ICT ASSET MANAGEMENT SYSTEM

SHAMSULNAIM BIN RIDUAN

B22110032

A project paper submitted to the School of Information Technology,

Malaysia University of Science and Technology, in partial fulfillment of the requirements for the degree of

Bachelor of Science in Information Technology

JUNE 2025

ABSTRACT

This project is a web-based system called ICT Asset Management System. This system aims to help the TSM-IT, Penang Contingent Police Headquarters section control and track ICT assets to a better level. The existing SPAIB system has the ability to register and search for asset purchase information, asset recipients and not updates on the current status of the asset, whether it is working, damaged, under repair or in vendor action.

This new system will allow various categories of users, namely, administrators, technicians, registrars and users to complete several types of tasks such as asset registration, reporting damage, updating repairs, knowing the current ICT statistics and laboratory booking functions. It also has functions such as PDF and Excel report export, dashboard, audit log and asset ownership history.

The system construction is done based on PHP, MySQL, HTML, CSS, JavaScript. By using this system, it becomes easy to access accurate information about assets thus enabling TSM-IT employees to improve daily performance and make better decisions on asset maintenance and planning.

ACKNOWLEDGEMENT

Alhamdulillah, I am grateful to Allah SWT for giving me the ability, perseverance and will to succeed in this Final Year Project.

I would also like to express my immense gratitude to my supervisor Mr. Hasmiza who was always with me, gave me valuable suggestions and inspired me a lot in the process of developing this project. I would also like to thank all the lecturers and staff of the School of Information Technology, Malaysia University of Science and Technology, for their help and encouragement.

Thank you to the officers, members, and civil servants of TSM-IT Penang Contingent Headquarters for their cooperation and input that greatly contributed to the success of this project. Finally, I would like to thank my family and friends for their endless support, understanding, and encouragement throughout the process of completing this Project.

APPROVAL

My final year project entitled "ICT Asset Management System" was prepared by **Shamsulnaim Bin Riduan (Student ID: B220110032)** has been submitted to the Malaysia University of Science and Technology in partial of the requirements for the Bachelor of Information and Technology.

This report has been approved by:

Supervisor:

Mr. Hasmiza Bin Othman

Department of IT

Malaysia University of Science and Technology

DECLARATION

I declare that this project paper consists of my original work, with the exception of quotations and citations which have been duly acknowledged, and that it has not been previously accepted for a degree and is not being concurrently considered for any other degree at Malaysia University of Science and Technology or any institution.

_____

SHAMSULNAIM BIN RIDUAN

Date: 26 June 2025

TABLE OF CONTENT

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

The existing Sistem Pengurusan Aset Bersepadu (SPAIB) used at the Penang Contingent Headquarters allows asset registration and displays asset purchase information, but it lacks the ability to generate real-time statistics such as the number of functioning or damaged ICT assets. This shortfall creates inefficiencies for the TSM-IT division, which is responsible for monitoring and maintaining these assets across departments.

To address this issue, the ICT Asset Management System was developed. It allows TSM-IT personnel to view summarized data on asset status, track asset repairs, log vendor activities, and export reports easily. This ensures that the department has up-to-date information and can perform asset planning, maintenance, and auditing more effectively.

1.1.1. PROJECT MOTIVATION

The motivation behind the development of this system stems from the need for a more functional platform that can support day-to-day operations of the TSM-IT division. While SPAIB registers assets, it does not allow users or technicians to view current asset status (e.g., under vendor action, damaged, or repaired). With the increasing number of ICT devices and demand for faster service response, the new system bridges this gap and allows better control, visibility, and reporting across the Penang Contingent Headquarters.

1.2. AIMS AND OBJECTIVES

Aim:

The main goal of this project is to develop a web-based ICT Asset Management System that will enable the TSM-IT section of the Penang Contingent Headquarters to efficiently manage, monitor and analyse ICT asset data in real time. This system aims to overcome the weaknesses of the current SPAIB system, with centralized control, real-time access to data, user-based authorization and reduced workload in maintenance, asset reporting and laboratory booking management.

Objectives:

1. **Implement secure login with role-based dashboard**

   There should be multiple types of users on the system, including the following: administrator, technician, registrar and regular user roles. Different roles will be allowed to view specific modules and functions according to their duties. Secure login, session management and password hashing protocol (bcrypt) should be used to ensure that unauthorized persons cannot access the storage area.

2. **Enable asset registration, tracking, and filtering**

   Designated users (administrator, Technician and registrar) will have the right to add new ICT assets to the system, assign them to departments, or users, and add details such as serial number, brand, model, year and condition. The system will allow asset type, year, department or location to be used in filtering and searching to facilitate tracking and auditing.

3. **Provide real-time damage reporting and repair updates**

   Users can use the system to report damaged assets using an online form. Through it, technicians can review the repair status, write repair notes, actions taken, and whether the repair was completed or not. Each asset has a repair history to store all updates.

4. **Include lab booking module with approval flow**

   Users can use the system to report damaged assets using an online form. Through it, technicians can review the repair status, write repair notes, actions taken, and whether the repair was completed or not. Each asset has a repair history to store all updates.

5. **Offer PDF/Excel export of statistics and reports**

   The system offers the functionality to export filtered asset lists, damage reports and usage documents either as PDF or as an excel file. This facilitates improved reporting in audits, meetings or annual reviews and is highly customizable with a variety of filters available to choose from including department, asset type or year.

6. **Maintain full audit log and ownership history**

   Any major changes made in the system including asset creation, update and deletion and status changes will be reflected in the audit table. Also, in the event of an asset transfer between users, the system will retrieve records of the previous and current users along with the reason and date of the transfer.

1.3. PROJECT PLANNING

In this project, the model of Software Development Life Cycle (SDLC) was referred to as a guide that led to the development of the system in a form of an organized one. The SDLC model contributed to the fact that all stages of the project implementation, including planning, implementation, and maintenance, were implemented in an orderly manner to realize the goals of the system.

In the planning phase, the scope of the system, objectives, user requirements, and main features were identified. During this time, the project timeline was also drafted to ensure the project would be completed within the allocated period. In order to be able to visualize and work with the development schedule, each stage of the project was taken in a Gantt Chart that gives a clear idea of the whole process.

