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COMMUNICATION TECHNOLOGY



DIPLOMA IN INFORMATION TECHNOLOGY (DIGITAL TECHNOLOGY)

TECHNICAL REPORT PUO CLOUD (CLOUD BASED TRACKING SYSTEM)

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i. Task Summaries

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MUHAMMAD HAZIQ BIN ZULKURNAIN	Hardware Configuration (RFID & NodeMCU Module), Documentation, Prototype.

Table 1.0

ABSTRACT

The efforts required in achieving the desired efficient system can be affectively increased by the implementation of better designs. The Cloud base tracking system are used as an alternative create by us to give an option for Ungku Omar Polytechnic as medium and platform for student and staff alike the ability to posses a system that has the capabilities to smoothly enter a premise with a swipe of card that require little to no effort and time required to do so. The cloud base tracking system is an example of future possibilities that Ungku Omar Polytechnic could achieve. The advancement advantage of cloud base tracking system is by the amount of user or people using the system itself. It is operated by student and staff to complete the system goal. By using the system will achieve synchronous method that is linear and efficient.

The cloud base tracking system plays an important role in the changing cycle of technology advancement of the old as we head into the Industrial revolution such as I.R 4.0. By the help of this project we want to embrace the opportunity transition into digitalized lifestyle and reduce current manual jobs, to a less complicated – more efficient method.

The significance and purpose of this project is to provide a user friendly support for the existing manual method to make the operation easier, safer and more reliable in order to reduce current covid-19 health risks.

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1.0 PROJECT PLAN

1.1 Introduction

The year 2020 has been a year full with challenges, one of the most difficult challenge we yet to solve none other than the deadly global pandemic. Covid-19. While we wait for a cure to be developed, **WHO** conclude another solution to combat the deadly pandemic. Various restriction added to our routine such as usage of QR Code Scanner to reduce physical contact, Social Distancing that lower the chances of spreading of the disease.

The Malaysian Government issued the practice of Social Distancing (Penjarakan Fizikal) back by Malaysia Ministry of Health (**MOH**). This new norm of lifestyle allows us to continue our daily task and work while combating the global pandemic. Primarily the students are allowed back into the campus and continue to advance in their studies while also following the guidelines provided by the government.

There is a saying by Benjamin Franklin that say “*An ounce of prevention is worth a pound of cure.*” Inspired by those words, we came out with an idea to create **PUO Cloud** a ‘Cloud Based Tracking System’. An offline alternative solution to the existing “MySejahtera App”. This system integrated with the norm usage of RFID allow us to able to track with an in depth look of the route of students take to their respective classes. Our system allows to show the logs of students originate from which class and headed. Should the traffic of an area is congested with students, students will be alerted by the system that the area they are headed to is packed with other students and reminded to practice the social distancing.

1.2 Problem Statement

It is stated by the government the mandatory usage QR Code Scanner when a person enters a premise, with the help “MySejahtera App” this allow of log of a person travels. This app offers a quick and efficient way of checking in. This also followed the new lifestyle of social distancing and reducing the physical contact of a person with other objects.

But what would happen if given under certain circumstances that apps failed or a student is unable to Scan QR Code to check into classes and in the campus. An apps that’s too dependent into Internet connection and many students doesn’t always have connection to internet. We will to resort back to the method of writing the information on a paper and risk the chance of infected with various people using the same pen and paper.

With that said we can clearly see that we do not have another solution of Checking-in that still maintain the Social Distancing lifestyle and reduce physical contact with other foreign objects. A solution that offers efficient and fluid Checking-in to premises.

1.3 Objectives of Project

Here are the objectives of Cloud Based Tracking System.

1. To create a System that enable checking into premises without the use of Internet Connection.
2. To create a system that helps lecturers to track the origin of a students.
3. To test an offline alternative to existing apps.

1.4 Scope of Project

For everyone who want to use this PUO Cloud Based Tracking System, it is divided by two scope which are user and system scope.

1.4.1 User

- i. Students of Polytechnic Ungku Omar.

1.4.2 System

- i. Verification of a students with the usage of existing RFID and Barcode.
- ii. Allow lectures to interact with the system to see the students travel log.
- iii. Display the route of students have taken.

1.5 Literature Review

Nowadays, many of revolution that happen to our world. Accordingly, every day there is a development of something new. The main purpose of these project is to develop a system that offers and alternative solution to existing apps the checking in into premises while alerting students if an area is congested with other students. The target audience of the project that is to be developed are the Students of Polytechnic Ungku Omar whom aren't always have a stable Internet Connection, Apps failure and those who in that current time does not poses a smart phone to checking into premises.

1.5.1 Research definition

1.5.1.1 RFID

Radio frequency identification (RFID) uses electromagnetic fields to automatically identify and detect tags affixed to an object. RFID tags consist of small radio transponders that are radio receivers and transmitters. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader, the tag sends digital data, usually an identifier inventory number, back to the reader. This number can be used to track. RFID reader also not required internet connection.

1.5.1.2 NodeMCU (Arduino)

NodeMCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. Since NodeMCU is an open-source platform, its hardware design is open for edit/modify/build. With NodeMCU we can make the system wireless and more portable. It's will directly connect to database system.

1.5.1.3 Database

A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a database management system (DBMS). Together, the data and the DBMS, along with the applications that are associated with them, are referred to as a database system, often shortened to just database. Database can be used to track and store all information of the user.

