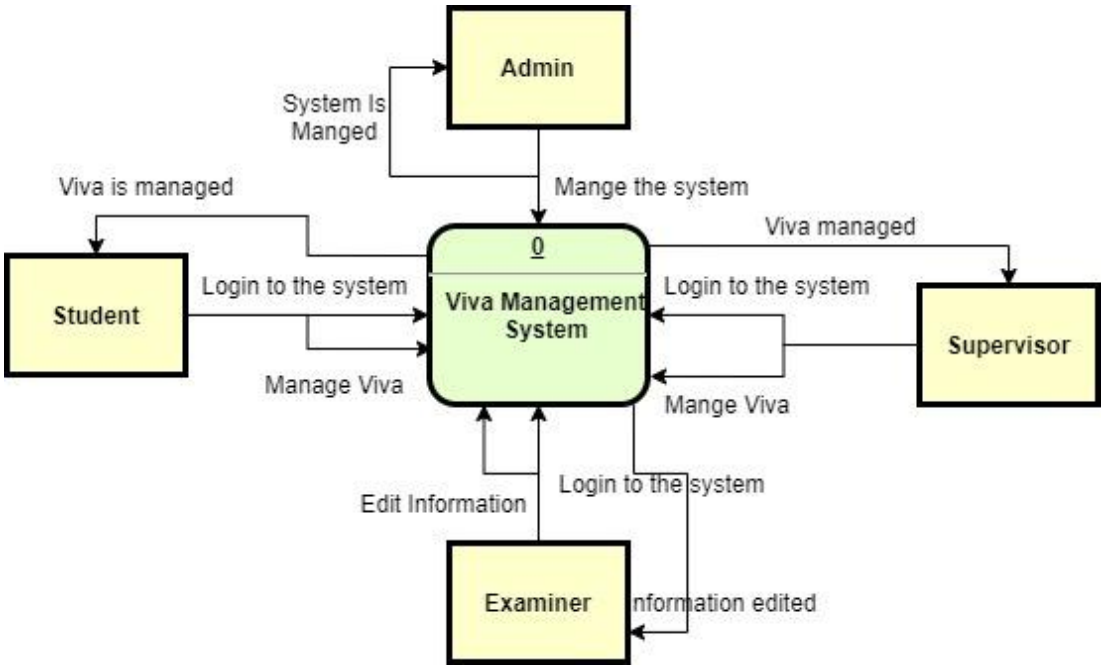

Figure 4. 5: Viva Management System Context Data Flow Diagram

4.3.1.2 Level-0 Data Flow Diagram

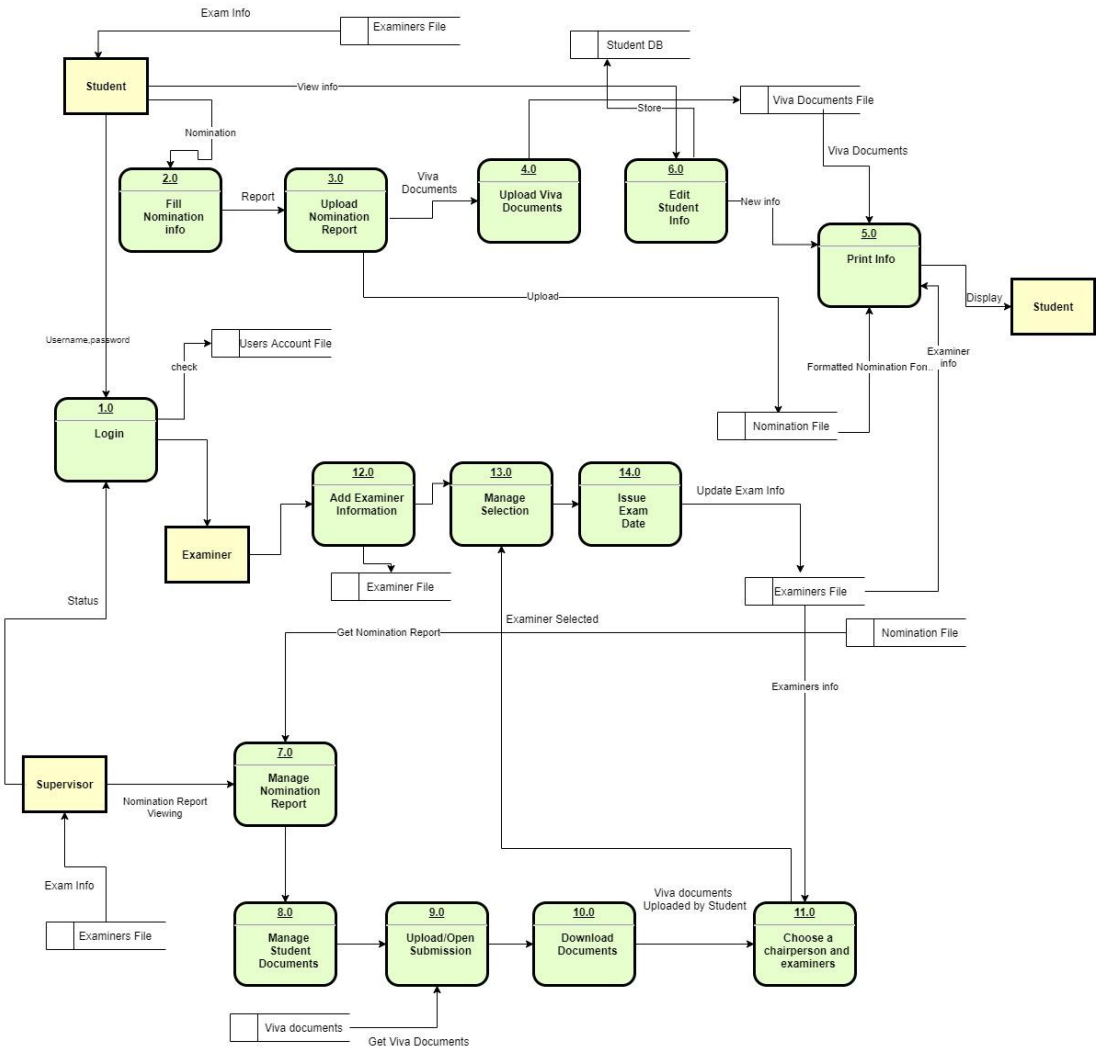

Figure 4. 6: Viva Management System Level-0 Data Flow Diagram

Figure 4.6 illustrates the data flow diagram (DFD) of the proposed system. Furthermore, the DFD begins with a login process which is essential to identify and authenticate the user who will use the system. The user who is a student, supervisor, or an examiner must login into the system. Moreover, as for the student, the data flow starts with the insertion of the nomination form. After filling in the form the student can upload it through the system which will be saved in the database. When this process been completed, the supervisor will be able to view, print, and download the form when using the system which is clarified in process 7.0. Furthermore, the student will have to upload the necessary documents for his viva examination to the supervisor

which will be accessible by the supervisor. However, the student will be able to edit his information. Next, the supervisor can choose the viva exam's chairperson and examiners which is shown in process 11.0. After choosing the examiners, the database will be updated. Moreover, the supervisor can also view the examiner's information by retrieving the data from the database. The supervisor will be able to view the student information by retrieving the information from the database. The user who is an examiner will login and be validated and will be able to add his information so that the supervisor and student will be able to get the examiner's information. The examiner can edit his information at any given time. Furthermore, the examiner will have to approve or disapprove a selection as being an examiner and if the examiner successfully approved then he can issue the date of the examination which will be shown to the student and supervisor.

4.3.2 System Architecture Diagram

To understand the system's boundaries and design, a diagram of the system's architecture should be provided. The diagram will help to abstract the relationship between the system's boundaries with the comprehensive elements of the system. Furthermore, it will assist in clarifying the system overview picture.

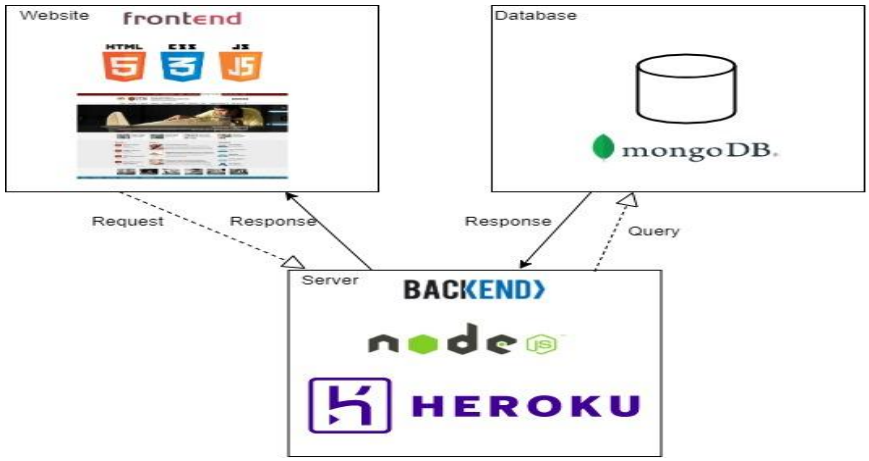

Figure 4. 7: System Architecture Diagram of viva management System

Viva Management System is an online web-based system that has three main elements which are front-end, backend, and the database. The front-end of the system is the graphical interface that will be shown to the user which will be based on HTML, CSS, and JavaScript. Moreover, Node.js will be used to contract the backend of the system and will use MongoDB as the database for the system for the storing of viva's necessary documents and examiner's information. However, using Node.js and MongoDB authentication and authorization will be conducted on the users. In addition, when a user requests a page in the system, there will be a handler function that is built using Node.js in the backend to handle and retrieve the services and will retrieve it from the database to the user. The system will use a Heroku server for the hosting and the implementation will be performed using Node.js.

4.4 Database Design

As for describing the organization of the data in the database and deciding the type of data to include and store and the relationship between the different entities in the database, an Entity Relationship Diagram (ERD) is needed. Entity Relationship Diagram (ERD) will assist in visualizing the overall database and its elements.

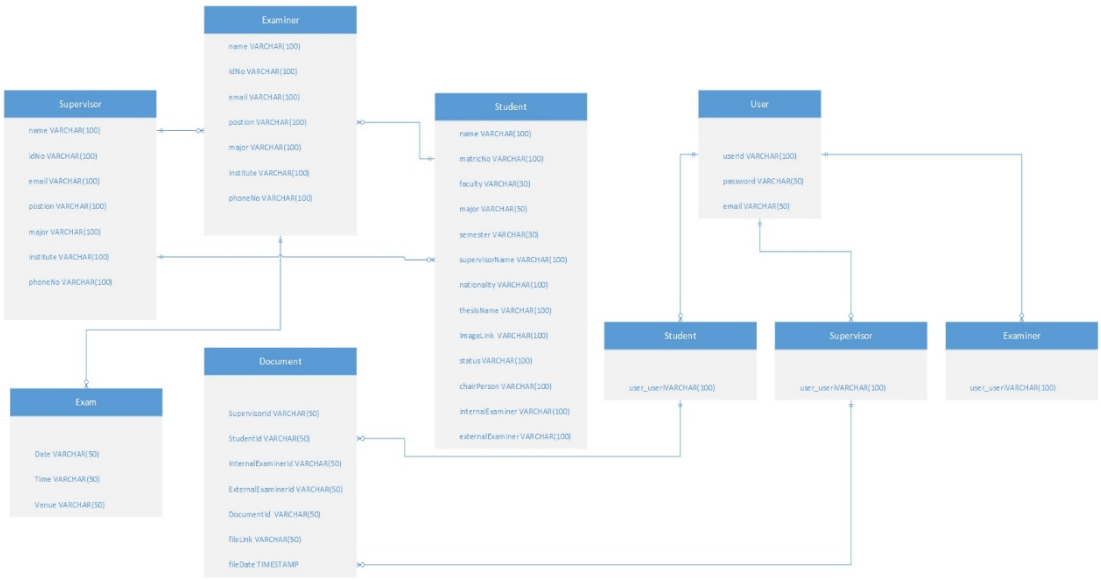

Figure 4. 8: Viva Management System Entity Relationship Diagram

The database design of the system is where the data is stored. Five different basic types of tables are needed to store the data in the system. Figure 4.8 illustrates the main elements and their relationship in the database. There are 5 basic entities that are essential for the proposed system which are student, supervisor, examiner, document, and user. However, the user consists of a student, supervisor, and examiner user. The student entity represents the postgraduate student's data for the viva exam. The examiner entity has the details of the examiner and the supervisor entity has the details of the supervisor. Document entity is the entity for the viva's documents and files. The supervisor will be able to collect the documents from students using documentId where it will be queried from the database using this string id. Examiners will be able to get the students as a list from the database through the InternalExaminerId and ExternalExaminerId from the document and student table.