The Gantt Chart consists of phases which are planning, feasibility study, system design, implementation, testing, deployment and maintenance. The phases were planned basing on the actual project progress beginning on April 2025 to June 2025 being a period of about eight weeks.

below illustrates the Gantt Chart that was used to manage and track the development progress of this system.

	APRIL 2025	MAY 2025				JUN 2025			
	W4	W1	W2	W3	W4	W1	W2	W3	W4
Planning & Analysis									
Feasibility Study									
System Design									
UI/UX Design									
Database Setup									
Implementation (Frontend + Backend)									
Testing									
Deployment									
Documentation									
Maintenance									
Project Presentation									

Figure 1.3.1

CHAPTER 2

LITTERATURE REVIEW

2.1. PROBLEM STATEMENT

The Integrated Asset Management System (SPAIB) is the existing asset management system used at the Penang Contingent Headquarters. It was created to record government-owned assets and store procurement details. However, this system lacks the essential features required by the TSM-IT division to efficiently control and oversee ICT assets. The main problems that can be identified are:

1. **Lack of real-time asset status**

   SPAIB also fails to provide current statistics of assets that are functional, damaged, under repair or under vendor action. This renders it hard to afford an instant asset status outlook to TSM-IT personnel.

2. **No damage or repair tracking system**

   It lacks in-built reporting module to report, update, and track status of any damaged ICT assets. The history of repairs and actions performed by the technicians cannot be documented systematically.

3. **No asset ownership history**

   The change in the users of assets and departments is not monitored in the system. This leads to loss of track and accountability in the transfer of assets amongst the officers.

4. **Inefficient reporting**

   SPAIB cannot export filtered reports in PDF form or excel form. It has to be extracted manually which is cumbersome and inaccurate.

5. **No role-based access or lab booking feature**

   The system has the same view to all the users. There is no tool that would allow to request a lab usage or approve an application online.

2.2. LITTERATURE REVIEW

Government departments should have Asset Management as it plays a crucial role in ensuring that government departments, especially IT units, can efficiently track, maintain and monitor ICT equipment. Many public sector agencies rely on manual methods such as logbooks, spreadsheets or basic databases to manage ICT assets. These methods often result in delays, data loss and lack of visibility into real-time asset conditions.

In recent years, web-based and centralized asset management systems through digital transformation have promoted their adoption and offer better automation, structured record keeping and better reporting tools. Government agencies in Malaysia widely use systems such as SPAIB (Integrated Asset Management System) to register and monitor assets. SPAIB fulfills basic functions such as asset registration and purchase tracking, however, it lacks key features required for operational use such as real-time damage reporting, repair history, asset ownership transfer logs and role-based access control.

More advanced features, including user-specific dashboards, maintenance tracking and exportable reports are offered by commercial tools such as Snipe-IT, Asset Panda and Sortly. These tools are often developed for enterprise or private sector environments, and may not align with the workflow, structure, or approval processes required in government ICT departments.

2.2.1. REVIEW RELATED WORK

Currently, most of the asset management applications like Asset Panda, Snipe-IT and Sortly are enterprise applications (Assets Tracking, 2017). They usually do not work in the government environment and tend to be complicated, mandating internet connection with advanced features such as reporting or barcode scanning.

There are lightweight systems that can be less cumbersome to use, nevertheless, these systems do not contain important functionalities like tracking of damages or ownership history of assets as well as role-based access. They also lack support of internal modules such as lab booking or repair logs of technicians.

On the contrary, the system that was created in this project is tailored toward the TSM-IT division at Penang Contingent Headquarters. It is oriented on real-time status of the assets, user tracking, damage reporting, and features which are not pronounced with most of existing instruments.

2.3. REQUIREMENT OF PROPOSED SYSTEM

1. **Real-Time Asset Monitoring**

   The system should be capable of showing current ICT assets status such as functional, broken, repair status, or under vendor's action to enable TSM-IT staff to get an overview of the available status of all assets.

2. **Role-Based Access Control**

   Different rights would be required based on the user (admin, technician, registrar, general user), only certain users with the appropriate role could do sensitive tasks like changing lab booking status or updating repair status.

3. **Damage Reporting and Repair Tracking**

   It is survivable by the users who can report the damaged assets and technicians who can update repair status and add notes to reflect the entire history of the repair.

4. **User and Ownership Management**

   In the system, the asset should be allocated to the users, and record the history of the ownership change so that it can be accountable and referenced.

5. **Lab Booking Functionality**

   Users should be entitled to book the use of lab with due purpose and due date. Admins or technicians should be able to handle approvals and make them valid to prevent double booking.

6. **Report Generation**

   The system should be able to generate reports in PDF, and Excel formats, and the report can be filtered according to the type of assets, year, status, department, and other quantities.

7. **Audit Trail Logging**

   Internal audit log should be kept to trace major activities like addition, editing or deletion of data to give transparency to the system and accountability.

8. **User-Friendly Interface**

   All types of users should find the interface simple and easy to use, with clear navigations and labeling to cut the time of learning and making mistakes with entering's.

CHAPTER 3

METHODOLOGY

3.1. DATA COLLECTION

The data collected was to understand the needs of the users and to know the limitations of the current asset management process. In this project, information was collected using several methods.

Firstly, the way the current SPAIB system was used by TSM-IT staff was observed. This highlighted the shortcomings of the lack of fault detection, real-time asset status and the ability to schedule time in the lab.

Secondly, informal interviews with the users of the system such as technicians and administration. Such discussions helped in determining some of the most important features which included role-based access, repair logging and creation of PDF/Excel reports.

Finally, a document analysis was also conducted where forms and record cards were reviewed in asset registration and asset lab booking as well as fault reports. This was able to identify the data fields required in the new system.

These methods provided findings that were used to design a system that was more efficient and friendly to the daily operations of the department.

3.2. DEVELOPMENT TOOLS AND TECHNOLOGIES

The ICT Asset Management System has been built with the help of various tools and components so that it can assist in system planning, user interface development, database modeling and report generation. The important modeling tools and components used in the project are as follows:

1.

Figure 3.2.1

PHP Language (with HTML/CSS/JavaScript)

Function: The main programming language used to develop the web-based system interface and backend logic, including form handling, user login, and report generation.

2.

Figure 3.2.2

phpMyAdmin

Function: It is a web-based database management program through which MySQL tables are created and managed. It offers you an opportunity of easy administration of the asset data, user accounts, damage reports, and lab bookings via an easy interface.