1.5.1 Case Study

1.5.1.1 Mysejahtera Apps

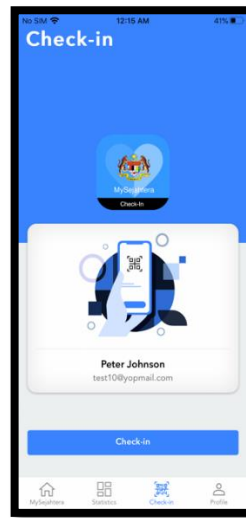


Figure 1.1 Mysejahtera Apps

For the literature review we chose the “Mysejahtera” Apps, Polythenic Ungku Omar Student Card, RFID Scanner and Barcode Scanner. This end-product provides the way of the project and how we will use it as a review to produce our project. Based on the observation, we have found out that some parts of it are related to our project. An application developed by the Government of Malaysia to assist in managing the COVID-19 outbreaks in the country. It allows users to perform health self-assessment on themselves and their family members. The users can also monitor their health progress throughout the COVID-19 outbreak. Also, MySejahtera enables the Ministry of Health (MOH) to monitor users’ health condition and take immediate actions in providing the treatments required.

ADVANTAGES	DISADVANTAGES
➤ Platform friendly (available on both IOS and Android platform)	➤ Internet subscription

1.5.1.2 Student Matric Card



Figure 1.2 Student Matric Card

Student matric card is proof of identity provided by the institution for any people in the campus claimed to be a student and also a method differentiating from other students and departments.

ADVANTAGE	DISADVANTAGE
<ul style="list-style-type: none"> ➤ Mandatory; Students of Polytechnic Ungku Omar are needed to always carry the card with them all the time while inside the campus 	<ul style="list-style-type: none"> ➤ Durability; The build quality of the card are made of plastic and thin, this is prone to breaks and snaps.
<ul style="list-style-type: none"> ➤ Availability; All students of Polytechnic Ungku Omar has their own unique Student Card 	<ul style="list-style-type: none"> ➤ Tempered; Any changes done onto the card is a violation to the institution rules.

1.5.1.3 RFID Reader

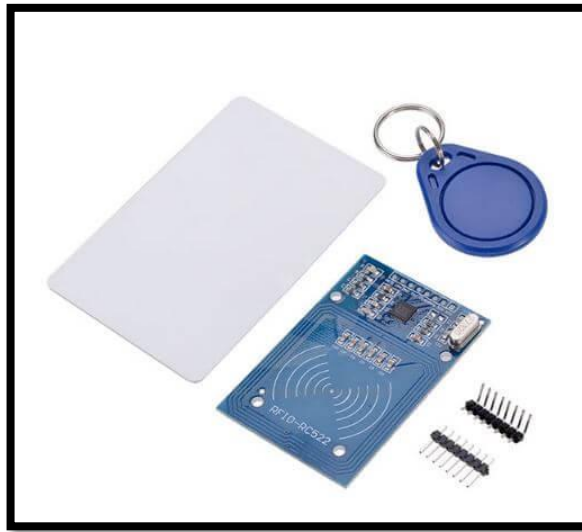


Figure 1.3 RFID Reader

A device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes.

ADVANTAGE	DISADVANTAGE
➤ Can scan multiple items at once	➤ Materials like metal & liquid can impact signal
➤ Can handle exposure to sun & rain	➤ Sometimes not as accurate or reliable as barcode scanners

1.5.1.4 Barcode Reader

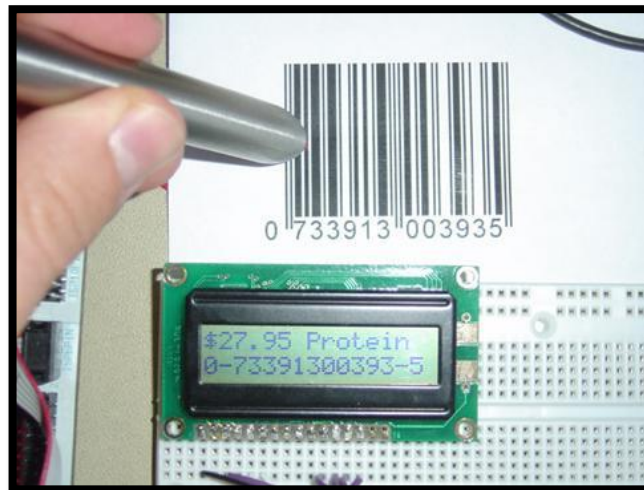


Figure 1.4 Barcode Reader

An optical scanner that can read printed barcodes, decode the data contained in the barcode and send the data to a computer.

ADVANTAGE	DISADVANTAGE
➤ Allows real time data to be collected accurately and rapidly with the help of barcode readers.	➤ Requires optical line of sight (LOS) scanning.
➤ Enables fast data entry operations with less errors.	➤ Less secure compare to RFID which can be easily forged.

1.5.2 The differences between the cases

System Function	MySejatera Apps	Student Matric Card	RFID Reader	Barcode Reader	PUO Cloud
Using card/ID	No	No	Yes	No	Yes
Notify user if the area is congest	No	No	No	No	Yes
Track user travel log	Yes	No	No	No	Yes
User can use it offline	No	Yes	Yes	Yes	Yes
Export data log of the user	No	No	No	No	Yes

1.6 Methodology

For methodology, we choose an incremental and iterative development process. This is because it is easy to use and can be improved if error occur. Furthermore, this process allows user approach where we users can experience and share their opinion about the product. The improvement and evaluation are easy to use because it is using an incremental prototype.