4.5 Interface Design

Interface Design is where the proposed system's design and architecture is discussed and evaluated. Furthermore, in this project, three different interfaces are needed. However, the student will have a different interface than the supervisor's interface. Examiners also will have a different interface.

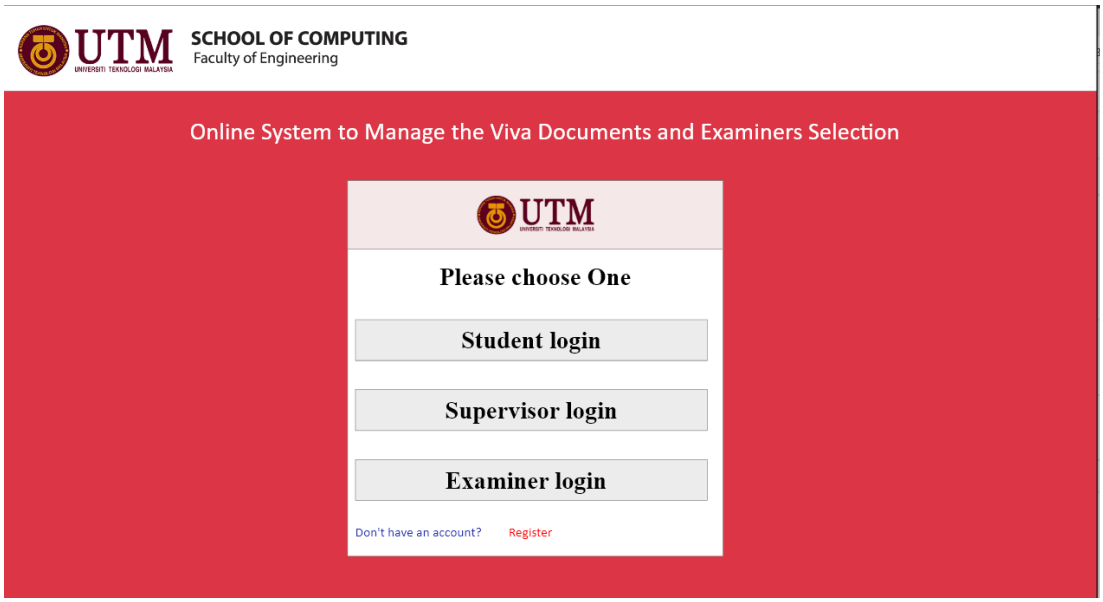

Figure 4. 9: First Login Page

Figure 4.9 illustrates the login page of the system. The user needs to choose whether he is a student, supervisor, or examiner. If the user is a supervisor then he should choose a supervisor login but if he is a student, he needs to choose a student login. If the user is an examiner, then he must click on examiner login. After selecting the login which is based on the user the page will direct the user to the appropriate login page. Moreover, if the student or supervisor has no accounts then they will have to register by clicking on the register word and then will be directed to another page for the registration process.

4.5.1 Student Interface Design

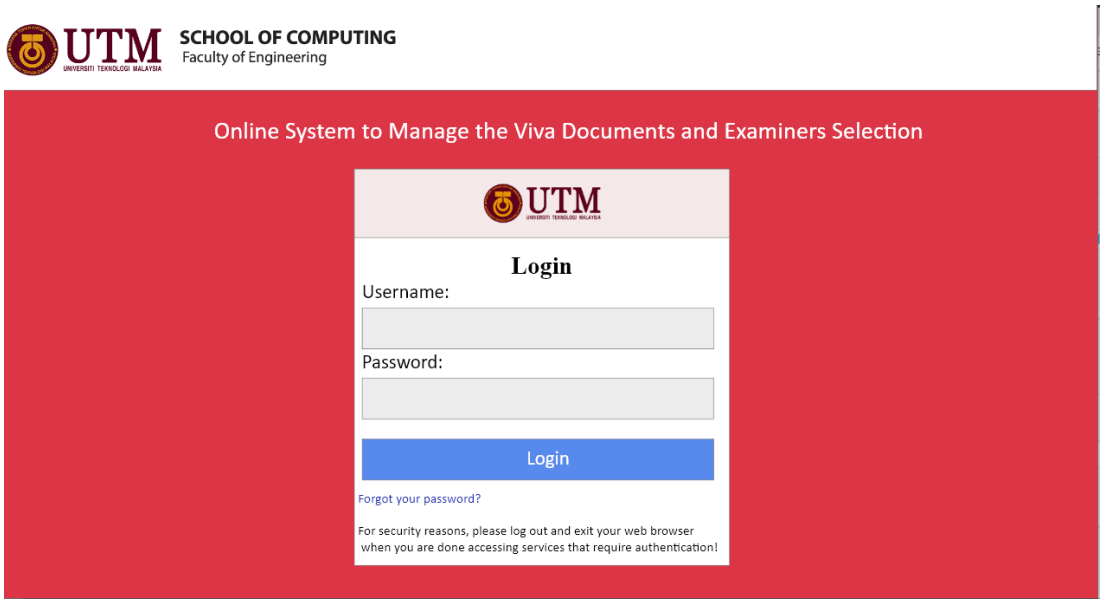

Figure 4. 10: Student Login page

Figure 4.10 shows the login page for the viva management system's users which are supervisor, examiner, and student. They will have to login to the system using their username and password.

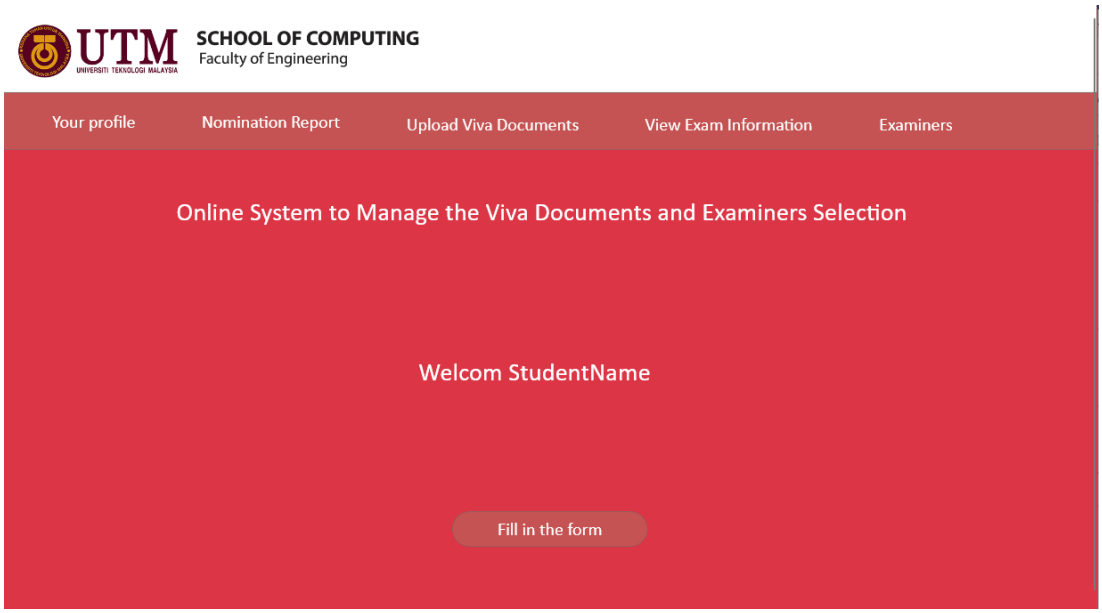

Figure 4. 11: Student Home Page

Figure 4.11 is the homepage that will be shown to a student when he login to the system. The homepage will welcome the student and there will be a small box that says fill in the form for the students who logged in for their first time. Students when press this button will be directed to the nomination form page. The student then will easily download the form and fill in the data and upload it. Furthermore, the page has five essential elements for the student which are displayed on the top of the page. These elements are student profile, nomination report, uploading the viva documents, view examiners information, and finally view the examination information. Students can click on each one and will be directed to the page to complete the procedures.

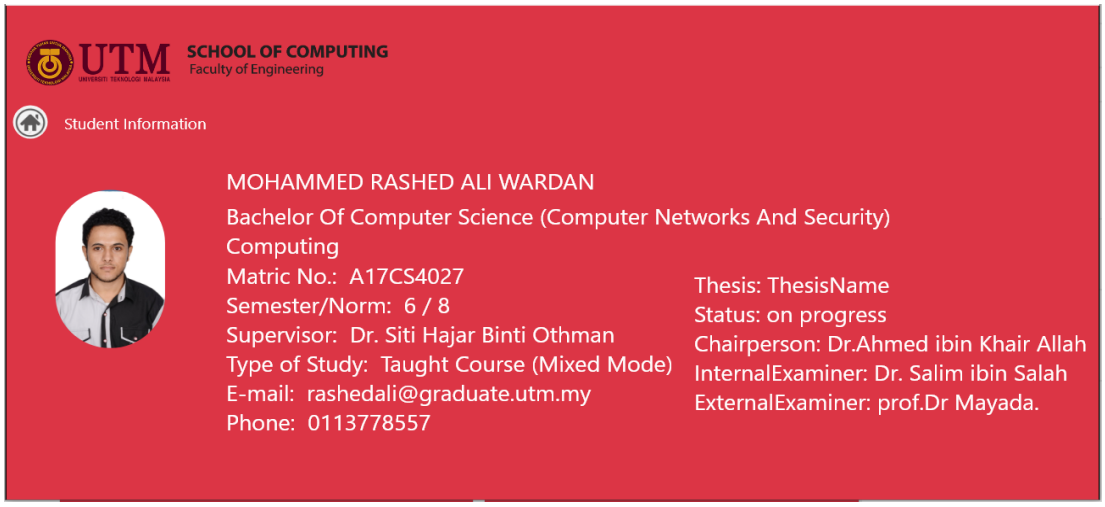

Figure 4. 12: Student Profile

Figure 4.12 represents the student page that will be shown to the student and supervisor. This page will show the student full necessary information like name, major, supervisor, email, phone, thesis, status, chairperson, and examiners. However, the student will be able to edit any information just by clicking on the desired box.