3.

Figure 3.2.3

XAMPP

Function: A local server setup that contains Apache, MySQL and PHP. It is applied to test and locally run the system in the development.

4.

Figure 3.2.4

draw.io

Function: A free diagram tool to create systems models as ERD (Entity Relationship Diagram), use case diagrams and project planning (Gantt chart).

5.

Figure 3.2.5

Visual Studio

Function: Function is a source code editor to write and organize files of the PHP, HTML, CSS and JavaScript. It facilitates live preview of the server as well as extensions of code.

6.

Figure 3.2.6

Google Chrome / Web Browser

Function: To test user interface of the system and make it compatible, responsive as well layout on devices.

7.

Figure 3.2.7

Microsoft Excel

Function: The functionality is to import in bulk data of assets and to export the system to generate

Excel files.

8. 

Figure 3.2.8

TCPDF Library

Function: Ruby-based library to create PDFs to book labs, write reports of the damage and lists of assets in the system.

9. 

Figure 3.2.9

Chart.js

Function: It is a JavaScript library which is used to generate dynamic chart like bar and pie charts on the system dashboard to depict asset statistics.

10. 

Figure 3.2.10

Bootstrap

Function: It is a front-end framework which makes the system mobile friendly and responsive across screen sizes.

CHAPTER 4

DESIGN AND IMPLEMENTATION

4.1 DESIGN

Design is a decisive step in the system development which assists in converting the needs of the user and operational requirements into a form of well-organized and workable solution. It supports a gap between users anticipation and the respective need satisfaction by means of the system characteristics and interfaces. An effective design is such that would make the final product efficacious, user friendly, serviceable, and modifiable to be subjected to future improvement.

In order to assist in the development of the ICT Asset Management System, a number of diagrams were also drawn so as to illustrate how the system operates- internally and externally, as well as how users are expected to treat them. Both structural and behavior aspects of the system were represented using Unified Modeling language (UML) and structural diagrams of the database.

The Use Case Diagrams were applied to demonstrate interaction of various user categories (admin, technician, registrar, and general user) with the main features including user login, asset registration, damage report, and ICT lab booking. To model the database in terms of entity relationship, Entity Relationship Diagrams (ERD) were used and there is a way that the different names of tables in the database, which include users, assets, bookings, and damage reports are interrelated. There were also important processes that were modeled by the use of flowcharts such as asset approval or tracking of repair.

These modelling tools made the design structure more organized, the communication between the developer and the user become clear, and the system could be implemented following a structure that is well understood.

4.1.1. UML USE CASE DIAGRAM

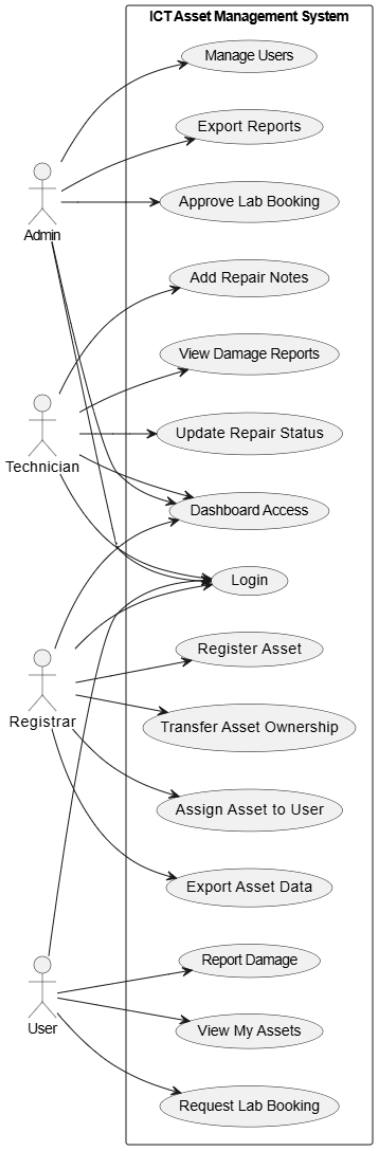

Figure 4.1.1.1

The Use Case diagram provides the basic interaction between the system users and the functions provided. Each user role is given specific tasks to guarantee role based, controlled access:

Admin

- To control users (add/edit/delete)
- Have access to all the system reports
- Export PDF/Excel files
- Confirm bookings of labs

Technician

- Read and modify damage reports
- Include repair notes
- Update repair of assets
- See statistics in dashboar

Registrar

- Register newly acquired ICT in order to establish ownership
- Assign uses assets
- Transfer of ownership of assets
- Export and filter-asset data

General User

- Load allocated assets
- Report broken stuff
- Book ICT laboratory

Every role allows specific functions to be performed by authorized users only and enhances system integrity and security of data.

