







Testing & Maintenance. All these phases cascade to each other, so that second phase takes off as and when a defined set of goals is achieved and signed off for the first phase, so the name "Waterfall Model". Thus, all the methods and processes undertaken in Waterfall Model are more visible.

**1. System/Information, User Requirements**

As software development is a large scale process, so the work begins by establishing requirements for all system elements, followed by the allocation of some subsets of these requirements to the software. The overview of this system is necessary as the software must interface with other elements such as hardware, users and other resources. The most basic and essential requirement for the existence of software in any entity, is knowledge of the system.

As the programmer he/she needs to know the requirements in order to build the system, to decide on the way to operate the system and to select the most suitable software for the system. Sometimes, knowledge of the system assists the programmer to maximize output.

**2. Software Requirement Analysis**

**2.1 Functional Requirements**

The Online management System enables searching and creates system functionalities such as creating a project title, accepting the project and the supervisor can accept the student or not. The system Administrator maintains user profiles for both students and supervisors. Students have to create an account in the system and their credentials are verified against the details in the faculty. The students are able to view and select the projects titles besides checking on the availability of supervisors. On the other hand, the supervisors are able to set their project, contact the students, put up project titles and make approvals on the students, proposals. If there is a need for meeting by the supervisor, this interaction is carried out via the email. The administrator is role to keep a record on all the projects titles and to monitor communication.

**2.2 Non Functional Requirements**

Non-functional requirements are not directly concerned with the specific functions delivered by the OSSMS system. , functional requirements define what a system is supposed to do whereas non-functional requirements define how a system is supposed to be. Non-functional requirements are often called qualities of a system. For the purpose of this research work, the non-functional requirements are categorized:

- **Compatibility**

The OSSMS system should operate on all the windows platforms and operating systems and web browser, such as Internet Explorer 5.0+. The system should have the following minimum hardware requirements, RAM Memory: 512MB (recommended) or 256MB (minimum), Disk Space, 5 GB disk space (recommended) and Dual Pentium III or IV Processors.

- **Usability**

The system should be easy to use and it should have the minimum possible screens.

- **Availability**

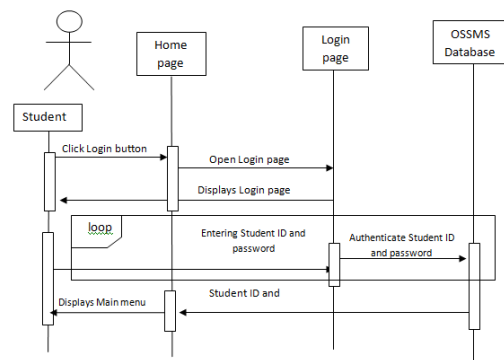
The system should be available as and when it is required as it will be frustrating for the students to find that the system is down when they want to use it.

- **Robustness and Reliability**

The system must be reliable. It should not mix up the project titles, names of students or cause any disagreement with supervisors. The system should have the ability to generate reports based on the data keyed in by the users.

**3. Sequence Diagram**

The sequence diagram (SD) specifies the time and control aspects of a system. Typically, SD is only used to analyze the more complex business events. Which are actions between the objects in the project. Business can also transmit data. A scenario is a sequence of events during one execution of a program. A scenario can include all the events or only the events sent to or received by certain objects in the system. In sequence diagram the parallel vertical lines, indicate different processes or objects that occur simultaneously, while the horizontal arrows denote the messages exchanged between them, in the order of their occurrences. This allows the specification of simple runtime scenarios in a graphical manner, so that it would be easier for the user to follow the sequence of activities and flow of data.



**Figure 2:** Sequence Diagram of "Signup"

This use case prompts the students to enter their usernames and passwords to be identified by the system when they want to access the system.