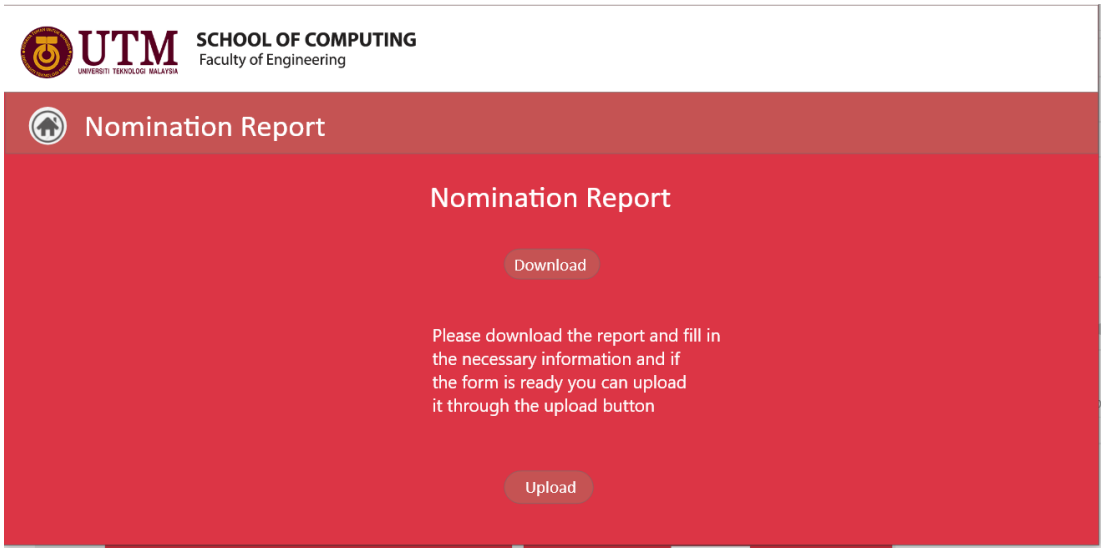

Figure 4. 13: Nomination Report Page

Figure 4.13 represents the student nomination report page. The student can download the report and then fill in the details electronically and upload it through the nomination page by clicking on the upload button. After uploading the report, the supervisor can view and download the report and then give the student feedback.

Figure 4. 14: Examiners Information

Figure 4.14 represents the page of the examiner's information. This page contains information about the examiners such as name, IC Number, status, field, and email.

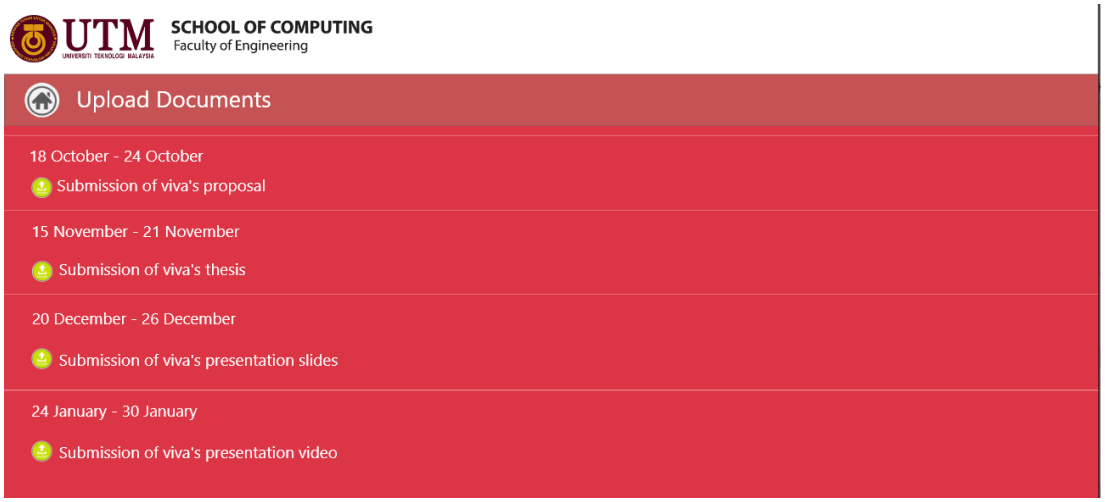

Figure 4. 15: Upload Viva Documents Page

Figure 4.15 represents the page where a student can upload his viva document in. The student will be shown the necessary documents that he should submit to his supervisor. However, the supervisor will be able to edit, add, delete any type of documents on this page. The student can only view what he should be uploading and upload through this page at the specific time available by the supervisor.

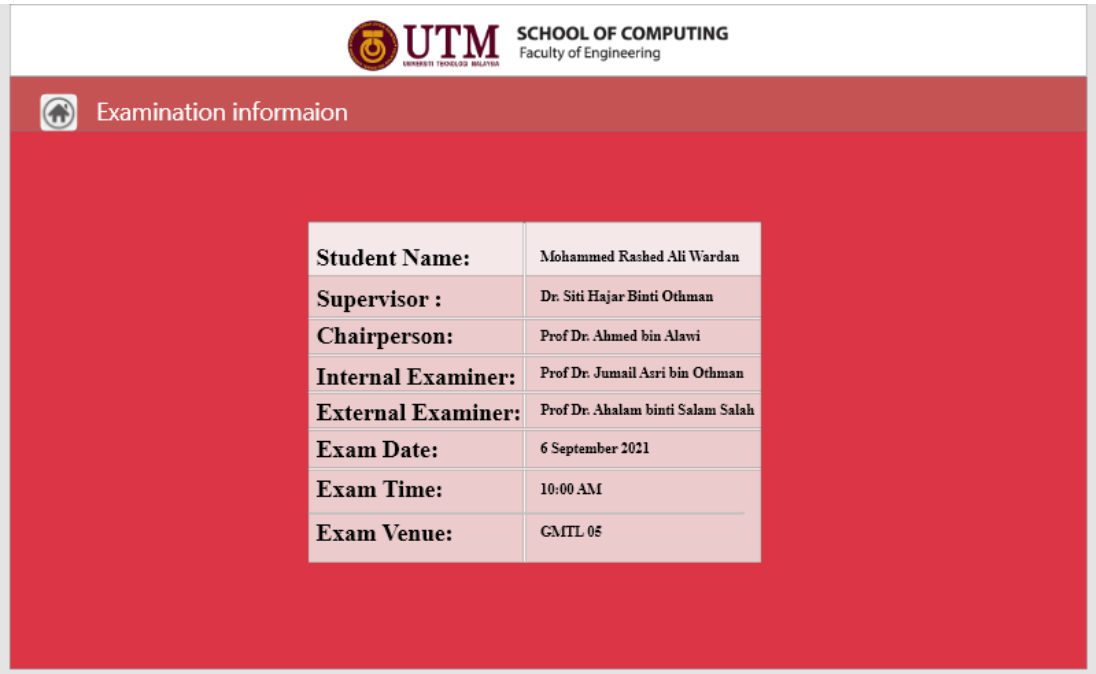

Figure 4. 16: Examination Information

Figure 4.16 illustrates the page of the viva examination information. The complete information will be shown only if the essential processes such as nomination report, uploading documents, examiners selection have been performed. The information will contain the student name, supervisor, examiners, date, time, and the examination venue. This page will be shown to students, supervisors, and examiners.

4.5.2 Supervisor Interface Design

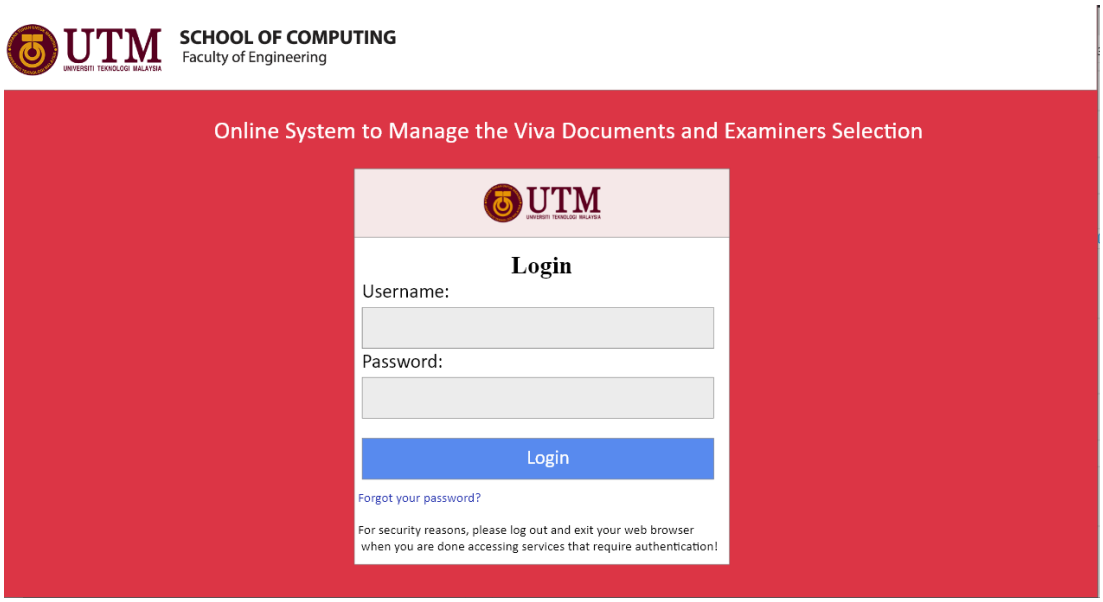

Figure 4. 17: Login Page

The supervisor like a student will also need to login using a username and password to be able to use the system. After login with username and password correctly, the system directs the supervisor to the supervisor home page.

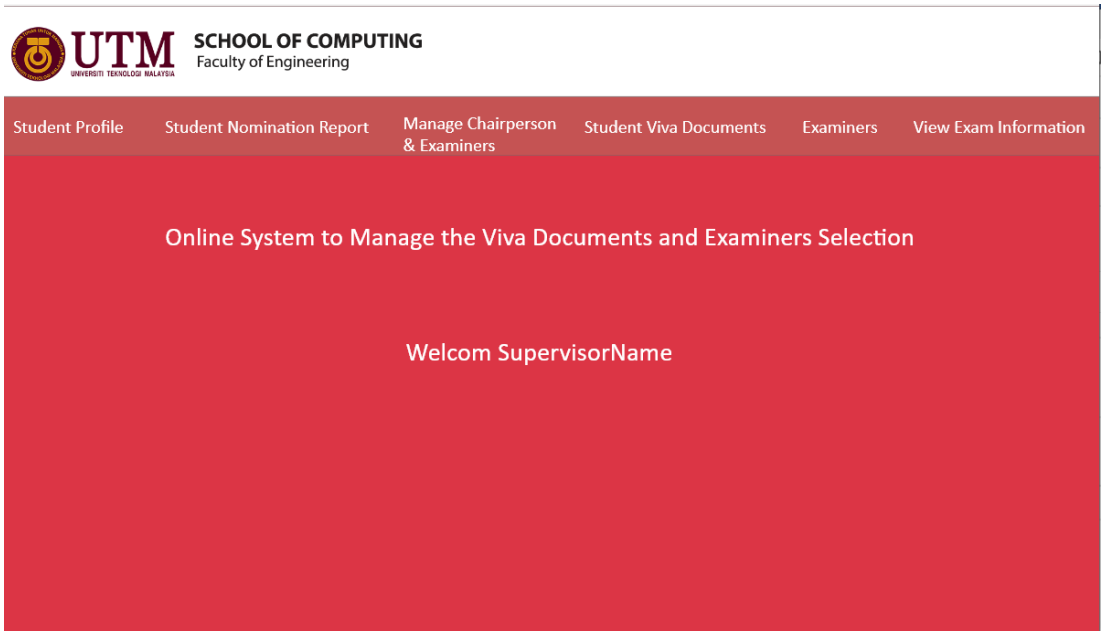

Figure 4. 18: supervisor Home Page

Figure 4.18 represents the supervisor's home page. This page will be shown to the supervisor when he enters the username and password correctly. This page contains important elements for the supervisor which are student profile, student nomination report, manage chairperson and examiners, student viva's document, the examiner's information, and the examination information.