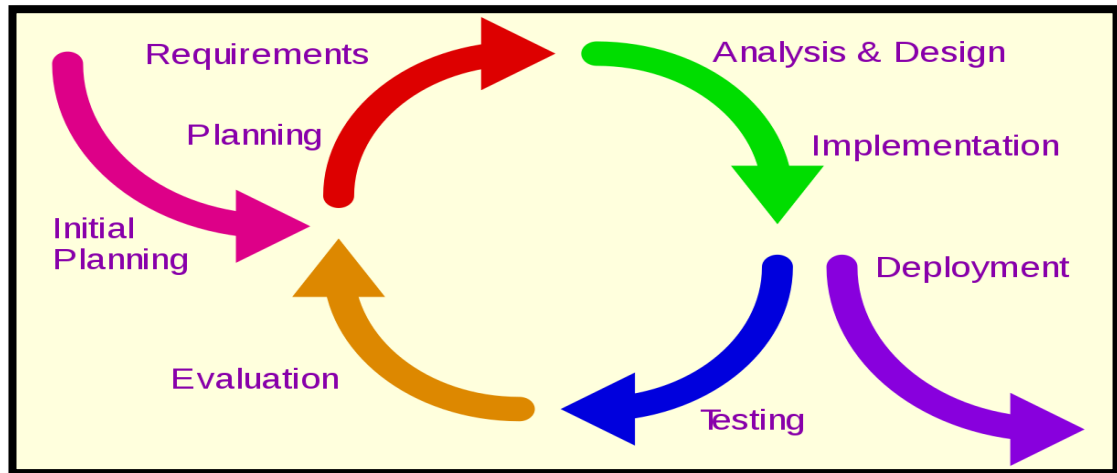


Figure 1.6.1 The System Design Life Cycle (SDLC) of Agile

1) Initial Planning

We plan what to do based on our research

For early planning for the development of the cloud based tracking system, a lot of opinion has been discussed. Planning phase has been made such as choose system title, the objective of system to be develop and identify the user scope of the project.

2) Requirements Planning

To obtain the objective in develop this product, users and analysts meet to identify objectives of the application or system and to identify information requirements arising from those objectives. This phase requires involvement from both groups. In the requirements planning phase, when information requirements are still being addressed, we make some observation on student travels routes. The orientation in this phase is toward overcome the problems. Although information technology and systems may even drive some of the solutions proposed, the focus will always remain on overcome vulnerabilities.

3) Analysis and Design

Evaluate the alternatives and prioritize the requirements.

The main objective in this phase is to understand the needs and the requirements of the system that can make easier for all the end users once research process has use to Gather, analyze, has validate the information. When all the system requirements for System has been collected, designing process will take place this can be done by define the requirements and design prototypes for new product.

4) Implementation

This phase is where the coding, programs, algorithms and module diagram of the project was develop. In this phase also, the actual prototype has been invented and will be used. Thus, the information that had been gathered in analysis and design phase will be recorded to achieved prototype target in a whole during this phase.

5) Testing

The primary purpose of the Test Phase is to determine whether the automated system or other IT solution developed is ready. During the Test Phase, formally focused on to uncover errors and bugs in the IT solution that need to be resolved. Additional tests may be conducted to validate documentation, training, contingency plans, disaster recovery, and installation depending upon the specific circumstances.

6) Evaluation

A systemic process that determines the quality and effectiveness of the designed instruction as well as the final product. In this process are occur after a bug has been discovered thus Upgrade and improve what is needed based on the result of the testing

7) Deployment

The deployment phase where the final phase of the process and puts the product into production. After we tests the product and the product passes each testing phase, the product is ready to go live for public use

1.7 Gantt Chart

WEEK/ PLANNING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.0 Initial Planning 1.1 Planning the project and title 1.2 Finding Supervisor 1.3 Student Registration Form															
2.0 Requirement Planning 2.1 Proposal Discussion 2.2 Prepare Project Proposal 2.3 Present and Submit Proposal 2.4 Information gathering															
3.0 Analysis and Design 3.1 Analysis the information 3.2 Start with the build of the hardware 3.3 Manage the software															
4.0 Implementations 4.1 Test it on a location															
5.0 Testing 5.1 Test on a real situation 5.2 Record the test															
6.0 Evaluation 6.1 Upgrade and evolve it															
7.0 Deployment 7.1 Deploy it on market															

2.0 REQUIREMENT SPECIFICATION

2.1 Functional Requirement

List a statement the project must do by module

2.1.1 User Requirement

User requirements describe often referred to as user needs, describe what the user does with the system, such as what activities that user must be able to perform. User requirement for (PUO CLOUD BASED TRACKING SYSTEM) is:

2.1.2 To generate student and staff information

This requirement for manage information that allows staff or administrator to update or adding new user.

2.1.3 To provide user with timely information

To facilitate the users to check an area of how many people have been there.

2.1.4 To generate daily or weekly report

The daily or weekly report is for track the origin of a students or staff.

2.1.5 To record information about user

The system must use to record information about users such as names, matric number, department, gender and contact number.

2.2 System Requirement Specification

System requirements are the configuration that a system must have in order for a hardware or software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems. System requirement for PUO Cloud Based Tracking System are:

2.2.1 Generate summary every week

On the last working day of each week, a summary about terminal area, date and time entry and out of student or staff shall be generated.

2.2.2 Automatically generate report

The system shall automatically generate the report for printing after 5:00 pm on the last working day of the week.

2.2.3 A report must be created for each terminal area

This report shall list all the data log about student and staff entry and out in each terminal area.

2.2.4 Restricted to authorized user only

Access to all reports must be restricted to authorized user listed on management access control list.

2.3 Non-Functional Requirement

2.3.1 Security

The system shall be designed with a level of security appropriate for the sensitivity of information enclosed in the database. More interaction is needed with client about the volatility of the information. The only requirements that could be implemented are encrypting the database and/or making the database password protected.

2.3.2 Reliability

Reliability is one of the key attributes of the system. Back-ups will be made regularly so that restoration with minimal data loss is possible in the event of unforeseen events. The system will also be thoroughly tested by all team members to ensure reliability.

2.3.3 Maintainability

The system shall be maintained by technician or delegated to another employee.

2.3.4 Portability

The system shall be designed in a way that shall allow it to be run on multiple computers with Microsoft Windows 10 Operating System.

2.3.5 Extensibility

The system shall be designed and documented in such a way that anybody with an understanding of SQL, phpMyAdmin & Apache shall be able to extend the system to fit their needs with the team's basic instructions.