4. Sequence Diagram of “View dissertation abstract” Use Case Diagram

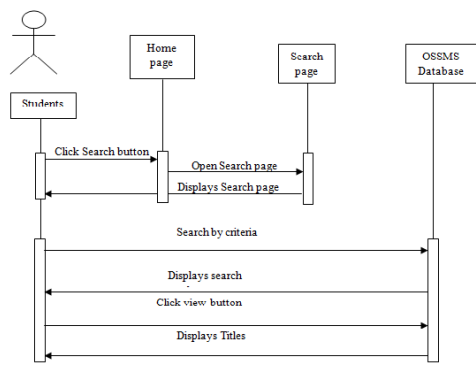


Figure 3: Sequence Diagrams of “View Titles”

This use case is initiated by all kinds of users (students, administrators and supervisors) to view titles of the abstracts. The initial requirement for this use case is to do a search and to obtain results.

5. Functionality Design

Having investigated the behavior of the domain, it is now necessary to examine in details the Online Student Supervision Management System (OSSMS). It is necessary to provide more explanation on the working of the system as well as to study the options of each user of the system. Figure 4 illustrates the work processes of the users of OSSMS namely:

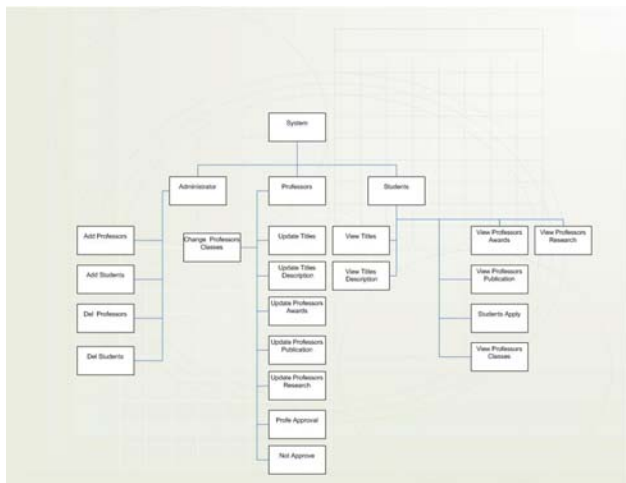


Figure 4: Structured Chart for Online OSSMS

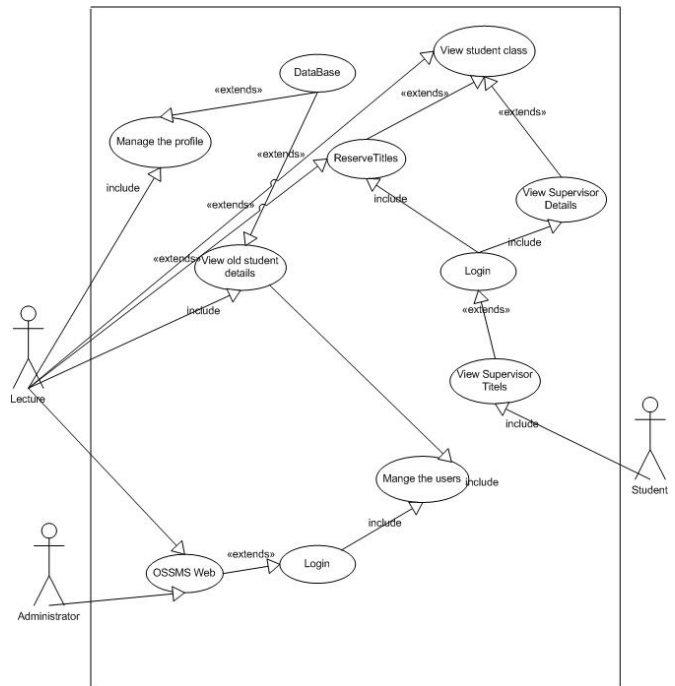


Figure 5: Use Case Diagram of the OSSMS

<i>Check Availability of Lecturer</i>	A Student wants to check on the availability of a lecturer
<i>Actor</i>	Student
<i>Pre-condition</i>	Student must be a registered student with a matric number and a passport or an identity card (IC) number.
<i>Flow of events</i>	<ol style="list-style-type: none"> <li>1. A student goes to the main page and clicks the hyperlink to check the currently and available status of lecturers.</li> <li>2. The system prompts the student for a matric number and passport or IC number.</li> <li>3. The student enters a matric number and passport or IC number by using the keyboard.</li> <li>4. The student presses the enter button.</li> <li>5. The system checks the matric number and passport or IC number for validity purposes. If it is in the system, it acknowledges entry.</li> <li>6. The student is taken to a page where it opens to lecturers with designations.</li> <li>7. Each title is followed by the lectures name.</li> <li>8. The student clicks the logout button.</li> <li>9. The system is logged out.</li> </ol>
<i>Post condition</i>	No changes are made in the system

4. Implementation and Evaluation

The design of the proposed system aims to meet the objectives and requirements identified in the system.

1. ERD - Entity Relationship Diagram

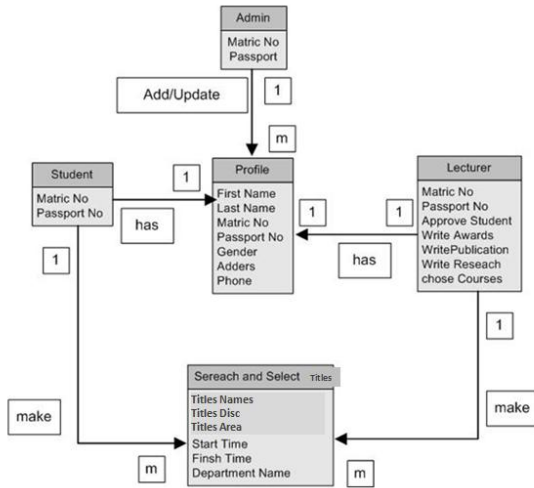


Figure 6: ERD - Entity Relationship Diagram for Online OSSMS