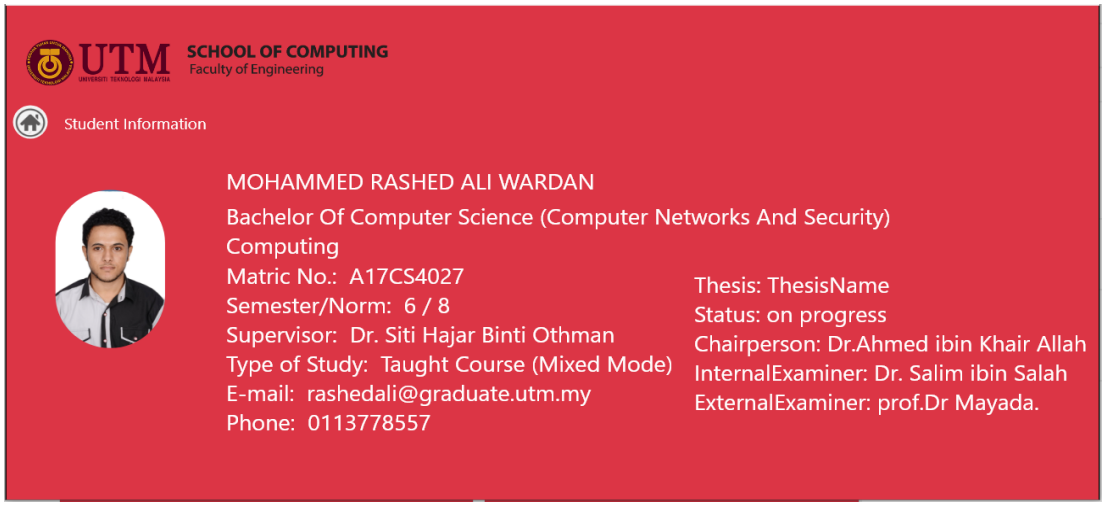

Figure 4. 19: Student Information

Figure 4.19 is the student information page that the supervisor can view. The supervisor can view this information when he clicks on the student information from the supervisor's home page. This page contains important information about the student that the supervisor might need to look at.

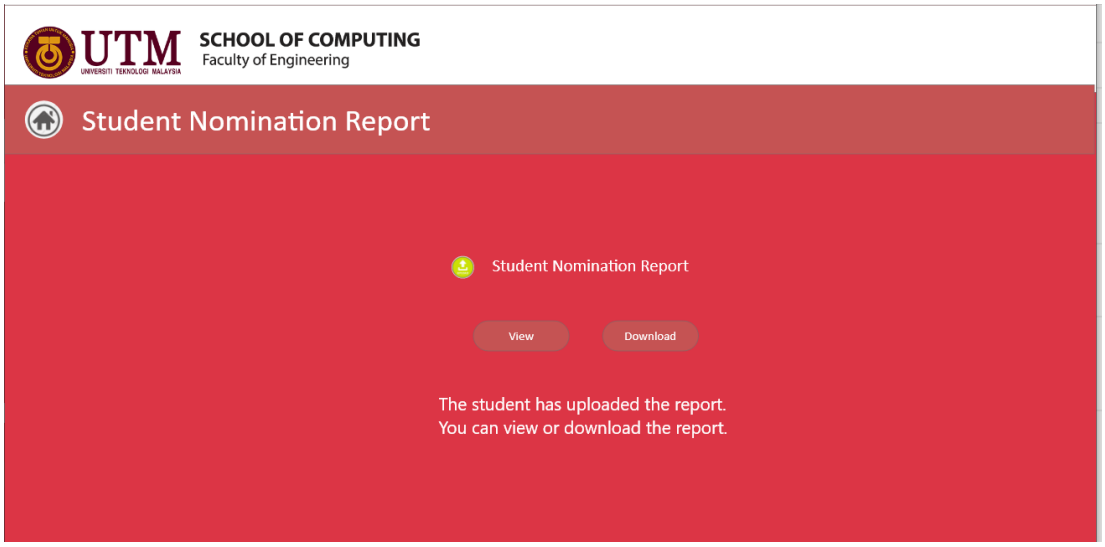

Figure 4. 20: Nomination Report Page

Figure 4.20 shows the student nomination report to the supervisor. The supervisor can view or download the report that has been uploaded by the student for further procedures. However, the supervisor will be able to edit the nomination report or delete it and ask the student to upload the nomination report again.

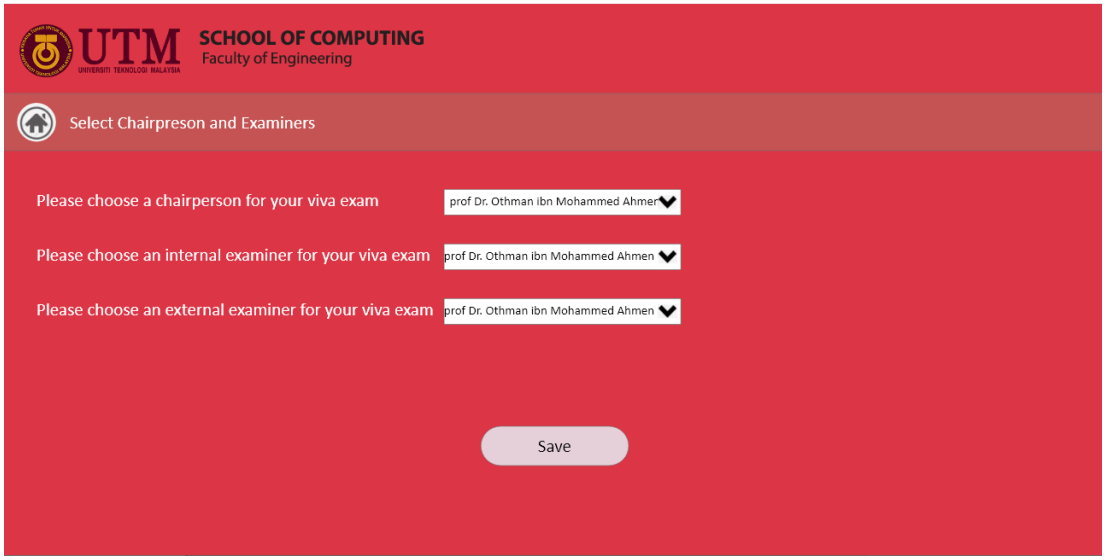

Figure 4. 21: Selection Page

Figure 4.21 shows the page that a supervisor can choose the chairperson, internal examiner, and external examiner. The supervisor can select the chairperson from a list that will contain several professors who are available for being a chairperson. In addition, the supervisor can choose the internal and external examiners from a list also. However, the supervisor should contact the examiners before confirming the selection in the proposed system. If the selected examiner is not available a pop message will be shown to the student saying that the chosen examiner should be changed.

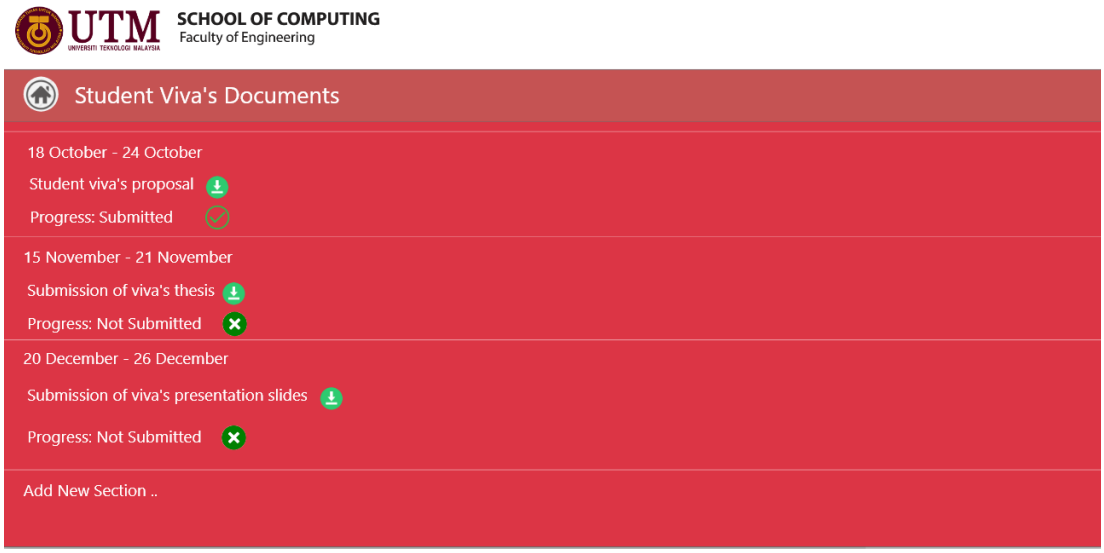

Figure 4. 22: Student Viva's Document Page

Figure 4.22 shows the viva documents page to the supervisor. The supervisor can manage the documents by editing, adding, and deleting them. However, the supervisor can add new sections on the page and these sections will be shown to the student. The supervisor can set the date and provide a link to the student so that they submit what is required during the period time.

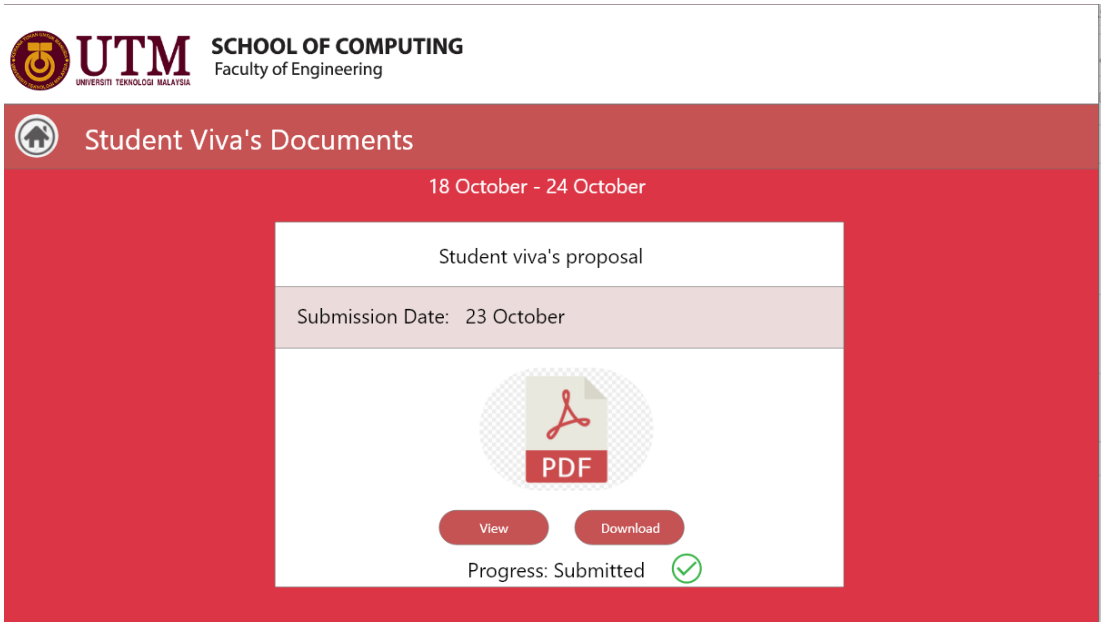

Figure 4. 23: Submission Details

Figure 4.23 shows the viva documents submission details to the supervisor. The supervisor can click on the link submission and the documents that were uploaded by the student will be shown. Furthermore, the supervisor will be able to view the document or download it. Moreover, the supervisor will know the date of the submission of the document.

