

**UTEM EASY PARK
(UTEM PARKING RESERVATION WEB-BASED SYSTEM)**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

BORANG PENGESAHAN STATUS LAPORAN

JUDUL: UTeM EasyPark (UTeM Parking Reservation Web-Based System)

SESI PENGAJIAN: [2022/2023]

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ABSTRACT

The "UTeM Parking Reservation Web-Based System" is a proposed technological solution designed to streamline parking reservation processes at Universiti Teknikal Malaysia Melaka (UTeM). The current manual system poses significant inefficiencies and challenges, prompting the need for a more organized and efficient approach. This web-based system aims to provide a convenient platform for UTeM's staff, lecturers, and related authorities to reserve parking spaces for specific events, minimizing the time and effort spent on this task. The system offers features such as tracking reservation details, including vehicle information, preferred location, and contact details. Moreover, it can monitor parking lot availability across various UTeM buildings and faculties. The existing manual system's limitations, including redundancy and lack of standardized processes, underscore the necessity of an automated, centralized reservation system. The proposed solution targets efficient parking space utilization, reduced congestion, increased user satisfaction, and improved data management. The key modules of the system include login, applicant, officer, parking reservation, approving, and reporting modules. The web-based system is expected to enhance the convenience and effectiveness of parking facilities at UTeM, benefiting both the applicant and the administrative staff while providing better data management through integration with Microsoft SQL Server. This thesis comprehensively explores the development and implementation of the UTeM Parking Reservation Web-Based System, addressing the identified problems and envisioning a more efficient parking reservation process.

ABSTRAK

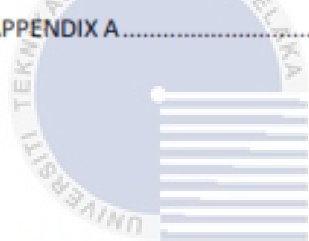
"UTeM Parking Reservation Web-Based System" adalah cadangan penyelesaian teknologi yang direka untuk menyusun semula proses tempahan tempat letak kenderaan di Universiti Teknikal Malaysia Melaka (UTeM). Sistem manual semasa menimbulkan keberkesanan dan cabaran yang signifikan, memotivasi keperluan untuk pendekatan yang lebih teratur dan efisien. Sistem berasaskan web ini bertujuan untuk menyediakan platform yang mudah digunakan bagi kakitangan UTeM, pensyarah, dan pihak berkenaan untuk mereservasi tempat letak kenderaan untuk acara tertentu, meminimumkan masa dan usaha yang dihabiskan untuk tugas ini. Sistem ini menawarkan ciri-ciri seperti penjejakkan butiran tempahan, termasuk maklumat kenderaan, lokasi pilihan, dan maklumat hubungan. Selain itu, ia dapat memantau ketersediaan tempat letak kenderaan di pelbagai bangunan dan fakulti UTeM. Kelemahan sistem manual sedia ada, termasuk pengulangan dan kurangnya proses piawai, menandakan keperluan sistem tempahan terpusat yang berautomasi. Penyelesaian yang dicadangkan bertujuan untuk penggunaan ruang letak kenderaan yang efisien, pengurangan kesesakan, peningkatan kepuasan pengguna, dan peningkatan pengurusan data. Modul utama sistem ini termasuk modul log masuk, pemohon, pegawai, tempahan tempat letak kenderaan, pengesahan, dan pelaporan. Dijangkakan bahawa sistem berasaskan web ini akan meningkatkan keselesaan dan keberkesanan kemudahan letak kenderaan di UTeM, memberi manfaat kepada pemohon dan kakitangan pentadbiran sambil menyediakan pengurusan data yang lebih baik melalui integrasi dengan Microsoft SQL Server. Tesis ini menyelidiki secara komprehensif pembangunan dan pelaksanaan "UTeM Parking Reservation Web-Based System", menangani masalah yang dikenal pasti dan membayangkan proses tempahan tempat letak kenderaan yang lebih efisien.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

UTeM Parking Reservation Web-Based System is used to ease the lecturers, staff, or authorities to reserve parking for special events around UTeM. This proposed system is also able to track all the process flows including details of reservations such as plate number of the car, type of car, color, preferable location, the number of parking lots intended, name of the applicant, phone number, date and time of reservation. Moreover, this system can trace the number of parking lots that is available in each building or faculty in UTeM.