This diagram shows the relationship between the entities in the system. Administrative staff, Supervisor and students have Matric Numbers and Passport Numbers to login to the system, One Administrative staff can create many users profiles with every supervisor and student having one profile. The profile contains user names and full name, password, address, telephone number and change of password, These attributes are inherited by both supervisor and students who have their Matric Number and Passport Number in the database of the university, supervisors has titles and courses, the Student and supervisor have one - many relationship with the OSSMS system, this means every supervisor and student can make only one title in the system.

2. Interface Design

Testing the effectiveness of each model is vital in order to ascertain how it improves the OSSMS. The models will undergo different levels of testing. Each model will be subject to some relatively simple initial tests. This is in line with the prototyping methodology to identify the best models. These initial tests are designed to be quick easy to apply and show very quickly whether a model could be suitable. Once a model is identified as potentially suitable it, will be implemented using a software package, allowing it to be subjected to more exhaustive testing with a greater number of students and supervisors.

3. Initial Model Testing

Testing helps to determine if the code written is executed correctly. Different types of tests are performed to ensure that the program developed meets the requirements and objectives initially identified. Unit and integration testing activities are performed during the development phase, while acceptance tests ensure that the proposed system developed has the required features and that they behave correctly, models quickly and effectively.

4. Interaction with the Database

In order for the OSSMS obtain the information that it requires from the database, it is necessary to design SQL queries to extract the required information. It will also be necessary to design a method to include the new project or dissertation into the database once it has been approved by the OSSMS. In order to deliver a fully integrated system, it will be necessary to write a great deal of additional codes so that the data extracted by the SQL queries can be converted into the format required by the OSSMS. The extraction of precise details is likely to depend on the type of software package, is used to implement the OSSMS, how eves it might be beyond the scope of this project to deliver a fully integrated system. If this is the case, an effort will be made to develop the most important SQL queries to ensure that data requires by the OSSMS is available in some format. This is likely to aid future work on an integrated system.