Figure 4. 24: Examiners Information

Figure 4.24 represents the page of the examiner's information. This page contains information about the examiners such as name, IC Number, status, field, and email. However, the supervisor and student will be able to view the examiner's information and details. This will help the student to decide which examiner to choose for the viva oral examination.

4.5.3 Examiner Interface Design

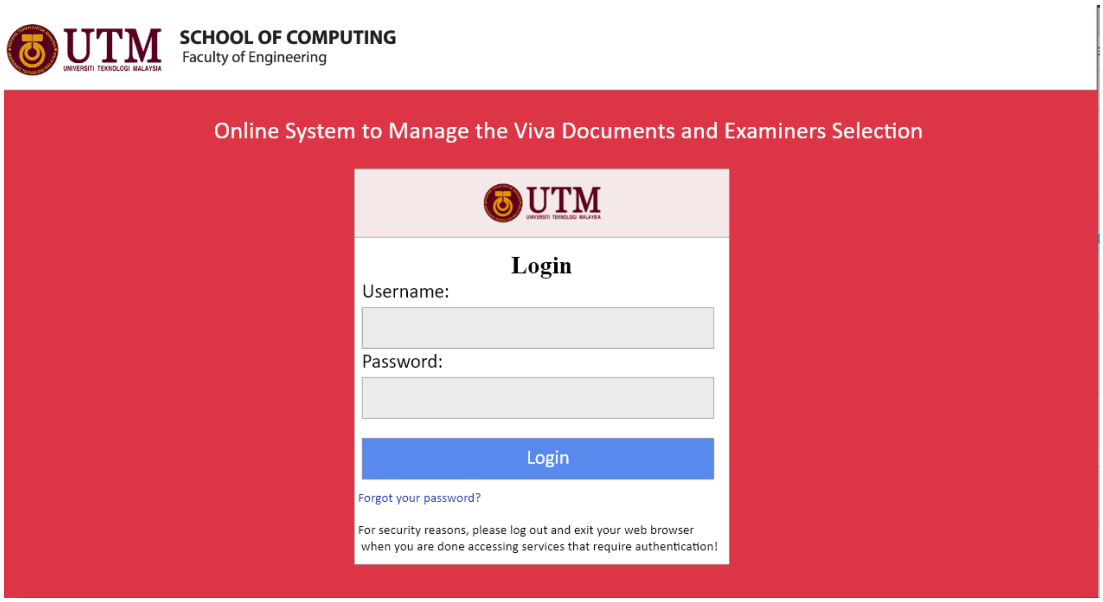

Figure 4. 25: Examiners Login Page

The examiner, like a student, and a supervisor will need to login using a username and password to be able to use the system. After login with username and password correctly, the system directs the examiner to the home page.

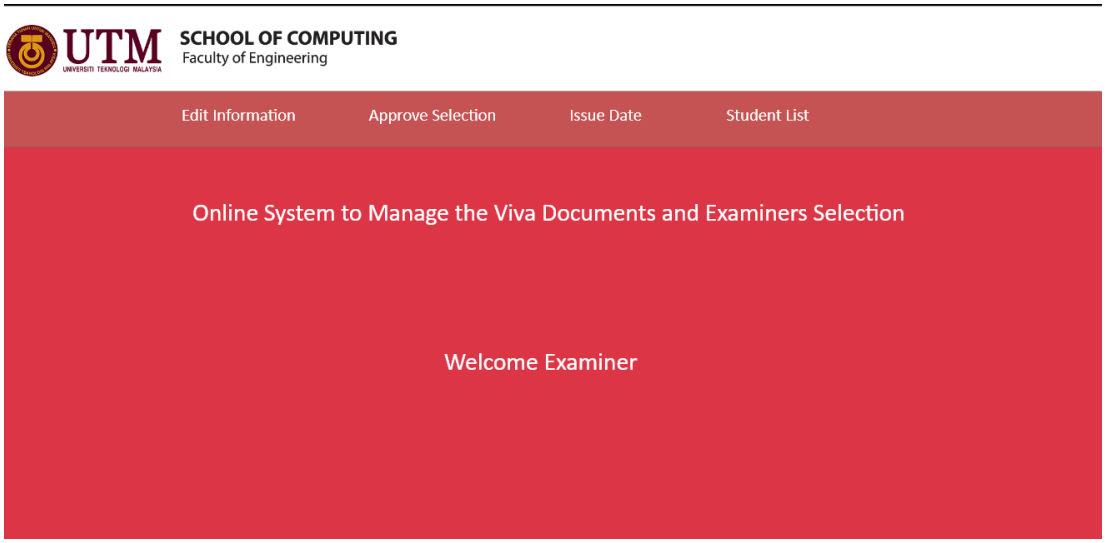

Figure 4. 26: Examiners Home Page

Figure 4.26 shows the home page of the user who is an examiner. The examiner will be directed to the home page after the login page. There are three significant elements on the examiner's home page which are “Edit Information”, “Approve Student” and “Students List”. The examiner will be able to edit his information by clicking on the “Edit Information” which is on the left top of the page and then will be directed to the page. Furthermore, the examiner can approve or reject any student that has chosen him to be the examiner by going to the approving page just by clicking on “Approve Student” on the top of the page. Finally, after the examiner approves the students, he will be displayed a list of students that he approved or not approved by clicking on “Students List” on the top right of the page.

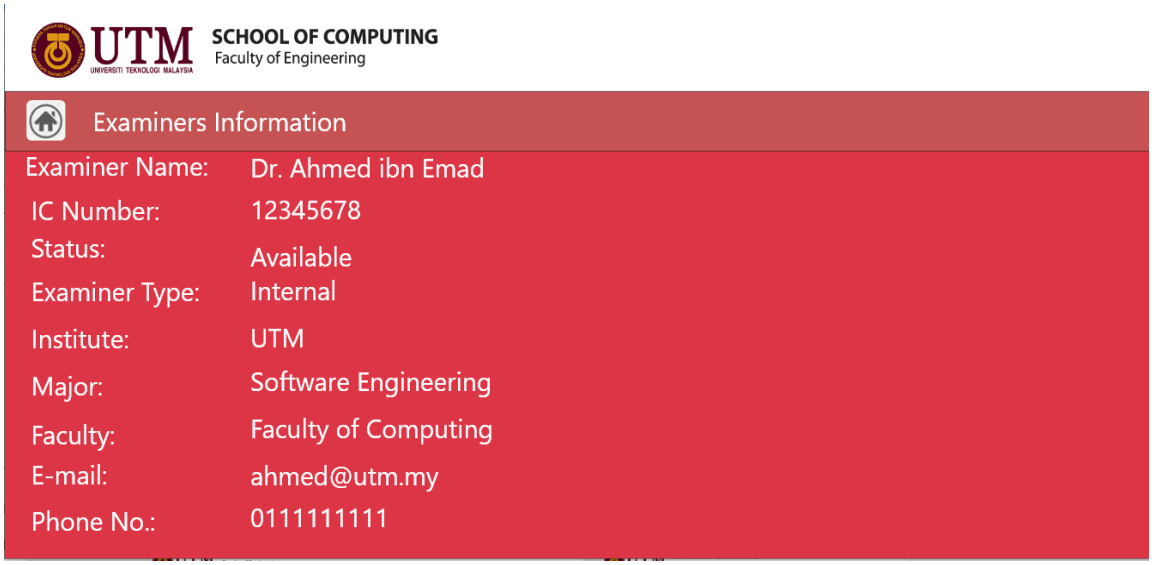

Figure 4. 27: Examiner’s Information Page

Figure 4.27 illustrates the examiner’s information page. On this page, the examiner will be able to edit his information such as name, IC Number, Status, Type, Institute, Major, Faculty, E-mail, and phone number.

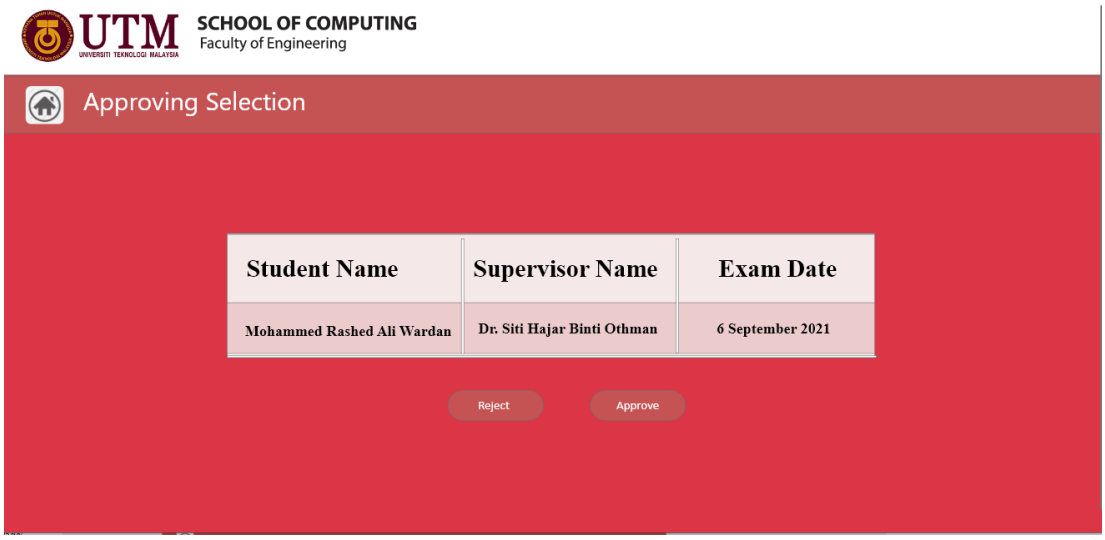

Figure 4. 28: Approving Page

Figure 4.28 shows that on this page, the student's name and his supervisor's name, and the date of the viva exam will be shown to the examiner. However, the examiner will have to decide whether to approve and be the student's examiner or reject that.