UTeM Parking Reservation Web-Based System provides institutes staff with an easy way of reserving a parking space for their specific events using the web portal. It overcomes the problem of finding an available parking space around UTeM areas which unnecessarily consumes time. For example, during convocation day it will ease both parties which are the parents and staff who handle the events. The parents will know where to park the car, since there will be arrow signage to guide the parents. Moreover, it also helps to prevent traffic jams and spent more time finding a single parking slot.

By having this proposed system, the staff or person in charge of certain events need to apply or make a reservation through the system and fill in all details about parking reservations and submit the application. The approving staff will get a notification from the system about the reservation made, the approving staff has the authority to verify which are to accept or reject an application. If the application is accepted, then the system will notify Pejabat Keselamatan and provides parking reservation information. Then, it will give all the reservation information to an officer on duty to settle down their job by putting the cone or signage at the requested location. After the officer has completed his/ her task, they will update the status and images as proof to let the applicant knows.

1.2 PROBLEM STATEMENT

The current system is entirely manual and involves a lot of procedures which consumes a lot of time and makes it inefficient to be used. The applicant who wants to make a reservation must fill up a form with their details and the reason for the parking reservation, wait for approval, and require a letter of support from Ketua PTJ. Then, if the status of the parking reservation is approved, the applicant needs to show the form to Pegawai Operasi at Pejabat Keselamatan for the next process. Otherwise, if the status of the parking reservation is rejected for certain reasons, the applicant needs to make another reservation. The issue that might arise from the old system is redundant reservation. For example, if the other user wants to make the same parking reservation on the same date, day, and location it causes a lot of problems. Over that, all the processes using form or paper are highly likely to be lost, fragile, or torn.

Locating a single parking slot or lot for special events might be one of the most frustrating problems that UTeM societies are facing nowadays. For manual parking reservations, it requires a lot of time and energy, and the applicant needs to fill up the form manually about the reservation. The current system is entirely manual and involves a lot of procedures which consumes a lot of time and makes it inefficient to be used. The applicant who wants to make a reservation need to fill up a form with their details and the reason for the parking reservation, and needs to wait for the approval. In the real situation, Pejabat Keselamatan states the main problem with this manual system is unstandardized and they tend to receive parking requests in different reservations such as by informal call, message through WhatsApp, and verbal communication.

All the problems will cause many difficulties such as duplicate requests and overlapping on the same date, or location. Other than that, usually in the old system, the applicant does not know the status of the reservation request whether it has been approved or not. To make things clear, Pejabat Keselamatan needs to call the applicant manually by referring to the form application. Moreover, the other issue received is the old system's unable to produce an appropriate report. Having this report will ease Pejabat Keselamatan to monitor the summary of the parking reservation request for every month.

1.3 OBJECTIVE

A UTeM Parking Reservation Web-Based System aims to improve the efficiency and convenience of parking facilities by allowing individuals to reserve a parking spot in advance. This system can benefit both the applicant which is the UTeM's staff and Pegawai Keselamatan. Some of the key objectives of a UTeM Parking Reservation Web-Based System are:

- **Efficient use of parking space:** A reservation system ensures that parking spaces are utilized more efficiently, reducing the number of vacant parking spots, and minimizing the amount of time that customers spend looking for a parking space.
- **Reduced congestion:** With a reservation system in place, the applicant can plan their arrival time and park their vehicles more quickly, reducing congestion in the parking facility and surrounding areas.
- **Increased satisfaction:** A reservation system provides applicants with the convenience of knowing that they have a guaranteed parking spot, reducing their stress and anxiety and increasing their overall satisfaction with the parking experience.
- **Capability:** This system allows them to book a parking slot that can be made for special events which prevents lecturers, staff, or authorities from wasting too much time making a parking reservation.
- **Convenient:** UTeM Parking Reservation will ease administration to know available spaces of parking lots for each building or faculty. In addition, it also eases Pejabat Keselamatan to monitor the summary of the parking reservation request for every month which offers a more convenient life for the UTeM's society.
- **Better data management:** A parking reservation system can collect data on parking usage, and applicant behavior, which can be used to optimize operations and improve service.