4.1.2. ENTITY RELATIONSHIP DIAGRAM (ERD)

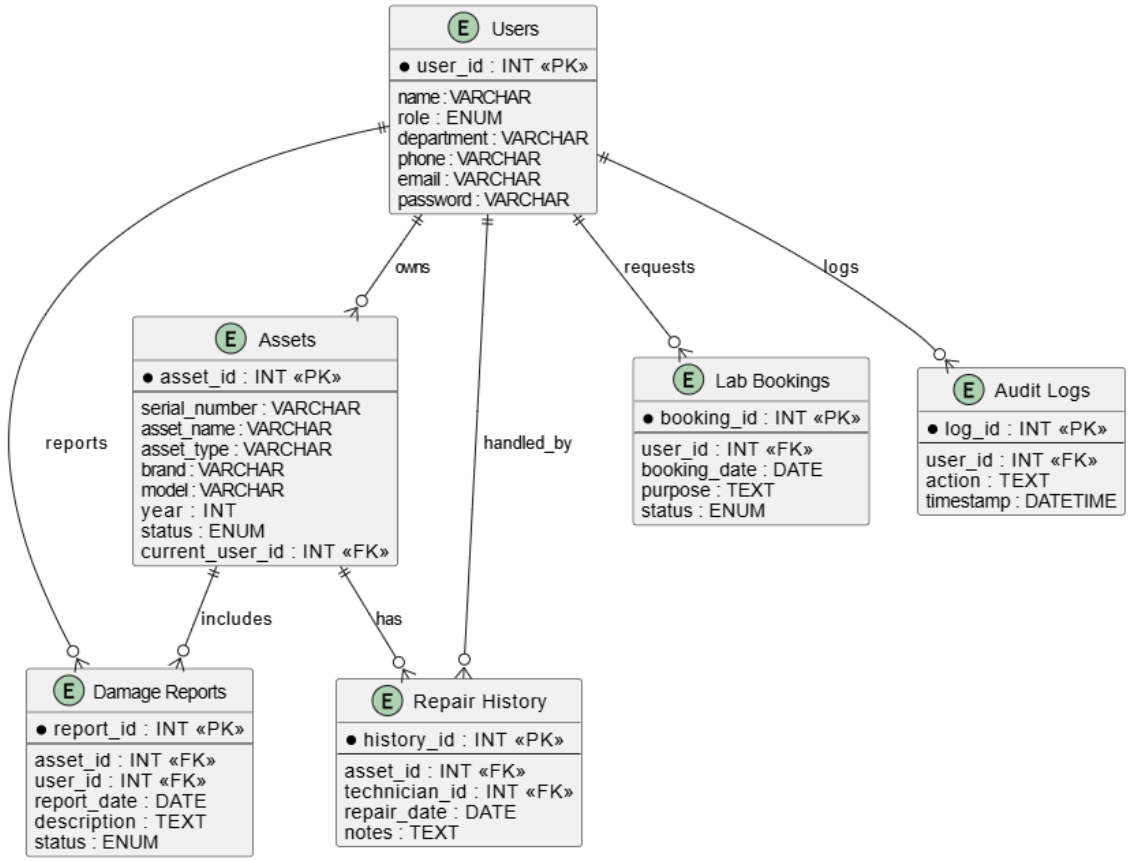

Figure 4.1.2.1

The following Entity Relationship Diagram (ERD) reflects the database design of the ICT Asset Management System written on behalf of Penang Contingent Headquarters. It determines the relationship between the major component in the system, thus making data well organized, properly referenced and consistent in relation.

1. **Entity: Users**

   Role:

   Stores the information of all the users of the systems including the admins and the technicians and the registrars and the general user. This is the body that takes care of user authentication as well as the level of access.

   Attributes:

- **user_id (Primary Key)**
- name, role, department, phone, email, password

2. **Entity: Assets**

   Role:

   Keeps information of all ICT devices, details, and their owners.

   Attributes:

   - **asset_id (Primary Key)**
   - serial_number, asset_name, asset_type, brand, model, year, status, current_user_id (Foreign Key to Users)

3. **Entity: Damage Reports**

   Role:

   Traces any reported problem or failure of the assets. Allows the user to report them and technicians to monitor and fix them.

   Attributes:

   - **report_id (Primary Key)**
   - asset_id (FK), user_id (FK), report_date, description, status

4. **Entity: Repair History**

   Role:

   Log repairs are actions of what has been done on a damage. This assists in the maintenance recording to be held at fault.

   Attributes:

   - history_id (Primary Key)
   - asset_id (FK), technician_id (FK), repair_date, notes

5. **Entity: Lab Bookings**

   Role:

   Receives requests by users to book ICT labs. Will contain information such as booking date, purpose and approval.

   Attributes:

   - booking_id (Primary Key)
   - user_id (FK), booking_date, purpose, status

6. **Entity: Audit Logs**

   Role:

   Archives all the critical system activity into accountability and security follow-ups.

Attributes:

- log_id (Primary Key)
- user_id (FK), action, timestamp

Relationship:

- A user can own multiple assets
- A user can report multiple asset issues
- Each asset can have many damage reports and repair history records
- A technician (user) can log multiple repairs
- A user can make lab booking requests
- All key user actions are recorded in the audit log

This ERD is the basis of the design of the database that can guarantee efficient management of all the data in a set of modules including asset registration, repair tracking and lab booking.

4.2 IMPLEMENTATION

ICT Asset Management System is a web-based PHP program written in HTML, CSS and JavaScript. Bootstrap was employed in the design of the interface to make it responsive and user friendly to all four user roles worker namely: administrator, technician, registrar, and user.

The system functionalities include registration of assets, damage lodgements, booking of labs, management of users and exportation of reports. These were carried out with backend logic in PHP and MySQL as the storage engine which was controlled by phpMyAdmin. The database design was based on the ERD design where the tables were connected by using primary keys and foreign keys.

Other libraries include Chart.js which was used in the dashboard statistics and TCPDF which is used to give PDF reports. Excel export was also considered wherein the PHP was used to power data export in the XLS and CSV file format.

Testing and development, by use of XAMPP, was locally and then it was transferred to live server which is available at http://ipkpg.zapto.org. Functionality, access control, and responsiveness were tested on the system, making it functional under all the roles and devices.