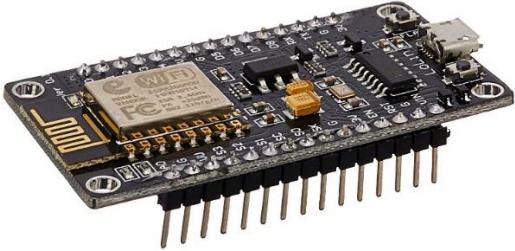
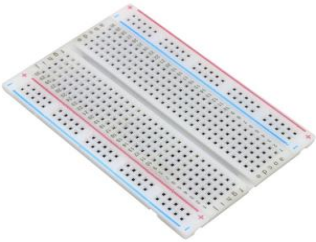

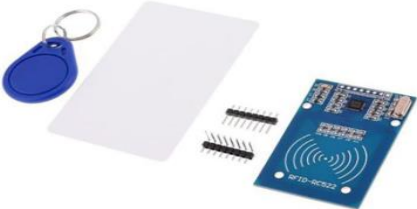

2.3.6 Reusability


The system should be designed in a way that allows the database to be re-used regularly for the various polytechnic institution that requires.

2.3.7 Serviceability

The maintenance of the system should be able to be sufficiently performed by any person with a basic understanding of SQL, phpMyAdmin & Apache.

2.4 Hardware and Software Requirement

No	Hardware	Cost
1	NodeMCU ESP8266 	RM 15.00 (x2)
2	Bread board 	RM 3.00 (x2)
3	Jumper cable 	RM 10 (Pack)
4	RFID Arduino sensor and RFID access card 	RM 9.00 (x2)
5	LED 	RM 1.00 (x2)

6		RM 20.00 (10x Pcs)
7	TOTAL	RM 83.00

NO	SOFTWARE	COST
1	Arduino Software (IDE)	Free Download
2	Google	Provide
3	phpMyAdmin	Free
4	MySQL	Free
5	XAMPP Server	Free

2.5 System Configuration

2.5.1 Arduino IDE version 1.8.13

We use Arduino IDE application to configure the nodeMCU hardware so the Arduino may respond and function the way we want it to be. For examples, we use the application to setup the system of the PUO Cloud Based Tracking System.

2.5.2 RFID scan

1. Need go to file then example and get the file MFRC522. The file MRFC522 should download before run the coding. After that, open the DumpInfo.

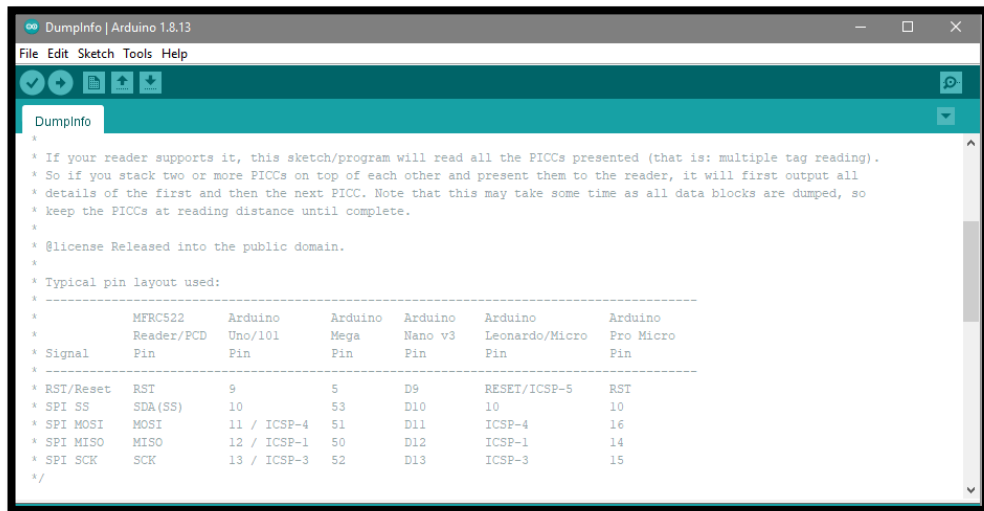
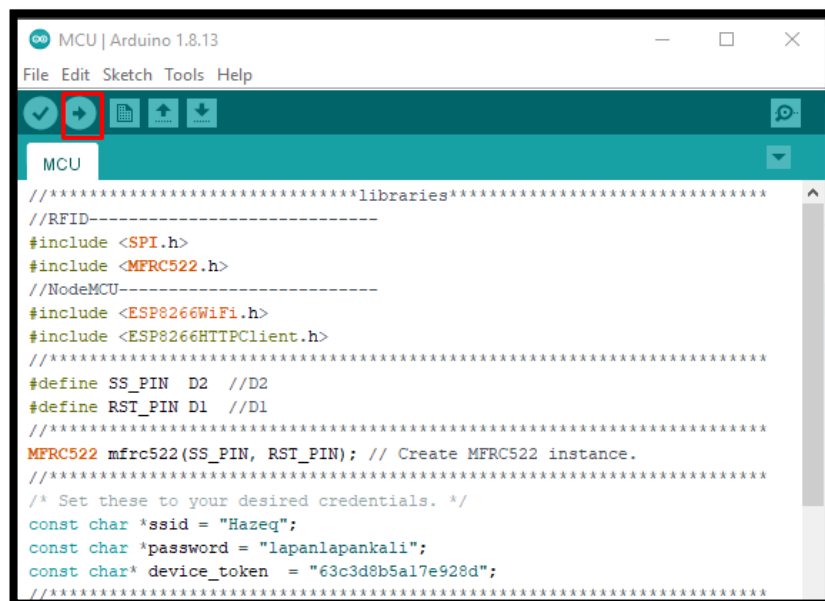