1.4 PROJECT SCOPE

In this proposed UTeM Parking Reservation Web-Based System, the main target users are Staff of UTeM, Lecturers, PTJ (Pusat Tanggungjawab), and Pejabat Keselamatan. Besides that, below are a few modules that will be developed in this system:

- **Login Module**

This module can be accessed by the applicant and the officer of Pejabat Keselamatan. Since the applicant or the officer are the staff of UTeM where each of the staff has their own unique id. To enter the system, they need to input their id, and the system will verify the id from the database. Therefore, if the entered id is correct, the system allows the user to enter the system.

- **Applicant Module**

This module can be accessed by the applicant. They can edit their personal information, which the system will retrieve from the database to display in the system. The system allows the applicant to make parking reservations and cancel the reservation. They are also able to receive notification once their application has been approved.

- **The Officer Module**

This module can be accessed by the officer of Pejabat Keselamatan. They can edit their personal information, which the system will retrieve from the database to display in the system. The system allows the officer to verify the parking reservation request, they can accept or reject the application for certain reasons. The status of an application will be displayed in the system. The officer will get a notification once a parking request is made by the applicant.

- **Parking Reservation Module**

This module can be accessed by both users applicant and officers. For the applicant, they can make reservations by fill up all the information regarding parking reservations. In addition, the officer is only able to view parking reservation requests and update the status of requests.

- **Approving Module**

This module can be accessed by the officer, which can view the parking reservation request and update the status of the request.

- **Reporting Module**

This module can be accessed by the officer who can view the summary of the reservation request report monthly.

1.5 PROJECT SIGNIFICANCE/ EXPECTED OUTPUT

UTeM Parking Reservation is a Web Based System. It allows the applicant, which is the staff of UTeM to reserve parking around UTeM for special events and the system will notify Pejabat Keselamatan about the parking reservation. The officer of Pejabat Keselamatan needs to approve the parking reservation request and update the status and upload photos of parking. The system will respond back to the applicant where their parking reservation has been approved. This UTeM Parking Reservation data will be stored in Microsoft SQL Server.



CHAPTER 2

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 INTRODUCTION

The literature review is a review of a case study. It includes all the facts and findings related to the case study. Research about a case study should include a review of the relevant literature of facts and findings. The review will be the guidelines to develop a good system. In this chapter, it explains the methodology to be used in the project development. The methodology consists of several phases as guidelines that need to be achieved.

2.2 FACTS AND FINDINGS (BASED ON TOPIC)

Fact is a statement or assertion of verified information about something that case or has happened. Moreover, finding is the act of determining the properties of something usually by research or calculation. For this project, facts and findings will be supported by the review of the existing system and technique that is related and already used by others.

2.2.1 Domain

The domain for this project is the parking reservation system. This proposed system needs to be developed because it can ease specifically ease the lecturers, staff, or authorities to reserve parking for special events around UTeM. This proposed system is also able to track all the process flows including details of reservations such as plate number of the car, type of car, color, preferable location, the number of parking lots intended, name of the applicant, phone number, date, and time of reservation. For this purpose, system the appropriate domain is UTeM Management, Staff since they will use the system to make parking reservations around UTeM.

2.2.2 Existing System

There are several existing systems related to parking reservations. The existing system is used to A parking reservation system is a software application or platform that allows users to reserve parking spaces in advance. It helps streamline the process of parking management by providing a convenient way for users to book parking spots and ensuring efficient utilization of available parking spaces.

2.2.2.1 The Development of Mobile Application for Parking Lot Management at the University Campus

This project is a campus parking mobile application project for academic purposes. The aim of this project is to develop a parking system that replaces the current old fashion system that can improve effectiveness when looking for parking spaces, to show the availability of parking spaces, and remind users of their vehicle location. The current parking system on the campus is not effective enough. Therefore, by implementing this project will improve the effectiveness and reduce the time needed to find a parking slot. Due to the different obstacles faced, Quick Response (QR) is the best-suited method to implement into the system. This system will improve student time management and reduce empty parking space time wasting. Other than that, the student data can be gathered from this system which can be further implemented or perform behavior analysis on the user.

Nowadays, it's challenging to locate a parking spot, especially during peak hours, in places like university campuses. The most challenging problem on a university campus is finding a place where all the staff and students can study or work. (Shang, Lin, et al., 2007; Balsas, 2003; Alshuwaikhat et al., 2008). Due to the limited amount of parking spaces available to students, faculty, and staff at the university, it has become more difficult to find open spots. Finding a parking space is therefore always difficult when there are too many cars in a parking lot with little accessible space.