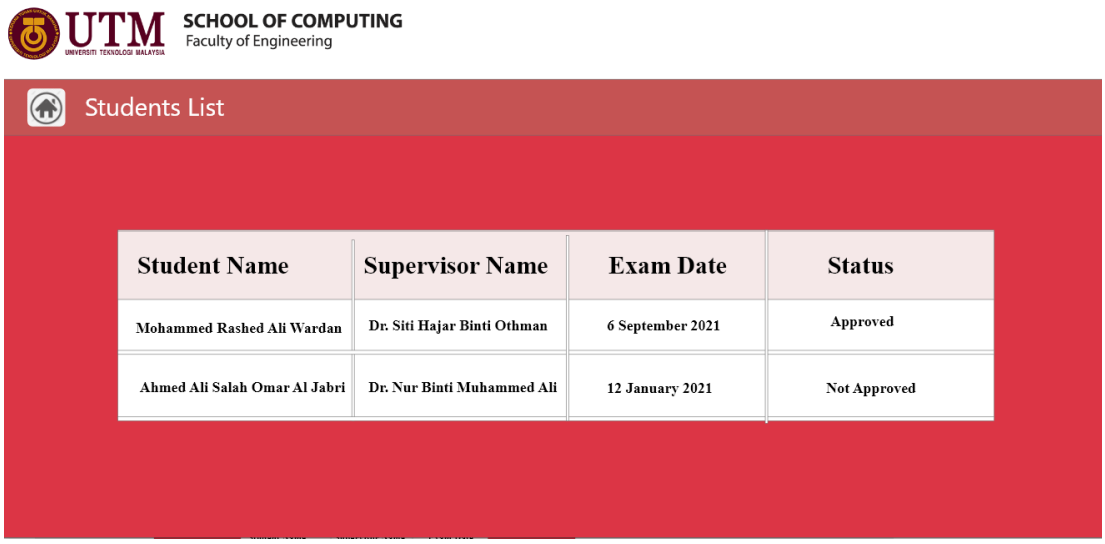

Figure 4. 29: Students List Page

Figure 4.29 demonstrates that on this page all students who choose the examiner to be their examiner will be displayed. The information that will be shown is the student name, supervisor name, exam date, and status whether it is approved or not.

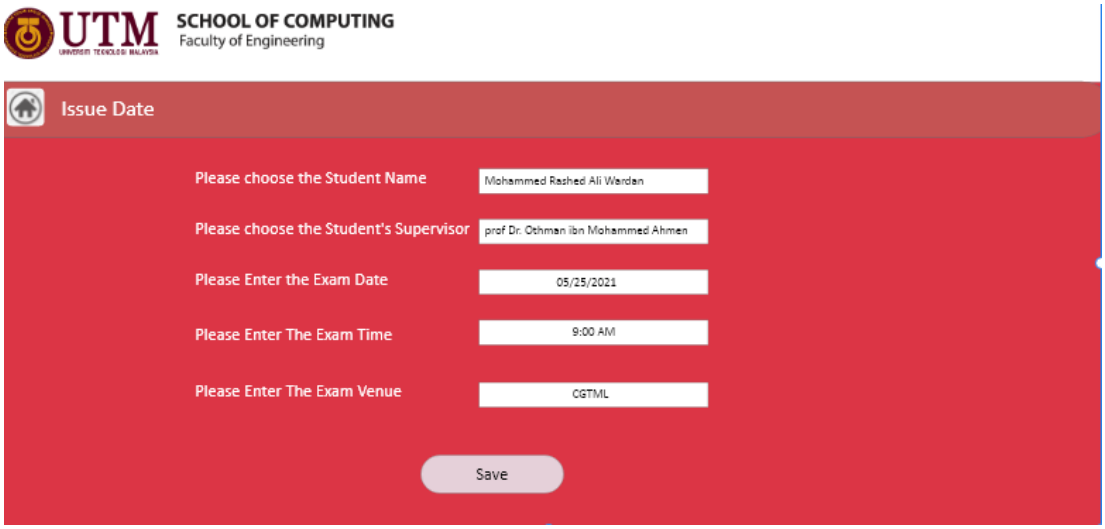

Figure 4. 30: Issue Date

Figure 4.30 shows that the examiner will be able to issue a date for the student viva examination through the system. The examiner should first approve the selection and then enter the essential information for the examination such as date, time, and Venue. However, after saving this information the student and supervisor will be able to view this information using their account.

4.6 Chapter Summary

In this chapter, a comprehensive analysis of the system design was conducted for the proposed system. This chapter began with the system's requirements analysis. The use case diagram of the system was illustrated to clarify the system requirements. Furthermore, an activity diagram was conducted for both users which are student, supervisor, and examiner. Moreover, the project design with the data flow was discussed. In addition, the system design and architecture were discussed and represented with a diagram that demonstrates how the system components interact with the system. Finally, the interface design of the system was discussed, and a sample was provided to clarify the design of the proposed system.

CHAPTER 5

CONCLUSION

5.1 Introduction

Web-based applications are used in a wide range for many services as most people can easily access web-based applications through different browsers and devices. Hence, developing a web-based application system is appropriate for this project. Users can easily use the system and they only need a device that has access to the internet and has a browser. In this chapter, a discussion on the conclusion of all work that has been done in the previous chapters will be conducted. However, the proposed project's essentials and objectives will be discussed at the beginning of this chapter. Furthermore, the project's accomplishments goals of the project will also be mentioned in this chapter. Proposed Online System was proposed to develop an online web-based management system for UTM faculty of computing postgraduate students. This proposed system will assist and ease the procedures of the oral viva examination. Furthermore, the online system will assist the students and supervisors to go through the viva's procedures fully online.

5.2 Achievement of Project Objectives

As for chapter one, the objectives of developing the current approaches of the proposed project that will be used are conducted. Furthermore, the necessary applications that will be used to develop this project.

In chapter two, a literature review was conducted and resulted in the important technologies that are going to be used for the proposed system. Furthermore, chapter two resulted in a conclusion of the overall system for ensuring a successful design and plan. Moreover, the chapter assists to make the development procedures clear and

simple. In addition, this chapter helped in understanding the overall system and its approaches and procedures that are done in the current traditional system. However, studying different systems and comparing them with this project helps to illustrate the advantages and disadvantages. Moreover, the advantages of the different systems will be used in the proposed system, but the disadvantages will be avoided for this project.

In chapter three, a system development methodology was discussed in detail which resulted in selecting a development methodology for the proposed online system which is the Rational Unified Process (RUP). However, this methodology is divided into four phases. The first phase of RUP is known as the inception phase where the project's objective goals and details are defined. Furthermore, the second phase is the elaboration phase where it focuses on the project's technical and analyzing the requirements in much more detail. The third phase is the construction phase where most of the system operations are conducted and the system should be built and tested in this phase. The final phase which is the transition phase is where the system is moved from a developing stage to a production stage and should be an actual active working system.

In chapter four, the overall design and architecture are constructed and designed to demonstrate the system. Moreover, the design assisted in illustrating how the system's components are interacting with each other. Furthermore, a use case, activity, and data flow diagram were conducted to provide an overview of the system.

In addition, the system's interface was designed, and a sample was provided to illustrate the overall system design.

The fulfilment of the project goals after completing the system are as follows:

i. Having a good knowledge of the emerging technologies for web-based development.
ii. The user requirements, objectives, and restrictions have been established.
iii. The system's design has already been conducted and launched.
iv. Implementation, debugging, and testing of the system are performed.

5.3 Suggestions for Future Improvement

The implementation of the project will be continued by following the Rational Unified Process (RUP) development methodology. Moving forward with the second half of the final year project (FYP2), the construction and transition phase will be conducted. However, the transition phase is where the development coding will be implemented. The transition phase is where the system is tested, and issues are fixed.

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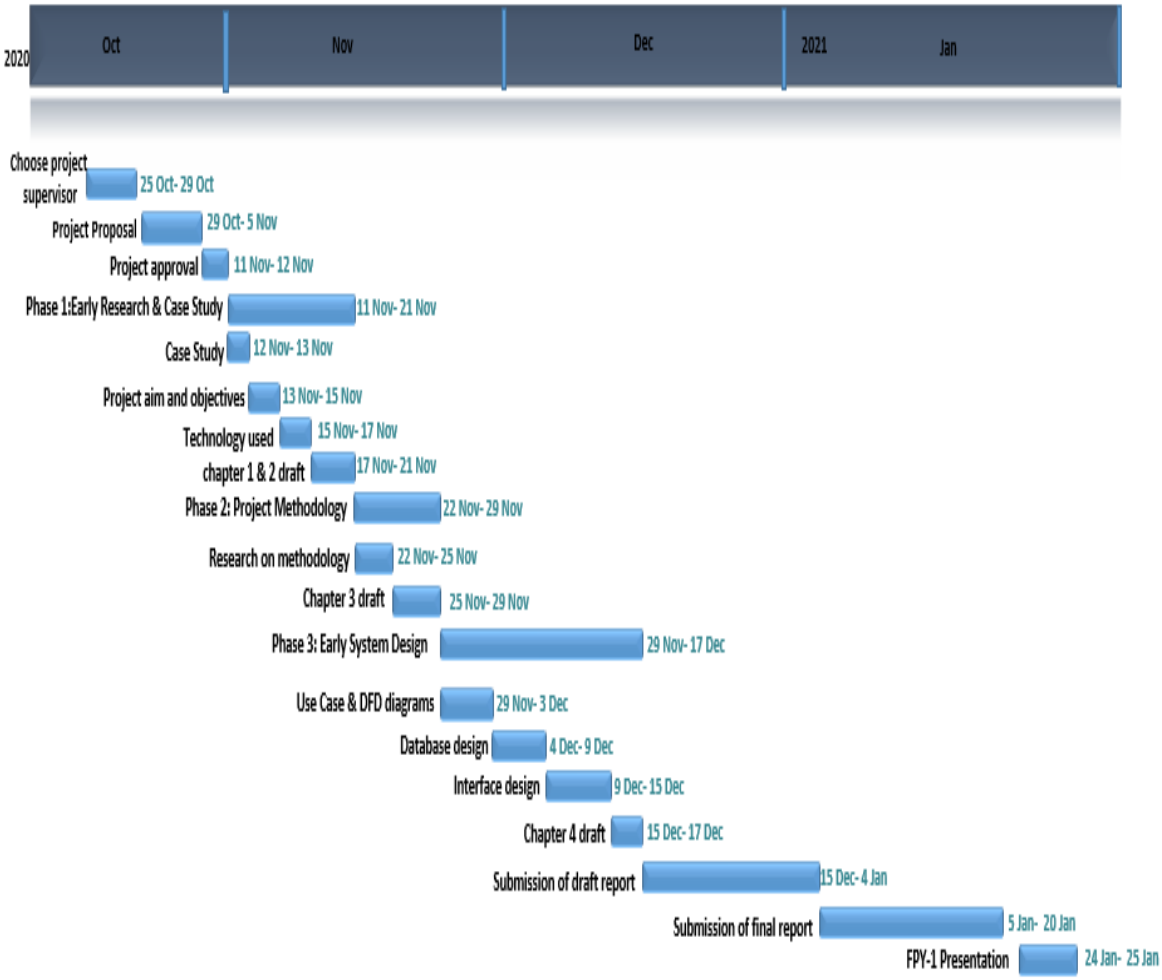
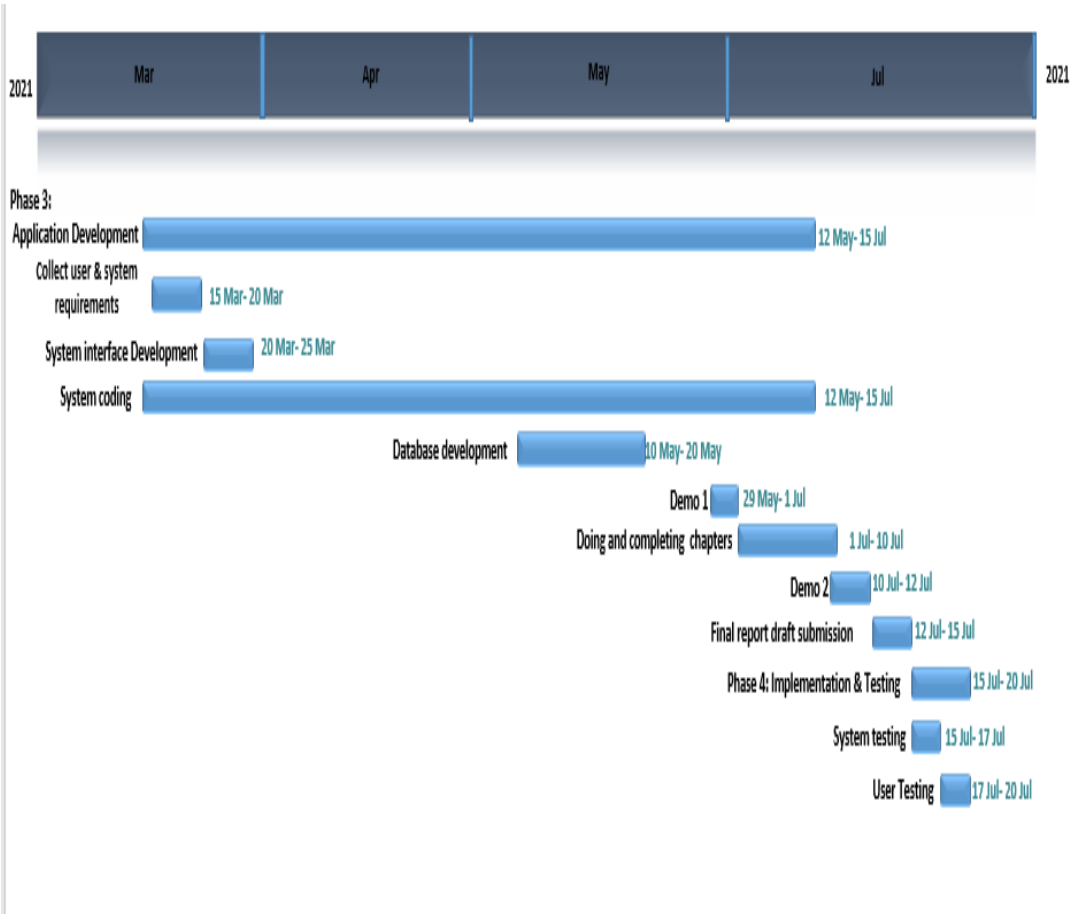
Watts, J. H. (2012). Preparing doctoral candidates for the viva: issues for students and supervisors. *Journal of Further and Higher Education*, *36*(3), 371-381.