4.2.1 CODING

```php
<?php
session_start();
require_once '../config/db.php';

if ($_SERVER["REQUEST_METHOD"] == "POST") {
    $id = $_POST['user_id'];
    $password = $_POST['password'];

    $stmt = $conn->prepare("SELECT * FROM users WHERE user_id = ?");
    $stmt->bind_param("s", $id);
    $stmt->execute();
    $result = $stmt->get_result();
    $user = $result->fetch_assoc();

    if ($user && password_verify($password, $user['password'])) {
        $_SESSION['user_id'] = $user['user_id'];
        $_SESSION['role'] = $user['role'];
        $_SESSION['nama'] = $user['nama'];

        switch ($user['role']) {
            case 'admin':
                header("Location: ../pages/dashboard_admin.php");
                break;
            case 'juruteknik':
                header("Location: ../pages/dashboard_juruteknik.php");
                break;
            case 'pendaftar':
                header("Location: ../pages/dashboard_pendaftar.php");
                break;
            case 'pengguna':
                header("Location: ../pages/dashboard_pengguna.php");
                break;
            default:
                echo "Role tidak sah.";
        }
    } else {
        $error = "ID atau kata laluan tidak sah.";
    }
}
?>

<!DOCTYPE html>
<html lang="ms">
<head>
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta charset="UTF-8">
    <title>Login - Sistem ICT</title>
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css" rel="stylesheet">
    <style>
        html, body {
            height: 100%;
            margin: 0;
            padding: 0;
            background: url('../assets/img/ipk-pulau-pinang-3.jpg') no-repeat center center fixed;
            background-size: cover;
            font-family: Arial, sans-serif;
        }

        .login-container {
            background: rgba(255, 255, 255, 0.95);
            border-radius: 10px;
            padding: 40px 30px;
            box-shadow: 0 0 30px rgba(0,0,0,0.3);
            max-width: 400px;
            margin: auto;
            margin-top: 100px;
        }

        .login-container img {
            width: 90px;
            margin-bottom: 10px;
        }

        .btn-main {
            background-color: #003366;
            color: white;
        }

        .btn-main:hover {
            background-color: #002244;
        }

        .form-control {
            margin-bottom: 15px;
        }

        .button-group {
            display: flex;
            justify-content: space-between;
            margin-top: 15px;
        }
    </style>

    <style>
    @media screen and (max-width: 600px) {
        .login-container {
            width: 90% !important;
            padding: 10px !important;
            margin: 30px auto !important;
        }
        input[type="text"], input[type="password"], input[type="submit"] {
            font-size: 16px !important;
        }
    }
    </style>


    <style>
    html, body {
        height: 100%;
        margin: 0;
        padding: 0;
    }
    .login-container {
        position: absolute;
        top: 50%;
        left: 50%;
        transform: translate(-50%, -50%);
    }
    </style>

</head>
<body>

<div class="login-container text-center">
    <img src="../assets/img/pdrm-logo.png" alt="Logo PDRM" class="img-fluid">
    <h4 class="mb-3">SISTEM PENGURUSAN<br>ASET ICT</h4>
    <h5 class="mb-4">Ibu Pejabat Polis Kontinjen<br>Pulau Pinang</h5>

    <form method="POST">
        <input type="text" name="user_id" class="form-control" placeholder="No. ID Pengguna" required>
        <input type="password" name="password" class="form-control" placeholder="Kata Laluan" required>
        <button type="submit" class="btn btn-main w-100 mt-2">Login</button>
        <?php if (!empty($error)) echo "<div class='text-danger mt-2'>$error</div>"; ?>
    </form>
</div>

</body>
</html>
```

Figure 4.2.1.1

```php
<?php
$role = $_SESSION['role'];
$nama = $_SESSION['nama'];
$dashboardPage = 'dashboard_admin.php';
if ($role == 'juruteknik') $dashboardPage = 'dashboard_juruteknik.php';
elseif ($role == 'pendaftar') $dashboardPage = 'dashboard_pendaftar.php';
elseif ($role == 'pengguna') $dashboardPage = 'dashboard_pengguna.php';
?>

<div class="d-flex">
    <nav class="bg-dark text-white p-3" style="width: 250px; height: 150vh; overflow-y: auto;">
        <div class="text-center mb-3">
            <img src="../assets/img/pdrm-logo.png" alt="Logo PDRM" style="width: 70px;">
        </div>
        <h5 class="mb-4 text-center">Sistem Pengurusan Aset ICT</h5>
        <p class="mb-4 text-center">Selamat Datang, <?= htmlspecialchars($nama) ?></p>

        <ul class="nav flex-column">
            <li class="nav-item">
                <a class="nav-link text-white" href="<?= $dashboardPage ?>"><i class='bx bx-home'></i> Dashboard</a>
            </li>
            <li class="nav-item">
                <a class="nav-link text-white" href="profile.php"><i class='bx bx-user'></i> Profile Saya</a>
            </li>
            <li class="nav-item">
                <a class="nav-link text-white" href="aset_saya.php"><i class='bx bx-laptop'></i> Aset Saya</a>
            </li>
            <li class="nav-item">
                <a class="nav-link text-white" href="permohonan_makmal.php"><i class='bx bx-calendar'></i> Permohonan Makmal</a>
            </li>

            <?php if ($role == 'admin'): ?>
            <li class="nav-item">
                <a class="nav-link text-white" href="pengurusan_pengguna.php"><i class='bx bx-group'></i> Pengurusan Pengguna</a>
            </li>
            <?php endif; ?>

            <?php if (in_array($role, ['admin', 'juruteknik', 'pendaftar'])): ?>
            <li class="nav-item">
                <a class="nav-link text-white" data-bs-toggle="collapse" href="#asetSubmenu" role="button" aria-expanded="false" aria-controls="asetSubmenu">
                    <i class='bx bx-layer'></i> Pengurusan Aset
                </a>
                <div class="collapse" id="asetSubmenu">
                    <ul class="nav flex-column ps-3">
                        <li class="nav-item"><a class="nav-link text-white" href="daftar_aset.php"><i class='bx bx-plus-circle'></i> Daftar Aset</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="edit_aset.php"><i class='bx bx-edit'></i> Senarai & Kemaskini Aset</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="aset_lupus.php"><i class='bx bx-trash'></i> Aset Lupus</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="tukar_pengguna_aset.php"><i class='bx bx-transfer'></i> Tukar Pengguna Aset</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="import_aset.php"><i class='bx bx-upload'></i> Import Pukal</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="senarai_kerosakan.php"><i class='bx bx-wrench'></i> Senarai Kerosakan</a></li>
                        <li class="nav-item"><a class="nav-link text-white" href="laporan_kerosakan.php"><i class='bx bx-file'></i> Laporan Kerosakan</a></li>
                    </ul>
                </div>
            </li>

            <li class="nav-item">
                <a class="nav-link text-white" href="laporan_statistik.php"><i class='bx bx-bar-chart'></i> Laporan Statistik</a>
            </li>

            <li class="nav-item">
                <a class="nav-link text-white" href="pengurusan_profile.php"><i class='bx bx-cog'></i> Pengurusan Profile</a>
            </li>
            <?php endif; ?>

            <?php if ($role == 'pengguna'): ?>
            <li class="nav-item">
                <a class="nav-link text-white" href="lapor_kerosakan.php"><i class='bx bx-error-circle'></i> Lapor Kerosakan</a>
            </li>
            <?php endif; ?>

            <li class="nav-item mt-4">
                <a class="nav-link text-danger" href="../auth/logout.php"><i class='bx bx-log-out'></i> Log Keluar</a>
            </li>
        </ul>
    </nav>
```