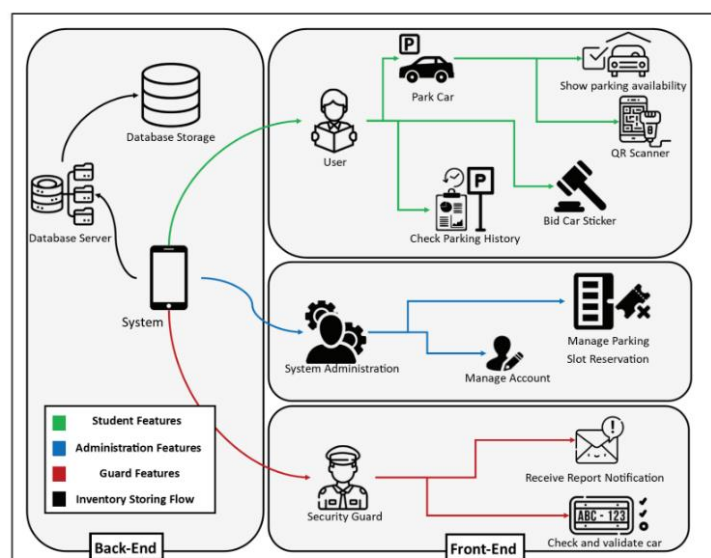


Figure 2.2.2.1 Proposed system framework

2.2.2.2 Smart Parking Management System

Parking lots have always been crucial because they enable drivers to leave their vehicles in a secure manner while going about their daily business. In general, the assistance offered, and the information provided by the smart parking system are highly helpful in aiding the motorist in finding available space. It is now simpler to pay parking fines thanks to the adoption of new technology. To assist in the detection of autos, sensors are utilized. Information regarding parked vehicles is required for creating a smart parking management system, so it is extremely vital. It is simple to gather the data from the sensor so that the system may use it. The driver will also receive the data.

Parking Guidance and Information System (PGIS) can be divided into two distinct features, according to Iyaka Beni. This can be used to monitor specific parking spaces or the entire building (Iyaka Beni, n.d.). The categories are primarily used in large parking lots. The five advantages of the Smart Parking System are essentially the same as those of the Parking Guidance and Information System (PGIS). Making decisions is where there is the most commonality. The system's information aids drivers in making decisions about how to go to their destinations as well as in discovering open parking spaces in the parking lot. Variable message signs were utilized in the Parking Guidance and Information System (PGIS) to instruct drivers on what to do when looking for vacant.



Figure 2.2.2.1 Parking Space Available according to the level

Figure 2.2 shows the placement of various sensors in separate parking spaces to detect the presence of cars. LED lights and sensors are linked together, and then the sensors are placed in each parking space in the parking lot. This is used to indicate that a

parking space has been occupied. Then, according to the different sensors, before outputting the available light spots, the occupancy of each light spot is counted. From the information obtained, the execution process will analyse the information to display accurate information for the driver to view.

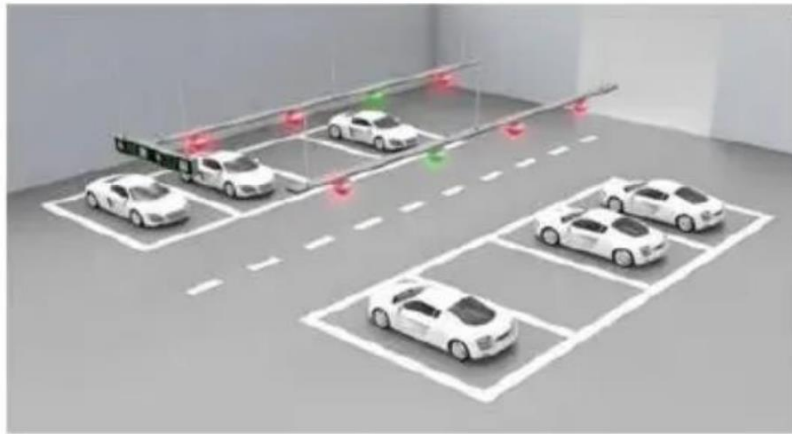


Figure 2.2.2.2 LED Sensor Detection (Iyaka Beni, n.d.)