Appendix A PSM 1 Gantt Chart

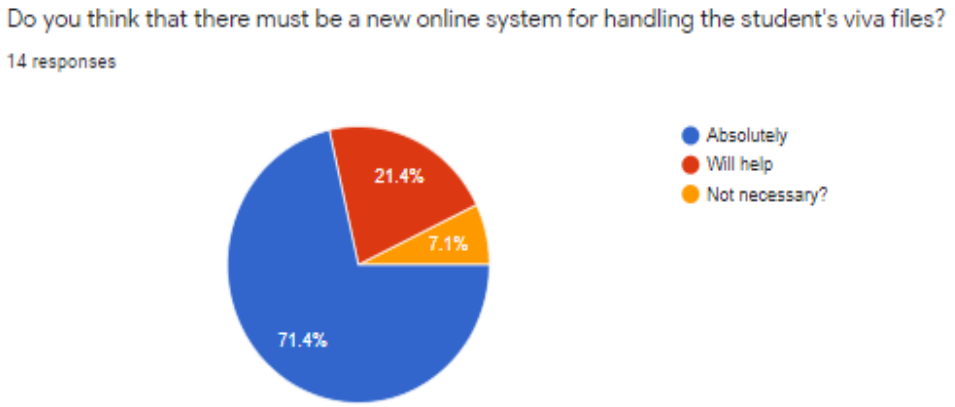


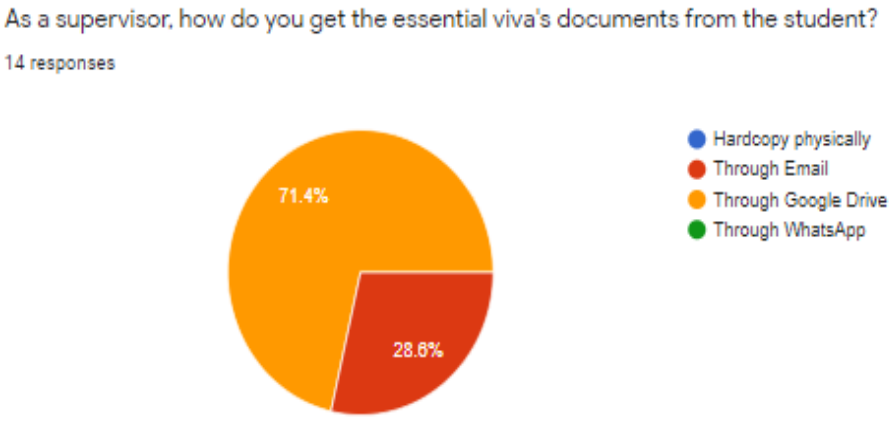
Appendix B PSM 2 Gantt Chart



Appendix C Lecturer's Survey

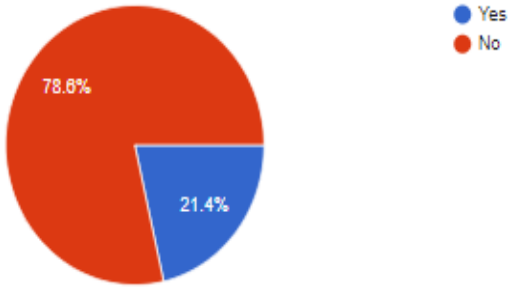
This survey was answered by lecturers from the faculty of computing in UTM. This survey was conducted to observe the user requirements and to know the lecturer's overview of the current system. Besides, the survey was conducted online due to the MCO of the covid-19 pandemic.





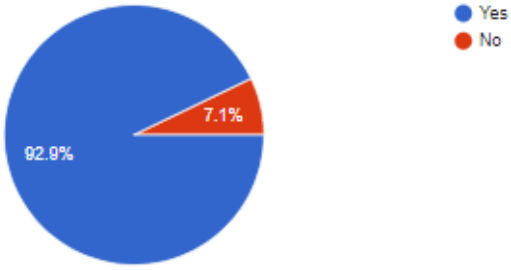
Can you follow the student progress in the current system?

14 responses



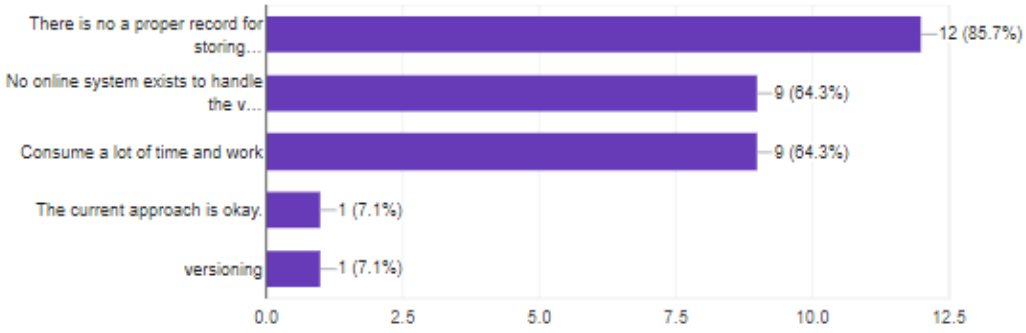
Do you think that the current method of managing the viva's documents has limitations?

14 responses



What type of limitations do you think are there in the current system?

14 responses



What are the main problems you face when it comes to getting the student's viva documents?

12 responses

current online implementation of viva require more systematic system.

Manual system

No proper storing system

No appropriate system to handle the documents

Difficulty of organising the files

No problem

Late submissions and no proper management system

Managing the documents.

delayed submission, multiple version of documents, hard to keep track

delayed submission, multiple version of documents, hard to keep track

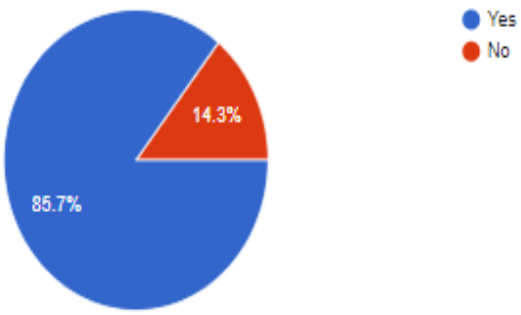
Time arrangement to meet student.

No proper system to manage the documents

Hard to keep track of files

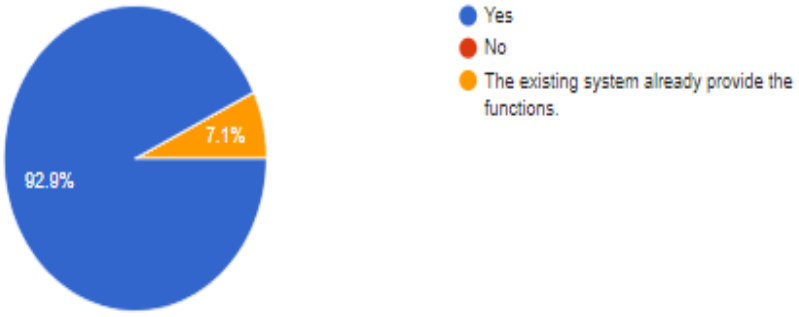
Is the current system of managing the nomination of examiners is not properly managed?

14 responses



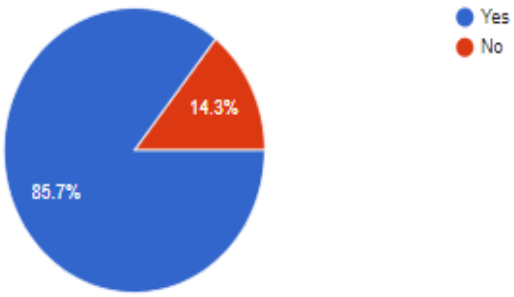
Do you think that a proper record of an examiners nomination system for selecting the examiners and chairperson is needed?

14 responses



If there is a new system that can handle the student's viva documents and provide the ability to select an examiner in an organized approach, would you like to use this online system?

14 responses

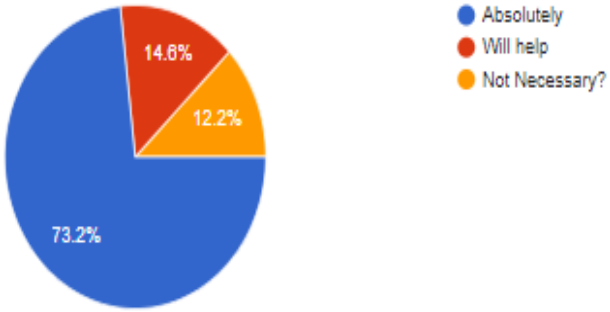


Appendix D Student's Survey

This survey was answered by students from the faculty of computing in UTM. This survey was conducted online to observe the user requirements and to know the student's view of the current system.

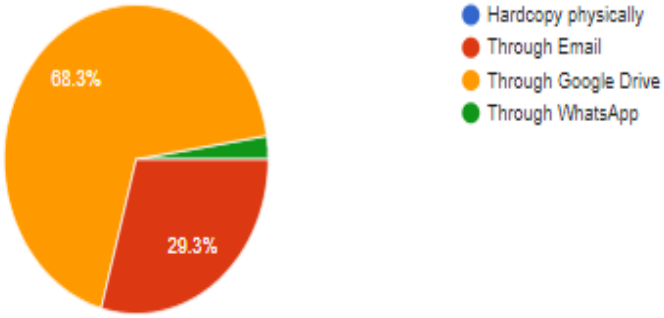
As a student, do you think that there must be a new online system for handling the student's viva files and examiner's selection?