5. Interface Design

The two main purposes of the interface are to collect information required by the OSSMS and to display information to the staff, students and supervisors regarding the spread of deadlines within a particular time period. However, there is a little more work involved in producing a more advanced system that allows the Supervisors manage own their profiles in OSSMS. Therefore, the system produced is capable of allowing supervisors to enter existing OSSMS details, as well as entering details of new projects or dissertation. There are problems in the management, such as storing the number of postgraduate Titles required that the new interface will not address. The testing processes include examination of system testing to ensure that the system meets its functional and non-functional requirements, with no unexpected way.

The goals of the testing process are

- To ensure that the system meets its requirements.
- To identify the short comings that cause unexpected behaviors in the system.

Below are some screen shots of the system interface for the Online Student Supervision Management System (OSSMS). The Welcome screen explains the use of the program and its benefits to the users.

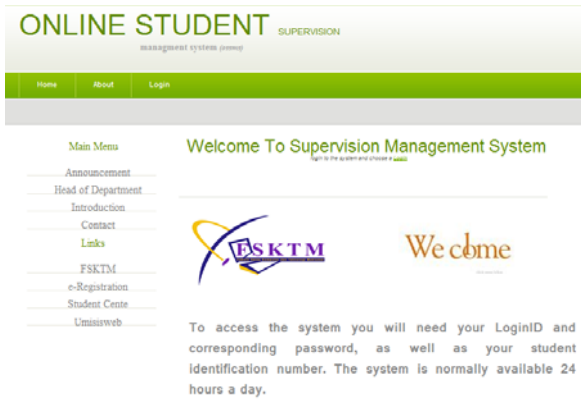


Figure 7: OSSMS Welcome screen Page



Figure 8: OSSMS Head of Department Page

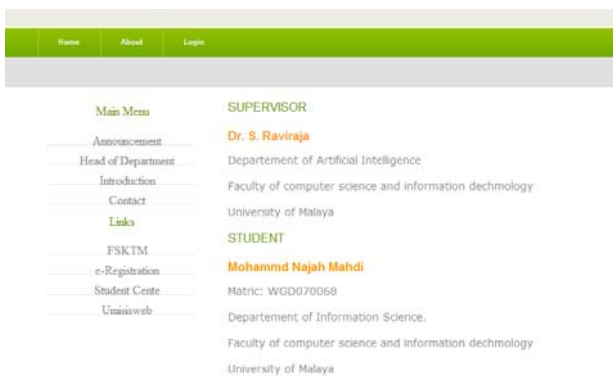


Figure 9: OSSMS Contact Page



Figure 10: OSSMS create a new user Page

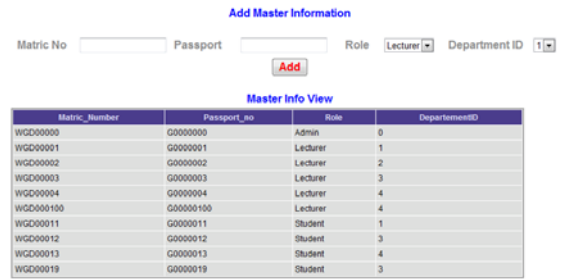


Figure 11: OSSMS Admin Add Users Page

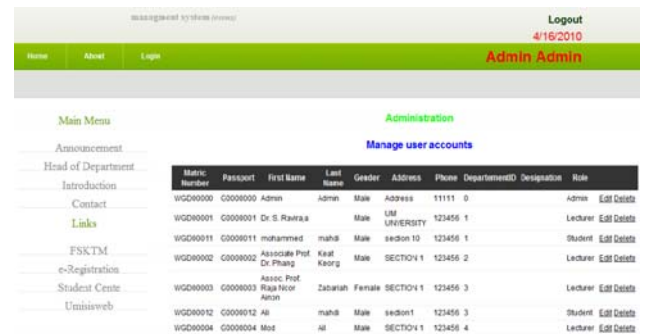


Figure 12: OSSMS Admin Mange User Account Page

## 6. Development

Program code, databases and interfaces are constructed during the development phase based on the design specification. This is so as to ensure the fulfillments of the objectives of the proposed system. The Online Student Supervision Management System (OSSMS) consists up of a collection of ASP.NET web pages that are hyperlinked together. Web server controls such as buttons, text boxes, radio buttons, dropdown lists and data grids for displaying table format are included in the web pages. Visual Basic script is used to ensure control of the Web server controls and performance of ASP.NET web pages perform as required. During the development stages, two main modules; one for Student and the other for were developed Supervisor to facilitate various functions. The functions are discussed below.

## 7. Login function

This is created using the Login controls provided by visual studio 2008. The login control is created on the Login page as the first interface that users will interact with. Additional Visual Basic code is written to identify login accounts based on the roles users; this facilitates the (student or Supervisor - Administrator) who login to be directed to the appropriate modules

- Edit account web page

This web page was designed to enable new users to modify their accounts. Various validation controls are included to ensure validity of user input.



- Modules

As mentioned above, the Online Student Supervision Management System consists of three main modules; Student, Supervisor and Administrator. Students gain access into their modules, to modify accounts or to search for the titles or to view titles taken. Some of the functions and features developed under this module are discussed below:

- **Student Module**

- a. Update Details Web form