Figure 4.2.1.2

```php
<?php
include '../includes/header.php';
include '../includes/sidebar.php';
require_once '../config/db.php';

// Kira jumlah aset ikut jenis
$jenis_query = $conn->query("SELECT jenis, COUNT(*) as jumlah FROM aset GROUP BY jenis");
$jenis_summary = ['Komputer Meja' => 0, 'Komputer Riba' => 0, 'Mesin Pencetak' => 0, 'Tablet' => 0];
$total_aset = 0;

while ($row = $jenis_query->fetch_assoc()) {
    $jenis = ucwords(strtolower($row['jenis']));
    $jumlah = $row['jumlah'];
    if (isset($jenis_summary[$jenis])) {
        $jenis_summary[$jenis] = $jumlah;
        $total_aset += $jumlah;
    }
}

// Kira status kerosakan dan baikpulih
$status_summary = [
    'Tindakan Baikpulih' => 0,
    'Dalam Tindakan Vendor' => 0,
    'Selesai Baikpulih' => 0,
    'Lupus' => 0
];

foreach ($status_summary as $status => $value) {
    $result = $conn->query("SELECT COUNT(*) as jumlah FROM aset WHERE status = '$status'");
    $status_summary[$status] = $result->fetch_assoc()['jumlah'];
}
$jumlah_rosak = array_sum($status_summary);
?>

<div class="container-fluid p-4">
    <h4 class="mb-4">Dashboard Admin</h4>

    <div class="row">
        <div class="col-md-6 mb-3">
            <div class="card bg-primary text-white" role="button" data-bs-toggle="modal" data-bs-target="#asetModal">
                <div class="card-body text-center">
                    <h5 class="card-title mb-1">Jumlah Aset ICT</h5>
                    <p class="card-text fs-4 mb-0"><?= $total_aset ?></p>
                </div>
            </div>
        </div>

        <div class="col-md-6 mb-3">
            <div class="card bg-danger text-white" role="button" data-bs-toggle="modal" data-bs-target="#rosakModal">
                <div class="card-body text-center">
                    <h5 class="card-title mb-1">Aset ICT Rosak</h5>
                    <p class="card-text fs-4 mb-0"><?= $jumlah_rosak ?></p>
                </div>
            </div>
        </div>
    </div>

    <!-- Modal: Jumlah Aset ICT -->
    <div class="modal fade" id="asetModal" tabindex="-1" aria-labelledby="asetModalLabel" aria-hidden="true">
        <div class="modal-dialog modal-lg modal-dialog-centered">
            <div class="modal-content">
                <div class="modal-header bg-primary text-white">
                    <h5 class="modal-title" id="asetModalLabel">Butiran Aset ICT</h5>
                    <button type="button" class="btn-close btn-close-white" data-bs-dismiss="modal" aria-label="Tutup"></button>
                </div>
                <div class="modal-body">
                    <div class="row text-center">
                        <?php foreach ($jenis_summary as $label => $val): ?>
                        <div class="col-md-6 mb-3">
                            <div class="card shadow-sm">
                                <div class="card-body">
                                    <h6 class="text-muted"><?= $label ?></h6>
                                    <h4><?= $val ?></h4>
                                </div>
                            </div>
                        </div>
                        <?php endforeach; ?>
                    </div>
                </div>
            </div>
        </div>
    </div>

    <!-- Modal: Aset ICT Rosak -->
    <div class="modal fade" id="rosakModal" tabindex="-1" aria-labelledby="rosakModalLabel" aria-hidden="true">
        <div class="modal-dialog modal-lg modal-dialog-centered">
            <div class="modal-content">
                <div class="modal-header bg-danger text-white">
                    <h5 class="modal-title" id="rosakModalLabel">Butiran Status Aset Rosak</h5>
                    <button type="button" class="btn-close btn-close-white" data-bs-dismiss="modal" aria-label="Tutup"></button>
                </div>
                <div class="modal-body">
                    <div class="row text-center">
                        <?php foreach ($status_summary as $label => $val): ?>
                        <div class="col-md-6 mb-3">
                            <div class="card shadow-sm">
                                <div class="card-body">
                                    <h6 class="text-muted"><?= $label ?></h6>
                                    <h4><?= $val ?></h4>
                                </div>
                            </div>
                        </div>
                        <?php endforeach; ?>
                    </div>
                </div>
            </div>
        </div>
    </div>

    <!-- Charts -->
    <div class="row mt-4">
        <div class="col-6 mb-5">
            <div class="card">
                <div class="card-header">Carta Bar: Jumlah Aset Mengikut Jenis</div>
                <div class="card-body">
                    <canvas id="asetChart"></canvas>
                </div>
            </div>
        </div>
        <div class="col-5 mb-4">
            <div class="card">
                <div class="card-header">Carta Pai: Pecahan Status Aset</div>
                <div class="card-body">
                    <canvas id="statusChart"></canvas>
                </div>
            </div>
        </div>
    </div>
</div>

<!-- Scripts -->
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
<script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
<script>
const asetChart = new Chart(document.getElementById('asetChart'), {
    type: 'bar',
    data: {
        labels: <?= json_encode(array_keys($jenis_summary)) ?>,
        datasets: [{
            label: 'Jumlah Jenis Aset',
            data: <?= json_encode(array_values($jenis_summary)) ?>,
            backgroundColor: 'rgba(54, 162, 235, 0.7)'
        }]
    },
    options: { responsive: true, plugins: { legend: { display: false } } }
});

const statusChart = new Chart(document.getElementById('statusChart'), {
    type: 'pie',
    data: {
        labels: <?= json_encode(array_keys($status_summary)) ?>,
        datasets: [{
            data: <?= json_encode(array_values($status_summary)) ?>,
            backgroundColor: ['#ffc107', '#dc3545', '#007bff', '#28a745']
        }]
    },
    options: { responsive: true }
});
</script>

<?php include '../includes/footer.php'; ?>
```

Figure 4.2.1.3

CHAPTER 5

TESTING AND RESULT EVALUATION

5.1. TESTING

It was also tested to ensure that the ICT Asset Management System functionality was comprehensive and everything was well functioning and user friendly. The XAMPP form of testing was initially implemented on a local server, and this could then be tested by web browsers such as chrome in order to check the consistency of the layout and functionality. The entire user roles, that is, the admin, technician, registrar, and the user were all subjected to manual testing. All the key functions like the registration of assets, the reporting of damage, booking of the labs as well as the exportation of the reports had to be tested several times to make sure they were functioning as they should. Particular consideration was paid to role-based access, which guaranteed that the given user could access only the functions that concern his/her role. The operations of the databases were confirmed using the phpMyAdmin to ascertain whether the data was being saved and updated aptly. Small bugs such as form validation bugs and status display bugs were corrected on testing. Upon fine tuning, the machine passed through the stability test and was live deployed to the web server on http://ipkpg.zapto.org.