41 responses



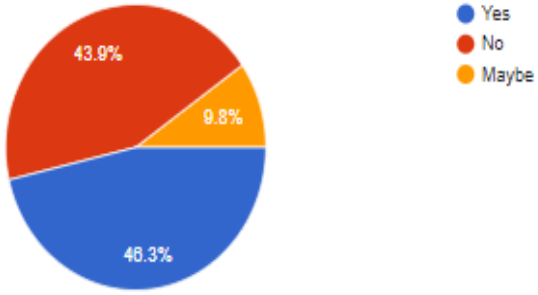
As a student, How do you send your documents to your supervisor?

41 responses



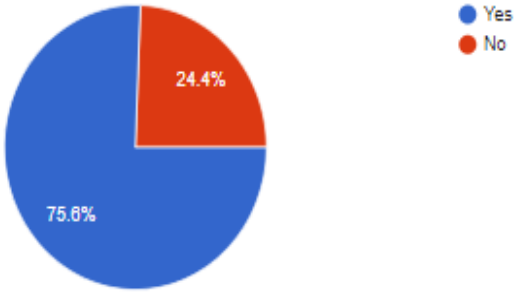
As a student, are you satisfied with the current method of managing your viva documents and examiner selection?

41 responses



Do you think that there are some problems with the current system when it comes to the viva's documents submission and examiner's selection?

41 responses

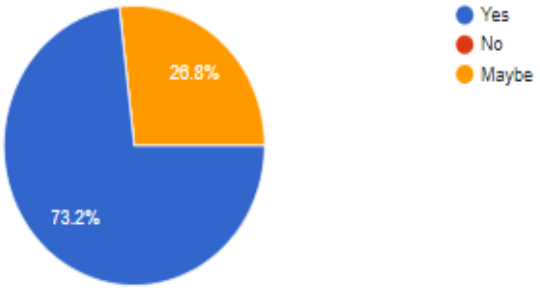


What type of limitations do you think are there in the current system?

41 responses

As a student, if there is a system that can handle the student's viva documents and provide the ability to select an examiner in an organized approach, would you like to use this online system?

41 responses



Appendix E Viva Management Forms

CALENDER OF DISSERTATION 3, SEMESTER II 2019/2020 (#MCO)
MASTER OF COMPUTER SCIENCE

WEEK	DATE	NEW WEEK	NEW DATE (#MCO)	ACTIVITY	RESPONSIBILITY
9	5/4 – 11/4/2020	24	19/7 – 23/7/2020	▪ Students submit **ONE** copy of dissertation draft to Supervisor.	▪ Student → Supervisor
10	12/4 – 18/4/2020	25	26/7 – 30/7/2020	▪ Supervisor returns the draft to Students.	▪ Supervisor → Student
12	26/4 – 2/5/2020	27	(Short sem starts) 9/8 - 13/8/2020	▪ Students submit to Academic Office: • 3 copies of dissertation report which were certified by Supervisor. • Plagiarism form (for each chapter similarity index must not exceed 20%). Endorsed by Program Coordinator.	▪ Student → Program Administrator
				▪ Program Administrator distributes dissertation & plagiarism report to Supervisor & Examiners.	▪ Program Administrator → Supervisor & Examiners
14	10/5 – 16/5/2020	30	30/8 - 3/9/2020	**ORAL EXAMINATION (VIVA)** ▪ Students do a 10-15 minutes presentation with maximum of 20 slides. ▪ Supervisor & Examiners submit the evaluation form to Program Administrator.	▪ Student ▪ Supervisor & Examiners → Program Administrator
	Depends on students correction period: B1 – within 1 month B2 – within 3 month C - within 6 month			▪ Submission of Hard Cover Thesis **(students who want to include their name in GRADUATION endorsement for Semester I 2019/2020)** ▪ Correction Verification Form can be downloaded at: *http://comp.utm.my/fcpg/academic-resources/forms/master/*	▪ Student → Program Administrator

CALENDER OF DISSERTATION 2, SEMESTER II 2019/2020 (*UPDATED #MCO-Movement Control Order*)
MASTER OF COMPUTER SCIENCE

WEEK	DATE (EXISTING)	NEW WEEK	NEW DATE (#MCO)	ACTIVITY	RESPONSIBILITY
7	22/3 – 28/3/2020	7	22/3 – 28/3/2020	Students email to the norazlizay@utm.my • Active email: • Matric no: • Supervisor name • Dissertation title	▪ Student → Program Administrator ▪ Program and Program Coordinator will create Turnitin account
9	5/4 – 11/4/2020	24	19/7 – 23/7/2020	Student submits ONE copy of dissertation draft to Supervisor	▪ Student → Supervisor
10	12/4 – 18/4/2020	25	26/7 – 30/7/2020	Dissertation draft returned by the Supervisor.	▪ Supervisor → Student
12	26/4 – 2/5/2020	27	(Short sem starts) 9/8 - 13/8/2020	▪ Students submit to the Academic Office: • 3 copies of dissertation reports certified by supervisor. • Plagiarism Form (for each chapter similarity index must not exceed 20%). Endorsed by Program Coordinator.	▪ Student → Program Administrator ▪ Coordinator email: hajar@utm.my
				▪ Program Administrator distributes dissertation & plagiarism reports to Supervisor & Examiners. ▪ Program Administrator publish Dissertation timetable	▪ Program Administrator → Supervisor & Examiners ▪ Program Administrator → Student
14	10/5 – 16/5/2020	29	23/8 - 27/8/2020	**DISSERTATION PROPOSAL ASSESSMENT & PRESENTATION** ▪ Students are required to do a 10-15 minutes presentation with maximum of 20 slides ▪ Supervisor & Examiners submit the evaluation form to Program Administrator.	▪ Student ▪ Supervisor & Examiners → Program Administrator
				▪ Student collect the correction report at the Program Administrator	▪ Student → Program Administrator
▪ Students submit correction report to Supervisor & Examiners together with the Correction Verification Form ▪ Correction Verification form can be downloaded from: *http://comp.utm.my/fcpg/academic-resources/forms/ master/*).					▪ Student → Supervisor & Examiners
16	24/5 – 30/5/2020	31	6/9 - 10/9/2020	DUE DATE submit correction for only B1 (2 weeks).	▪ Student → Program Administrator
20	21/6 – 27/6/2020	32	4/10 – 8/10/2020	DUE DATE submit correction for only B2 (6 weeks).	▪ Student → Program Administrator
				For Result C: • Student need to resubmit the proposal. • Student need to represent the proposal.	▪ Student → Program Administrator

SCHOOL OF COMPUTING, FACULTY OF ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA

PLAGIARISM FORM

Master of Computer Science (MCSS) – Dissertation 3

NO	SUBJECT	SIMILARITY INDEX
1	CHAPTER 1	
2	CHAPTER 2	
3	CHAPTER 3	
4	CHAPTER 4	
5	CHAPTER 5	
6	CHAPTER 6	
7	CHAPTER 7	
8	CHAPTER 8	

ENDORSED BY:---------- Date: ----------

UTM SCHOOL OF COMPUTING
Faculty of Engineering

STUDENT NAME:_____

MATRIC NO :_____

CHECK OF HARDBOUND THESIS SUBMISSION FOR GRADUATION

(PLEASE ENSURE ALL THE SUBJECT ARE FULFILLED BEFORE SUBMITTED TO ASSOCIATE CHAIR/DIRECTOR/ COURSE COORDINATOR)

NO	SUBJECT	TICK [√]	NOTES
1	Binded Thesis (Endorsed by Supervisor) **-1 copy**		Thesis formatting 2018 http://sps.utm.my/thesis-formatting-2018/
2	Copy of CD (stick at the back of the thesis) - **provide extra 1pcs** 1. Name 2. Matric No 3. Thesis title		
3	Copy of Pre-transcript		
4	Copy of Registration Slip		**current semester**
5	Copy of Abstract Approval Form		**research students only**
6	Copy of Publication Paper/Journal/Book Chapter		**for dissertation students only**
7	Graduation Checklist Subject		**endorsed by coordinator**
8	Copy of First Page Student's: Passport **(for International)** or Identity Card **(for Malaysian)**		
9	Confirmation of Fees Status		**letter from UTM Bursary**
10	Verification Correction Form **Dissertation 3**		**for dissertation students only**
11	Exit Survey Form		https://goo.gl/forms/BeKni9cts0u0Hhqh1
12	Graduation Form		http://academicmanagement.utm.my/files/2016/09/PENGESAHAN-MAKLUMAT-GRADUAN.pdf

CHECKED AND SIGNED BY: ---------- DATE: ----------

STAMP

UTM | School of Graduate Studies

☐ PEPERIKSAAN LISAN / *VIVA VOCE*
☐ PEMBETULAN / *CORRECTION* (1) (2) (3)
☐ PEMERIKSAAN SEMULA / *REVIVA*
☐ TESIS BERJILID / *HARD COVER*

BORANG PENYERAHAN TESIS/*SUBMISSION OF THESIS*
SESI/*SESSION* _____/_____

BAHAGIAN A : DIISI OLEH PELAJAR [PART A – TO BE COMPLETED BY THE STUDENT]

Nama Pelajar : ..... **No. Matrik Pelajar** : .....
[Name of Student] [Matric No.]

No. Kad Pengenalan : ..... **No Telefon Bimbit** : .....
[IC No./Passport No.] [Handphone No]

Program Pengajian (Kod & Nama) : .....
[Programme of Study (Code & Name)]

Fakulti [Faculty] : .....

Tajuk Tesis : .....
[Title of Thesis] .....
.....

Tandatangan [Signature] : ..... **Tarikh** [Date] : .....

Alamat Surat Menyurat : .....
[Corresponding Address] .....

BAHAGIAN B : DIISI OLEH PENYELIA [PART B – TO BE COMPLETED BY THE SUPERVISOR]

Saya _____ **memperakui bahawa** [I ____certify that]:

a. **Pelajar ini telah mematuhi keperluan "Panduan Menulis Tesis UTM" Universiti Teknologi Malaysia** [the students has adhered to the University requirements for the presentation of research thesis]

b. **Tesis pelajar ini boleh dihantar kepada Fakulti/Universiti** [the thesis can be submitted to the Faculty/University]

c. **Kandungan tesis telah disemak dan didapati bebas plagiat dan boleh diserahkan ke Universiti untuk tujuan peperiksaan** [The content of thesis has been checked for plagiarism and can be submitted to the university for the purpose of examination]

Name [Name] : ..... **Tandatangan** : .....
[Signature]
Alamat Pejabat : ..... **Tarikh** : .....
[Office Address] ..... [Date]

BAHAGIAN C : UNTUK KEGUNAAN SEKOLAH PENGAJIAN SISWAZAH [PART C – FOR SCHOOL OF GRADUATE STUDIES]

Adalah disahkan bahawa _____ **salinan tesis telah diterima.** [It is confirmed that _____ copies of thesis have been received]

Name [Name] : _____ **Tandatangan & Cop Rasmi** : _____
[Signature & Official Stamp]

☐ Yuran Peperiksaan Lisan / Viva Voce Examination Fees*
*(*for Semester I 2016/2017 intake onwards)*

☐ Yuran Pemeriksaan Semula / Resubmission Fees

Tarikh [Date] : _____

Salinan Pertama – Untuk SPS [First Copy – For SPS]