Figure 2.1 DumpInfo

2. Set the wireless SSID and password depends on the computer internet connection. Then compile the coding first then change the port to COM3. After that, click at upload.



```

//*****
String URL = "http://172.20.10.15/puocloud/getdata.php"; //computer IP or the server domain
String getData, Link;
String OldCardID = "";
unsigned long previousMillis = 0;
//*****

void setup() {
  delay(1000);
  Serial.begin(115200);
  SPI.begin(); // Init SPI bus
  mfrc522.PCD_Init(); // Init MFRC522 card
  //-----
  connectToWiFi();
}
//*****

void loop() {
  //check if there's a connection to Wi-Fi or not
  if(!WiFi.isConnected()){
    connectToWiFi(); //Retry to connect to Wi-Fi
  }
  //-----
  if (millis() - previousMillis >= 15000) {
    previousMillis = millis();
    OldCardID="";
  }
  delay(50);
  //-----
  //look for new card
  if ( ! mfrc522.PICC_IsNewCardPresent() ) {
    return;//got to start of loop if there is no card present
  }
  // Select one of the cards
  if ( ! mfrc522.PICC_ReadCardSerial() ) {
    return;//if read card serial(0) returns 1, the uid struct contains the ID of the read card
  }
  String CardID="";
  for (byte i = 0; i < mfrc522.uid.size; i++) {
    CardID += mfrc522.uid.uidByte[i];
  }
  //-----
}

```

Figure 2.2 RFID Code

3. If success, the message “connected will be shown at Serial Monitor.

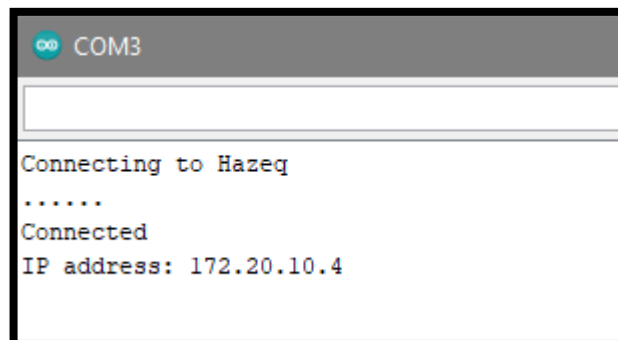


Figure 2.3 COM3

2.5.3 Database for PUO Cloud Base System

```
--
-- Database: `puocloud`
--
-----

--
-- Table structure for table `admin`
--
CREATE TABLE `admin` (
  `id` int(11) NOT NULL,
  `admin_name` varchar(30) NOT NULL,
  `admin_email` varchar(80) NOT NULL,
  `admin_pwd` longtext NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--
-- Dumping data for table `admin`
--

INSERT INTO `admin` (`id`, `admin_name`, `admin_email`, `admin_pwd`) VALUES
(1, 'Admin', 'admin@gmail.com', '$2y$10$89uX3LBy4mIU/DcBveQ11.32nSianDP/E1mfUh.Z.6B4Z0q13y7PK');

-----

--
-- Table structure for table `devices`
--
CREATE TABLE `devices` (
  `id` int(11) NOT NULL,
  `device_name` varchar(50) NOT NULL,
  `device_dep` varchar(20) NOT NULL,
  `device_uid` text NOT NULL,
  `device_date` date NOT NULL,
  `device_mode` tinyint(1) NOT NULL DEFAULT '0'
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

-----

--
-- Table structure for table `users`
--
CREATE TABLE `users` (
  `id` int(11) NOT NULL,
  `username` varchar(30) NOT NULL DEFAULT 'None',
  `serialnumber` text NOT NULL DEFAULT,
  `gender` varchar(10) NOT NULL DEFAULT 'None',
  `email` varchar(50) NOT NULL DEFAULT 'None',
  `card_uid` varchar(30) NOT NULL,
  `card_select` tinyint(1) NOT NULL DEFAULT '0',
  `user_date` date NOT NULL,
  `device_uid` varchar(20) NOT NULL DEFAULT '0',
  `device_dep` varchar(20) NOT NULL DEFAULT '0',
  . . . . .
```

```

    `device_uid` varchar(20) NOT NULL DEFAULT '0',
    `device_dep` varchar(20) NOT NULL DEFAULT '0',
    `add_card` tinyint(1) NOT NULL DEFAULT '0'
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

-----

--
-- Table structure for table `users_logs`
--

CREATE TABLE `users_logs` (
  `id` int(11) NOT NULL,
  `username` varchar(100) NOT NULL,
  `serialnumber` text NOT NULL,
  `card_uid` varchar(30) NOT NULL,
  `device_uid` varchar(20) NOT NULL,
  `device_dep` varchar(20) NOT NULL,
  `checkindate` date NOT NULL,
  `timein` time NOT NULL,
  `timeout` time NOT NULL,
  `card_out` tinyint(1) NOT NULL DEFAULT '0'
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--
-- Indexes for dumped tables
--

--
-- Indexes for table `admin`
--
ALTER TABLE `admin`
  ADD PRIMARY KEY (`id`);

--
-- Indexes for table `devices`
--
ALTER TABLE `devices`
  ADD PRIMARY KEY (`id`);

--
-- Indexes for table `users`
--
ALTER TABLE `users`
  ADD PRIMARY KEY (`id`);

--
-- Indexes for table `users_logs`
--
ALTER TABLE `users_logs`
  ADD PRIMARY KEY (`id`);

```

```
--  
-- AUTO_INCREMENT for table `admin`  
--  
ALTER TABLE `admin`  
  MODIFY `id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=2;  
  
--  
-- AUTO_INCREMENT for table `devices`  
--  
ALTER TABLE `devices`  
  MODIFY `id` int(11) NOT NULL AUTO_INCREMENT;  
  
--  
-- AUTO_INCREMENT for table `users`  
--  
ALTER TABLE `users`  
  MODIFY `id` int(11) NOT NULL AUTO_INCREMENT;  
  
--  
-- AUTO_INCREMENT for table `users_logs`  
--  
ALTER TABLE `users_logs`  
  MODIFY `id` int(11) NOT NULL AUTO_INCREMENT;  
COMMIT;  
  
/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;  
/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;  
/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;
```