To facilitate the update of student information, students are required to fill a web form with registration particulars, after which they submit the form. If information provided by the user is valid, upon submission of the web form the students' details are inserted into a database.

- b. Validation controls

To ensure that students always provide valid input, a set of validation controls are added to the update web form and login page. The validation controls provide an easy-to-use but powerful way to check for errors and where necessary, display messages to the user (Microsoft). By using validation controls custom error information is displayed to the user. The type of validation controls used in the development of the Online Student Supervision Management System is:

- Required Field Validator

This validation control ensures that the user does not omit the entry of required information during the registration process. Since most of the information requested is compulsory, this control is used frequently. If a user omits a required entry, an asterisk will appear along the required field to prompt the user to complete.

- Compare Validator

This validation control compares a user's entry against a constant value or against the value of another control using a comparison operator such as less than, equal, or greater than for a specific data type (string, integer, date etc). In the update form, it is used to ensure that under username, students do not select username that have been chosen by other students. If a discrepancy is detected between the two controls, an asterisk will appear along the dropdown list control to prompt the user to make the necessary adjustments.

- Regular Expression Validator

This validation control is used to check that an entry made by a student matches a pattern defined by a regular expression. This type of validation enables the checking for predictable sequences of characters such as addresses and date on the update form.

The required information will be flagged by asterisks. The asterisks represent different validation controls and on the right are the properties for a single validation control.

- **Tabular display of records**

In this module, the records of users are required to be displayed in a tabular grid format. To facilitate this, the Grid View controls are used to display information from the database by binding the control to a data source. SQL select statements are used to specify the criteria for the information retrieved. The Grid View control supports sorting by a single column as well as simple paging functionality. The paging functionality of the Grid View control can be customized in the Grid View control properties.

## 5. Testing

- **Introduction**

Testing is a process that identifies the correctness, completeness and quality of a developed system. Testing ensures that the system is working as intended. Unit and integration testing activities are performed during the development phase, while acceptance tests are carried out to ensure that the proposed system is developed with the required features that behave correctly.

As with the OSSMS, it is important to test the interface. The two aims of this testing procedure one is to ensure that the system behaves as expected when interacting with the database, and to evaluate the usability of the system. Testing the functionality of the system is fairly straightforward since the number of operations that can be performed is relatively small. Although there is a very huge number of a combination of projects, supervisors and other elements to consider, all these do not need to be tested due to the fact that the database is in SQL Normal Form.