5.1.1. TESTING RESULT

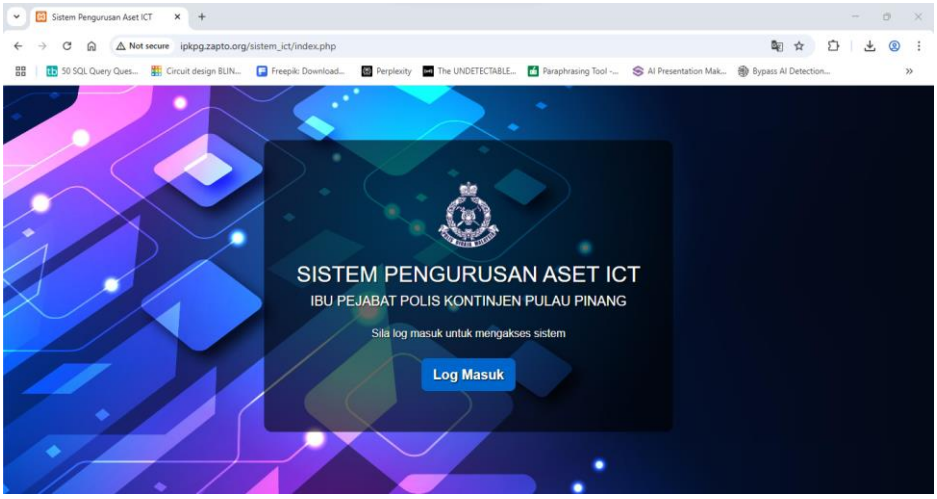

Figure 5.1.1.1.

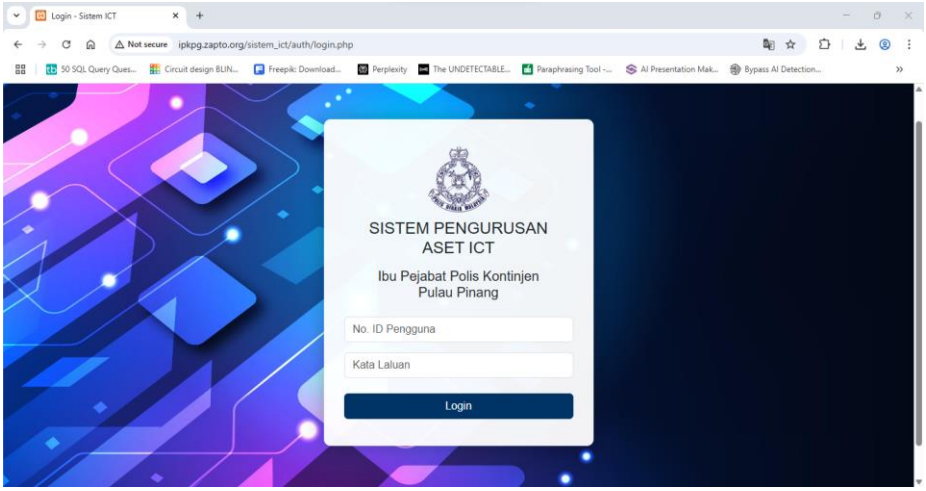

Figure 5.1.1.2.

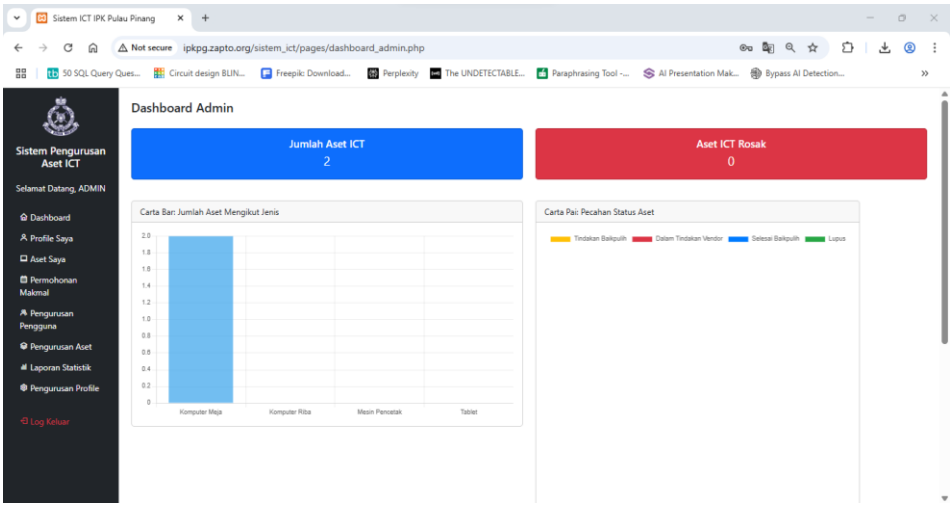

Figure 5.1.1.3

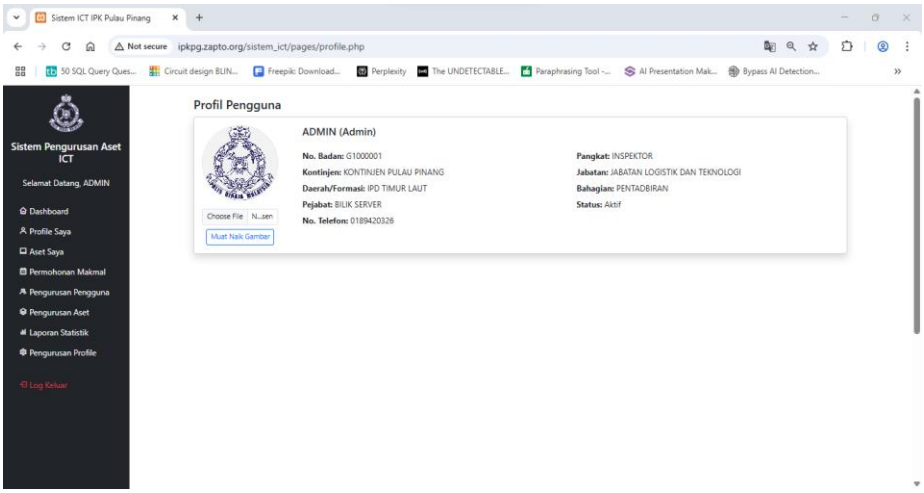

Figure 5.1.1.4

The ICT Asset Management System testing was positive as it proved that the system achieved its purpose conditions and worked consistently in all the modules. These functions are the most important, like asset registration, user logging in, reporting on damage, booking activities at the lab, and exporting reports, which were tested in sequence and analyzed separately, each of them successfully performed without any serious problems.