Figure 2.4 Database SQL Code

2.5.4 User data log entry and out

1. Run this code into MySQL using phpMyAdmin

```
session_start();
<?>
<div class="table-responsive" style="max-height: 500px;">
  <table class="table">
    <thead class="table-primary">
      <tr>
        <th>ID</th>
        <th>Name</th>
        <th>Matric Number</th>
        <th>Card UID</th>
        <th>Department</th>
        <th>Date</th>
        <th>Time In</th>
        <th>Time Out</th>
      </tr>
    </thead>
    <tbody class="table-secondary">
      <?php
        //Connect to database
        require 'connectDB.php';
        $searchQuery = " ";
        $Start_date = " ";
        $End_date = " ";
        $Start_time = " ";
        $End_time = " ";
        $Card_sel = " ";

        if (isset($_POST['log_date'])) {
          //Start date filter
          if ($_POST['date_sel_start'] != 0) {
            $Start_date = $_POST['date_sel_start'];
            $_SESSION['searchQuery'] = "checkindate='". $Start_date. "'";
          }
          else{
            $Start_date = date("Y-m-d");
            $_SESSION['searchQuery'] = "checkindate='". date("Y-m-d"). "'";
          }
          //End date filter
          if ($_POST['date_sel_end'] != 0) {
            $End_date = $_POST['date_sel_end'];
            $_SESSION['searchQuery'] = "checkindate BETWEEN '". $Start_date. "' AND '". $End_date. "'";
          }
          //Time-In filter
          if ($_POST['time_sel'] == "Time_in") {
            //Start time filter
            if ($_POST['time_sel_start'] != 0 && $_POST['time_sel_end'] == 0) {
              $Start_time = $_POST['time_sel_start'];
              $_SESSION['searchQuery'] .= " AND timein='". $Start_time. "'";
            }
            elseif ($_POST['time_sel_start'] != 0 && $_POST['time_sel_end'] != 0) {
              $Start_time = $_POST['time_sel_start'];
            }
          }
        }
      </?php>
    </tbody>
  </table>
</div>
```

```

//End time filter
if ($_POST['time_sel_end'] != 0) {
    $End_time = $_POST['time_sel_end'];
    $_SESSION['searchQuery'] .= " AND timein BETWEEN '" . $Start_time . "' AND '" . $End_time . "'";
}
}
//Time-out filter
if ($_POST['time_sel'] == "Time_out") {
    //Start time filter
    if ($_POST['time_sel_start'] != 0 && $_POST['time_sel_end'] == 0) {
        $Start_time = $_POST['time_sel_start'];
        $_SESSION['searchQuery'] .= " AND timeout='" . $Start_time . "'";
    }
    elseif ($_POST['time_sel_start'] != 0 && $_POST['time_sel_end'] != 0) {
        $Start_time = $_POST['time_sel_start'];
    }
    //End time filter
    if ($_POST['time_sel_end'] != 0) {
        $End_time = $_POST['time_sel_end'];
        $_SESSION['searchQuery'] .= " AND timeout BETWEEN '" . $Start_time . "' AND '" . $End_time . "'";
    }
}
}
//Card filter
if ($_POST['card_sel'] != 0) {
    $Card_sel = $_POST['card_sel'];
    $_SESSION['searchQuery'] .= " AND card_uid='" . $Card_sel . "'";
}
}
//Department filter
if ($_POST['dev_uid'] != 0) {
    $dev_uid = $_POST['dev_uid'];
    $_SESSION['searchQuery'] .= " AND device_uid='" . $dev_uid . "'";
}
}
}

if ($_POST['select_date'] == 1) {
    $Start_date = date("Y-m-d");
    $_SESSION['searchQuery'] = "checkindate='" . $Start_date . "'";
}

// $sql = "SELECT * FROM users_logs WHERE checkindate=? AND pic_date BETWEEN ? AND ? ORDER BY id ASC";
$sql = "SELECT * FROM users_logs WHERE " . $_SESSION['searchQuery'] . " ORDER BY id DESC";
$result = mysqli_stmt_init($conn);
if (!mysqli_stmt_prepare($result, $sql)) {
    echo '<p class="error">SQL Error</p>';
}
else{
    mysqli_stmt_execute($result);
    $result1 = mysqli_stmt_get_result($result);
    if (mysqli_num_rows($result1) > 0){
        while ($row = mysqli_fetch_assoc($result1)){
            <?php
            <TR>
            <TD><?php echo $row['id'];></TD>
            <TD><?php echo $row['username'];></TD>
            <TD><?php echo $row['matricnumber'];></TD>
            <TD><?php echo $row['card_uid'];></TD>
            <TD><?php echo $row['device_dep'];></TD>
            <TD><?php echo $row['checkindate'];></TD>
            <TD><?php echo $row['timein'];></TD>
            <TD><?php echo $row['timeout'];></TD>
            </TR>
        }
    }
    // echo $sql;
    <?php
    </tbody>
    </table>
    </div>

```

Figure 2.5 User Log Code

2.6 Security Requirement

Security requirement is one of the most vital elements in security as it always have been applied to ensure the system security. Life in the 21st century is full of technological advancement and without security, all data or things could be exposed or illegally modified for other malicious intent.

2.6.1 Login required to access database

This project database will allow access for authorized user only. The database will be protected by login and password detail of the user. The password also will be encrypted for strengthen the security measure.

2.6.2 System hardening and monitoring

The security requirements deal with the primary security. The software should be handled by the administrator and authorized users. Only the administrator has right to assign permission like creating new accounts and generating password. Only authorized users can access the system with username and password.

2.6.3 Weatherproof casing for terminal

The casing for terminal will be weatherproof built. It will be long lasting and resistant to the effects of bad weather. This weatherproof casing will protect all electronic component inside the terminal and maintain it sustainability.

3.0 FINAL DESIGN

3.1 Logical Design

Before the development of the system is done, sketch of system design should be done in order to develop the system a more systematic and seamlessly.