2.2.2.3 Electronic Parking

According to Iyaka Beni, this is a parking system that allows the driver to select or request the availability of parking spaces. If there are vacancies, they can reserve a parking space to ensure that there will be no parking problems when they arrive at their destination. The electronic parking system allows drivers to reserve parking spaces through various methods such as telephone and online. The advantage of using an electronic parking system is that the driver does not need to find all the trouble of finding a parking space. (Iyaka Beni, n.d.).



Figure 2.2.2.2 Online Reservation System

2.2.3 Technique

Several methodologies may be relevant and linked when looking at different Parking Reservation System approaches. Here are a few instances:

Reservation based on a time slot: Customers are given specified time windows to reserve parking in this method. Customers can select their preferred time slots depending on availability when the system separates the available parking spaces into set time intervals (for example, hourly or daily). This method can be used effectively in situations when customers have predictable parking times because it is reasonably simple to put into practice. Nevertheless, it might not be the best option when clients require greater flexibility or when the length of parking is unknown.

Parking rates can be changed according to demand and supply with dynamic pricing. To calculate the best pricing for various time periods, the system employs algorithms to analyze real-time data such as parking occupancy rates and historical patterns. To control demand, prices are higher during peak hours, while discounts may be provided during off-peak hours to draw customers. By using dynamic pricing, parking resources may be distributed effectively, and income can be maximized. Dynamic pricing algorithms can be difficult to implement and manage, and there may be questions about their fairness and ability to satisfy customers.

2.3 PROJECT METHODOLOGY

According to Wikipedia, methodology the free encyclopedia, methodology can be defined as: (<http://en.wikipedia.org/wiki/Methodology>)

1. "the analysis of the principles of methods, rules, and postulates employed by a discipline"
2. "the systematic study of methods that are, can be, or have been applied within a discipline" or
3. "a particular procedure or set of procedures".

A methodology is a set of instructions and rules for different stages of the software lifecycle. The technique establishes the framework for a software product's development. There are various methodologies, including:

- Modelling a waterfall
- Spiral
- Incremental Model
- Prototyping

To create a high-quality product and guarantee a smooth development process, it is crucial to employ the appropriate technique. The approach picked must be appropriate for the project being produced. Following considerable investigation and analysis of various approaches, the application will be developed using the conventional waterfall paradigm. The project requirements and their implementation are well understood; hence the waterfall methodology was chosen.

2.3.1 Database Life Cycle

The database life cycle model has six basic steps to be implemented. Figure 6 below shows what are the steps in DBLC and the flow of each step. The DBLC model will be used in developing this project, especially in database development because it will guide the developer to develop the project. Since this project involved a database application, it is the most suitable model that can be used to be implemented.

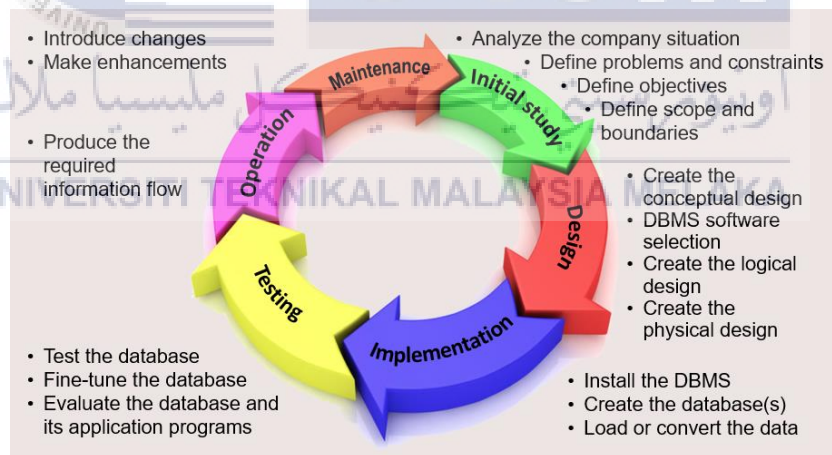


Figure 2.3.1.1 Database Life Cycle Model

2.3.1.1 Database Initial Study

- Analyze the company's situation.
- Define problems and constraints.
- Define objectives.
- Define scope and boundaries.

The initial stage of the database life cycle model is the database initial study. Before analyzing the issues with the corporate system at this level, one must be aware of the business scenario. Constraints in the company must be identified, and the best solutions must be sought in order to address the difficulties and constraints. It is necessary to take note of or pay more attention to the company's goal of establishing a good new system. Therefore, the system's objectives must be specified. When developing a system, it's important to understand the system's scope and bounds, including its users, functions, hardware, and software.