Role-based access control was effective as administration users had authority to make users, technicians had the right to change the repair status, registrars with authority to allocate assets, and common users were in a position to report damages and to book labs. Each position was designed with the appropriate restrictions in access.

Connection with the MySQL database through phpMyAdmin has been successful and all the functions of data addition, update, deletion and retrials are taken accurately in real time. Exported reports of PDF and XLS files all coincided with the value shown and they all came with correctly applied filters.

Such minor problems like missing field validation, inconsistency of status labels, etc were revealed during the initial testing stage. They were eliminated with the introduction of input checks and clarification of data presented logistics. Once combination was done, fixes and it worked fine, and it was ready to go into production.

5.2. EVALUATION RESULT

Adoption evaluation of the ICT Asset Management System was carried out to identify the response effectiveness, reliability, and capability of supporting the operational requirements of the TSM-IT division. The system has managed to achieve the key targets with regard to testing and user opinion and provides a set of features that make it easier to manage ICT assets by utilizing a clean interface and easy to understand role-based operations.

The system did good assessment. The ability to register the assets, report damages, book labs, export reports became easy to users. It was user-friendly, very easy to navigate and the functions it performs were clearly labeled, and non-technical users could use it as well.

Technically, the system was receptive and had quick data handling. The effort to fit in the MySQL database element also made sure that there were no mistakes in the updates, destructions, and interrogations. Report generation by PDF and excel also worked well by providing useful reports to keep records and audit.

Aspects such as real-time tracking of the status of the assets, history of repairs, ownership of assets and system access were all addressed and all the major objectives that have been set at the planning stage were achieved in implementing the system. The system lacks features such as automatic notifications, barcode scanning, etc.; however, it works very well on the planned scale and can be extended in case of necessity.

In the broad sense, the system offers a realistic, stable, and easy-to-use method of managing ICT assets within a government set-up, and especially concurrent with the path of work and needs of the Penang Contingent Headquarters.

CHAPTER 6

RECOMMENDATION AND CONCLUSION

6.1. RECOMMENDATION

1. **Enhance Asset Tracking with Barcode/QR Code Integration**

   Putting into operation barcode or QR code reader would enhance the quality and velocity of assets registration and status update. Physical devices could be scanned with labels to retrieve a record or change asset status without the need to put hands on the asset, and large-scale inventory operations could be simplified by using devices to eliminate human error.

2. **Add Notification and Alert System**

   They may add a notification block that would inform the users of upcoming lab resolutions, the status of damaged equipment, or approval change. This would enhance the interaction between the user and the technicians and less follow-up would be done manually.

3. **Integrate Approval Workflow for Asset Movement**

   The introduction of formality to the process of transfer of an asset between users or departments would realize greater control. Any request on transfer, when logged, might be approved by an administration or registrar and updated in the system.

4. **Improve Dashboard Customization**

   Although the main statistics of interest are already presented in the dashboard, customizability of the charts presented or filtering by departments or by years would enhance usability and pertinence to the actual user (in particular to the technicians and the registrars).

5. **Add Audit Trail Export and Filtering**

   The audit log already records everything done by users however it would be more useful by filtering the records by either date, user or type of action and also allow the audit log to be exported which would make it more applicable in internal audits and review of incidents.

6. **Enhance User Profile with Permissions and Photo**

   Other controls of permissions and profile photos can be added to the user profile. This aids in identity of users and enhances the ability of tracking in a system systemically more so in a big organization envisaging the police department.

7. **Introduce Mobile-Friendly Progressive Web App (PWA)**

   As much as the current system is responsive, changing it into Progressive Web App would enable mobile users to install the system on their phone to go offline and provide a more available system at the time of a field inspection or repair.

6.2. CONCLUSION

In conclusion, the ICT Asset Management System established at the Penang Contingent Headquarters is effective in overcoming the basic issues faced by the TSM-IT section in terms of managing and monitoring ICT assets. The system encompasses all the necessary features and is a practical, easy-to-use solution for organizations in the areas of real-time asset tracking, fault reporting, laboratory booking, user management and role-based authorization access control.

The project development is a well-planned project that has its beginning through design, planning, implementation and testing. At each stage, it has ensured that the system is user-friendly, responsive and secure. The fact that reporting facilities are built in, including audit logs, and dashboard statistics also makes the system more usable and efficient.

Although it can be enhanced in the future, it does not underperform its requirements, and thus, the given version of the system can be implemented as a tool that will help organizations improve the quality of asset management and the effectiveness of its operations.

REFERENCE:

1. Chart.js. (n.d.). Simple yet flexible JavaScript charting for designers & developers. Retrieved from https://www.chartjs.org/

2. TCPDF. (n.d.). PHP class for generating PDF documents. Retrieved from https://tcpdf.org/

3. Bootstrap. (n.d.). Build fast, responsive sites with Bootstrap. Retrieved from https://getbootstrap.com/

4. phpMyAdmin. (n.d.). phpMyAdmin – A web interface for MySQL and MariaDB. Retrieved from https://www.phpmyadmin.net/

5. PHP Manual. (n.d.). PHP: Hypertext Preprocessor. Retrieved from https://www.php.net/manual/en/

6. W3Schools. (n.d.). PHP Tutorial. Retrieved from https://www.w3schools.com/php/

7. SPAIB – Sistem Pengurusan Aset IPK Bukit Aman. (2024). Aset PDRM – Sistem Pengurusan Aset Bersepadu. Retrieved from https://spaib.rmp.gov.my/

8. draw.io. (n.d.). Diagramming for development teams. Retrieved from https://www.diagrams.net/

9. Visual Studio Code. (n.d.). Code editing. Redefined. Retrieved from https://code.visualstudio.com/

10. XAMPP. (n.d.). Apache Friends – XAMPP for local web development. Retrieved from https://www.apachefriends.org/