- **Unit Testing**

Component testing is the process of testing individual components in the system to discover the defects in interfaces, input, output, arithmetic, and control logic. Component testing detects errors in coding when compilation takes place. These errors are corrected instantly before proceeding to the next part of the module or to the next module.

As mentioned previously the OSSMS is made up of hyperlinked ASP.NET pages that contain codes written in Visual Basic to perform different functions. (Instant update, deletes, insert and view records) The functions such as are tested individually to ensure that they are performing as required the system.

- **Integration Testing**

Integration testing verifies the interoperability of the proposed Online Student Supervision Management System (Student, Supervisor and Administrator) to ensure that all functional and technical objectives are achieved. The system should grant access to the different modules based on the user's role - normal user (Student, Supervisor) or administrator. To test this function, two user accounts are created while "Admin role" is assigned to one account. "Admin role" is reserved for a login account that belongs to



the FSKTM main office staff that will be responsible for creating records of users in the system. Upon login, the user account is assigned "Admin role". This should enable the user (who is supposed to be the system's administrator) to access the administrator's main page from where student records are managed. A user account that is not assigned "Admin role" is not authorized to access the administrator's module. The results of this test can be seen in the screen shots below.

**Add Master Information**

Matric No:  Passport:  Role:  Department ID:

**Master Info View**

Matric Number	Passport No	Role	DepartmentID
WG00000	G0000000	Admin	0
WG00001	G0000001	Lecturer	1
WG00002	G0000002	Lecturer	2
WG00003	G0000003	Lecturer	3
WG00004	G0000004	Lecturer	4
WG000100	G00000100	Lecturer	4
WG00011	G0000011	Student	1
WG00012	G0000012	Student	3
WG00013	G0000013	Student	4
WG00019	G0000019	Student	3

Figure 13: The different roles to create Student or Lecturer

**Titles**

Title_Desc	Title_Description	Edit	Delete
Online Student Supervision Management System	The purpose of this research is to develop a system application to help the students finding lectures or professors to supervision on them, theses or projects		
Online Project	project des		
New lect title for new studen	using hand offer		

Title:  Title Description:

[Change Personal Information](#)

Figure 14: OSSMS Lectures Home Page - (Add Titles) Pages

Course Code	Course	Status
Select WXGE9101	Database Concept and Implementation	Registered
Select WXGE9103	Software Engineering Process and Practice	Registered
Select WXGE9104	Visual Programming, Concept and	Registered
Select WXGE6311	Multimedia System Development	Registered
Select WXGE9105	Computer Network	Free
Select WXGE9105	Information Technology Application Project	Free
Select WXGE6302	Project Management & Case Tools	Free
Select WXGE9309	Knowledge Management	Free
Select WXGE6315	Internet, Intranet, Internetworking	Free
Select WXGE6318	Multimedia System Technology	Free
Select WXGE6320	Web Development	Free
Select WXGE6404	Network Security and Management	Free
Select WXGE6405	Distributed Systems and Processing	Free
Select WXGE9101	Research Foundation in Computer Sciences	Free

Figure 15: OSSMS Lectures' Home Page - (Add Courses) Page

**Main Menu**

- Announcement
- Head of Department
- Introduction
- Contact
- Links
- FSKTM
- e-Registration
- Student Centre
- Umisweb

**Research**

International Association of Computer Science and Information Technology

Member, International Committee, 2008, (International)

International Conference on Software Engineering Theory and Practices 2008, Florida, USA, Member Of The International Committee, 2008, (International)

Research:

Publication:

Award:

Figure 16: OSSMS Lectures' Personal Page - (Add Research, Publication and Awards) Pages