3.1.1 High-level System Architecture Diagram

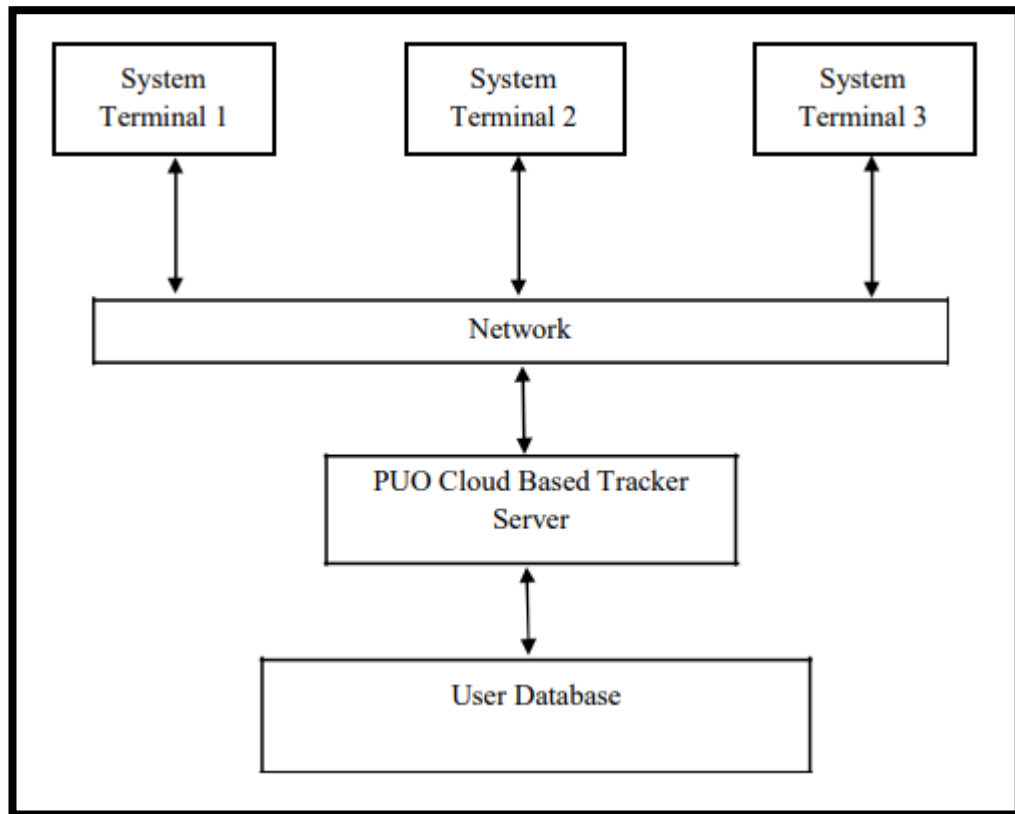


Figure 3.1 Organization of the PUO Cloud Based Tracker

3.1.2 System Server Architecture Diagram

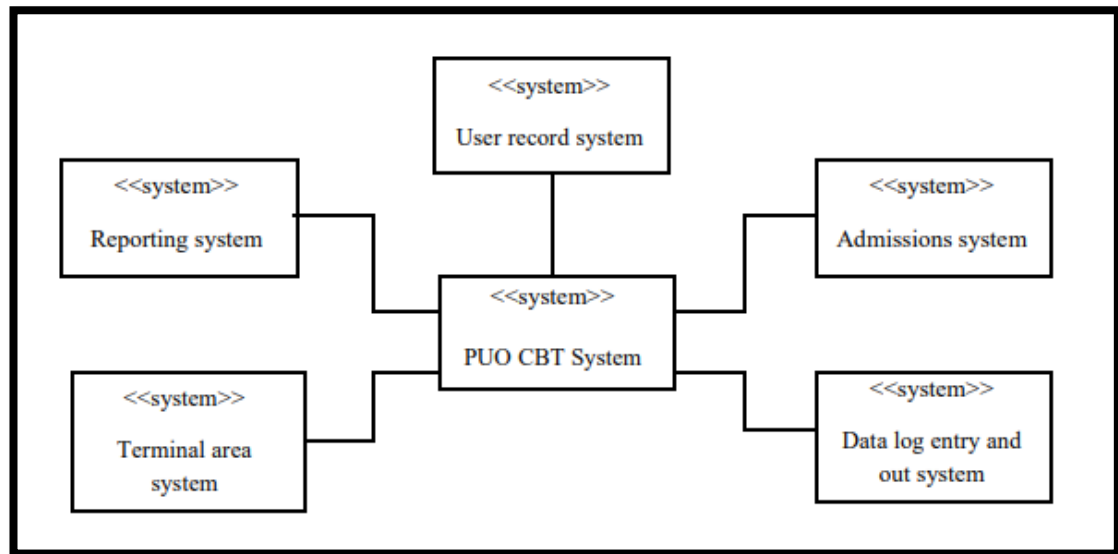


Figure 3.2 System Server

This diagram explains about the details in the system server. This system has been stored separately to several systems so that the server could get the results of the user asking for and the server has little chance to hang because the data has been separate in correct way