2.3.1.2 Database Design

- Create a conceptual design.
- DBMS software selection
- Create a logical design.
- Create a physical design.

The second level of the Database Life Cycle Model is database design. This level is the most critical DBL phase. Makes sure the final product meets requirements and focuses on data requirements. First, create a conceptual design to know the relationship between entities. At this level also, suitable software must be selected to develop the system. In that case, DBMS software must be chosen because it offers the best requirement to implement the system. Since there are various types of data models that can be used in conceptual design, the designer needs to choose one data model to transform it to its equivalent logical representation. Then, a physical design must be created that includes the coding in DBMS.

2.3.1.3 Implementation and Loading

- Install the DBMS.
- Create the Databases.
- Load or convert the data.

The third level is implementation and loading, in this level, DBMS should be installed in the computer. Follow the instructions step by step to install the DBMS so that it will operate properly in the future. Then, we databases must create databases regarding the system. After creating the databases, can load and convert the data to DBMS language because only DBMS understand programming language. At this level, performance, security, backup and recovery, integrity, company standards, and concurrency controls must be created.

2.3.1.4 Testing and Evaluation

- Test the Database.
- Fine-tune the database.
- Evaluate the database and its application programs.

Testing and evaluation is the fourth level in Database Life Cycle. At this level, test the database to see whether it works correctly or not. For example, must insert, alter, delete, and save data from DBMS. Then, test and fine-tune the database for performance, integrity, concurrent access, and security constraints. Testing and evaluation must be done in parallel with application programming. Lastly, need to evaluate the database and its application programs. If tests fail, must fine-tune based on reference manuals and modified the physical design over again.

2.3.1.5 Operation

- Produce the required information flow.

Operation is the fifth level in Database Life Cycle. At this level, the user must produce the required information flow and starts the process of system evaluation. This step can help users to use the system to manage the business for the company. For example, users can use the order function in the system. Ready to settle unforeseen problems that we may be faced.

2.3.1.5 Maintenance and Evaluation

- Introduce Changes.
- Make enhancement.

The last level of the Database Life Cycle Model is maintenance and evaluation. With the changes, the system will offer better service because the changes can update the function, data, interface, and so on. Enhancements can be made such as to the functions, according to the current situations and requirements that are needed by the user. At this level, it is required to do preventative maintenance, corrective maintenance, adaptive maintenance, and assignment of access permissions.

2.4 PROJECT REQUIREMENTS

During the development of this project, there are several requirements that need to be paid attention to complete this project successfully. The requirement can be the base or main

requirement which is important in this project and by-product requirement. The requirements that are used during the development of this project will be explained below.

2.4.1 Software Requirements

a. Development Tools

- Microsoft Visual Studio 2022

Platform to do the web-based. Easier to code and design interface for the web-based system.

b. Adobe Photoshop CS4

- Software used for editing images for website interface design.

c. PHP (PHP Hypertext Processor)

- PHP is a programming language that allows web developers to create dynamic content that interacts with databases.

d. Draw.io

- Draw.io will be used to design diagram and model of the project.

e. Microsoft Word

- Microsoft Word will be used to write the report of UTeM Parking Reservation system's development.

f. WAMP Server 2.0

- WAMP Server is a form of mini-server that can run on almost any Windows operating system. WAMP includes Apache 2, PHP 5 and MySQL (phpMyAdmin) in its package.

g. Database Management System

- MySQL
- Relational database management system (RDBMS). The program runs as a server providing multi-user access to several databases.

2.4.2 Hardware Requirements

The hardware required is very minimum and can meet client server needs. Perhaps the hardware for the client and server is much better than these minimum requirements. The hardware requirements are as below:

- Laptop

Acer Nitro 5

1. **Processor:** 4-core Intel Core i5-7300HQ, 2.50 GHz, 6 MB Cache
2. **Memory:** 8 GB DDR4 SDRAM
3. **Storage:** 1 TB Serial ATA SSD
4. **Graphics:** NVIDIA GeForce GTX 1050 Ti, 4 GB GDDR5
5. **Display:** 15.6", FHD (1920 x 1080)

2.4.3 Other Requirements

- Internet : Maxis Home Fibre 300mbps