Show All

Lecturer Name	Title	Title Description	Availability
Select Dr. S. Raviraja	Online Student Supervision Management System	The purpose of this research is to develop a system application to help the students finding lectures or professors to supervision on them, theses or projects	Unavailable
Select Dr. S. Raviraja	Online Project	project des	Unavailable
Select Associate Prof. Dr. Phang Keat Keong	Middleware for Network Monitoring	This project is about developing a java-based middleware for mobile environment	Available
Select Associate Prof. Dr. Phang Keat Keong	Ad-Hoc Security	The exact title will be determined after consultation with the student	Available
Select Associate Prof. Dr. Phang Keat Keong	Peer-to-peer Network Security	The final title will be determined after consultation with the student	Available
Select Associate Prof. Dr. Phang Keat Keong	Image Encryption	To developed an image encryption and decryption application.	Available

Figure 17: OSSMS Student Home Page - (Student Search for Titles) Page

**Register Title here** [Back to Student Home Page](#)

Title:

Semester Period:  Start Year:  Finish Year:

App\_Web\_Iggyrwnq

Title has been submitted. Awaiting lecturer approval

Figure 18: OSSMS Student Register Title Page

Show All

Lecturer Name	Title	Title Description	Availability
Select Dr. S. Raviraja	Online Student Supervision Management System	The purpose of this research is to develop a system application to help the students finding lectures or professors to supervision on them, theses or projects	Unavailable
Select Dr. S. Raviraja	Online Project	project des	Unavailable
Select Associate Prof. Dr. Phang Keat Keong	Middleware for Network Monitoring	This project is about developing a java-based middleware for mobile environment	Unavailable
Select Associate Prof. Dr. Phang Keat Keong	Ad-Hoc Security	The exact title will be determined after consultation with the student	Available
Select Associate Prof. Dr. Phang Keat Keong	Peer-to-peer Network Security	The final title will be determined after consultation with the student	Available

Figure 19: OSSMS the Titles Drop from the Search Page

• **Acceptance Testing**

The acceptance testing of the proposed online student Supervision Management system is performed whereby the all problems and short comings are corrected accordingly. Some of short comings uncovered during the acceptance testing may lead to changes in the design and development phases. The acceptance testing performed in a test environment that simulates duplicates the production environment. To facilitate this, Visual Studio 2008 with an in built Internet Information Services (IIS) web server that enables the completed system to be executed as a local IIS Web site accessible this work web browser of Internet Explorer.

Test data must be designed to meet all the requirements. The test data must also ensure the testing of all control boundaries in the system code. The records entered into the database should be similar to the records which would be used in the actual registration environment, once the system is put to use in the online student Supervision Management system.

Validation controls provide an easy-to-use mechanism for web form validation such as to test for valid dates, values within a range and to ensure that users key in required information without omission. During acceptance testing, these validation controls for the various input controls on the student registration web form are tested.

## 6. Results and Discussion

This project is aimed at developing an efficient online student Supervision Management system for the FCSIT at University Malaya in Malaysia. The project is expected to overcome problems faced by users due to the current system in use. The expected outcomes of using the proposed online appointment system include:

1. The system enables accurate registration of students.
2. The system facilitates authentication, so as to ensure only authorized users gain access to services such as registration, information retrieval and updating.
3. The system provides basic functions and features such as validation, consistency and user friendliness.
4. The system includes provide administrative features for the administrator (office staff) to maintain the database.
5. The system allows for future enhancement of the system to improve its effectiveness.

## 7. Conclusion

This project aims to develop an online Student Supervision Management system for the faculty of FSKTM at University Malaya in Malaysia. It and will be utilized by students and supervisors. The main benefit of this system is its potential to provide more convenience and greater accessibility for the search of the titles, and to allow easier and faster process will make information retrieval easier, faster as compared to the current manual system, through the administration features provided.

Establishing and maintaining an effective online student Supervision Management system requires the coordination of provider time, active communication, and attention to details. Properly done, a well-run online student Supervision Management system will move the faculty to a higher level of productivity and performance by generating new benefits for the students, the supervisor, and finally the office staff. The online student Supervision Management system will increase the efficiency of the operating system of the faculty, while maintaining a high level of student service. Thus effective online student Supervision Management system is well worth the time spent on creating the system.

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