3.1.3 Flow Chart Diagram

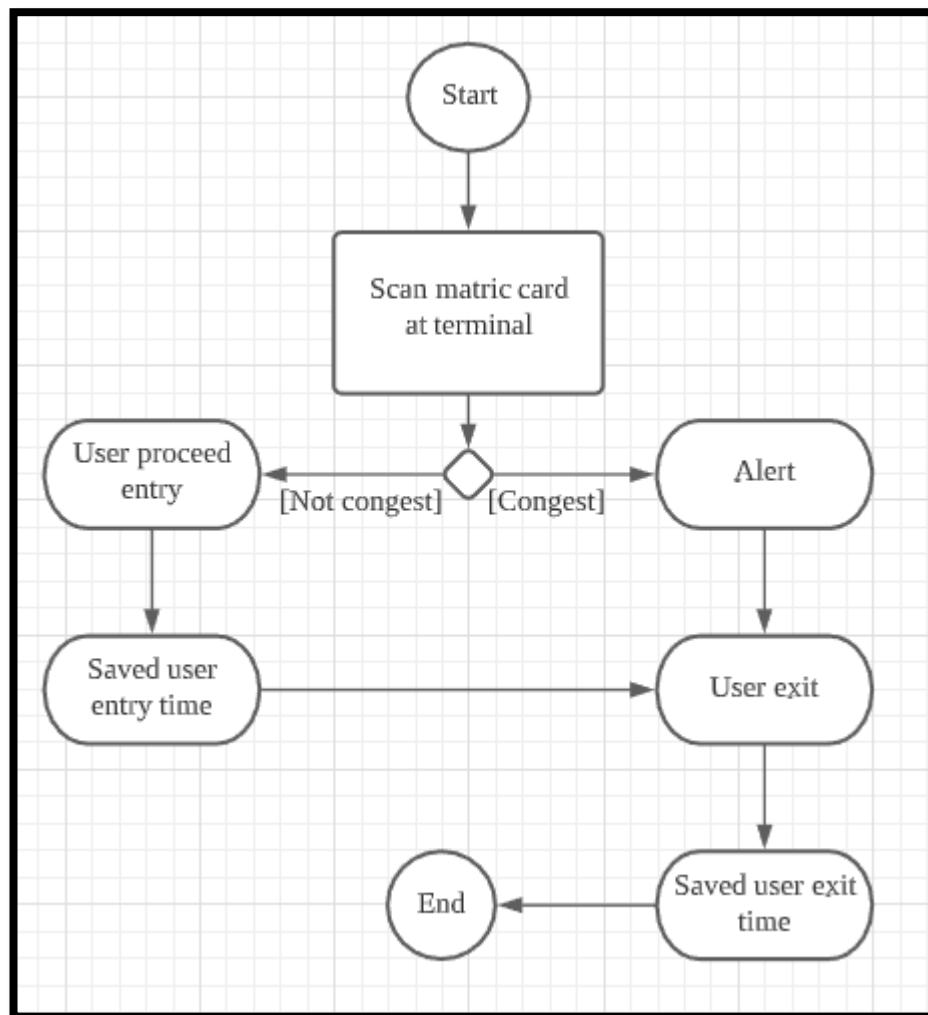


Figure 3.3 Flow Chart Diagram

3.1.2 Context Diagram

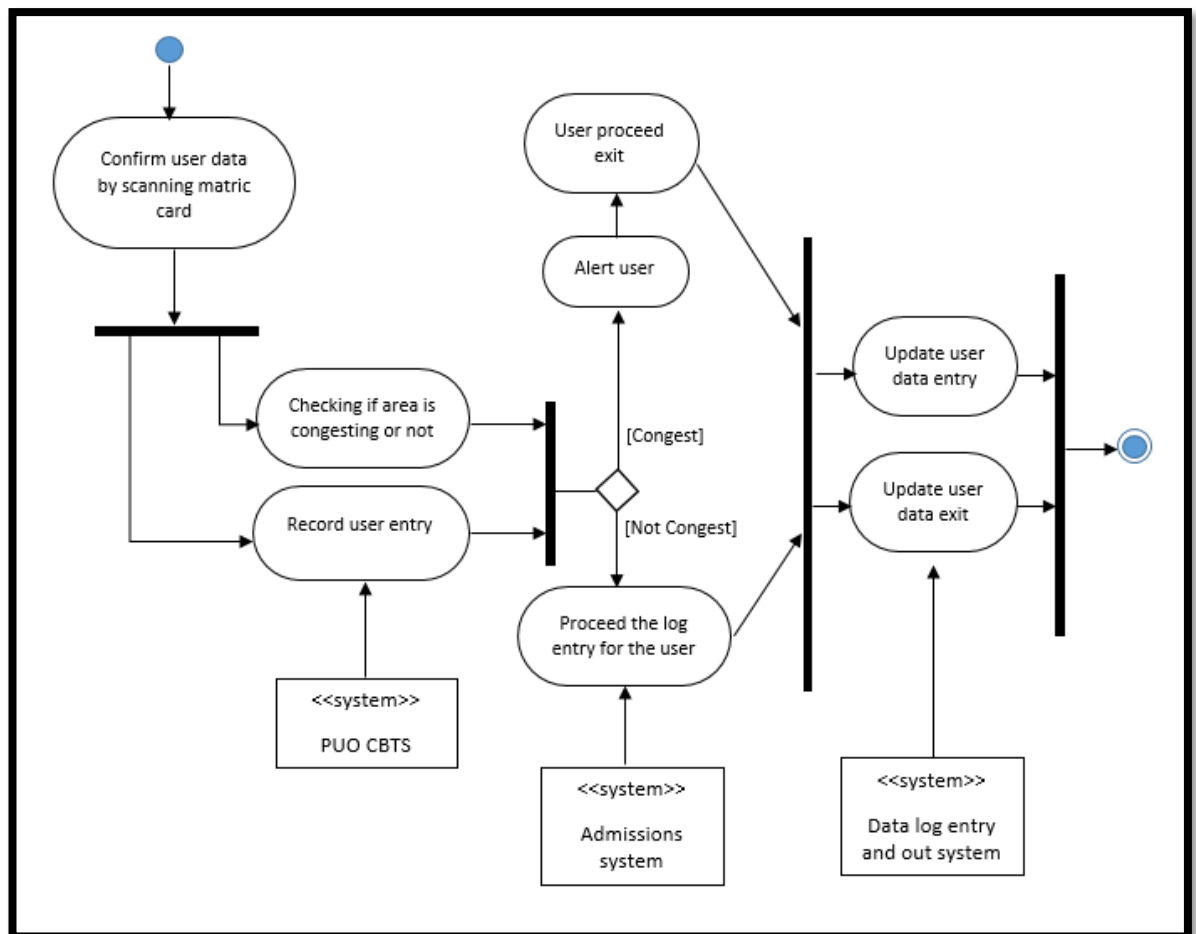


Figure 3.2 Context Diagram

3.1.3 Database Structure diagram

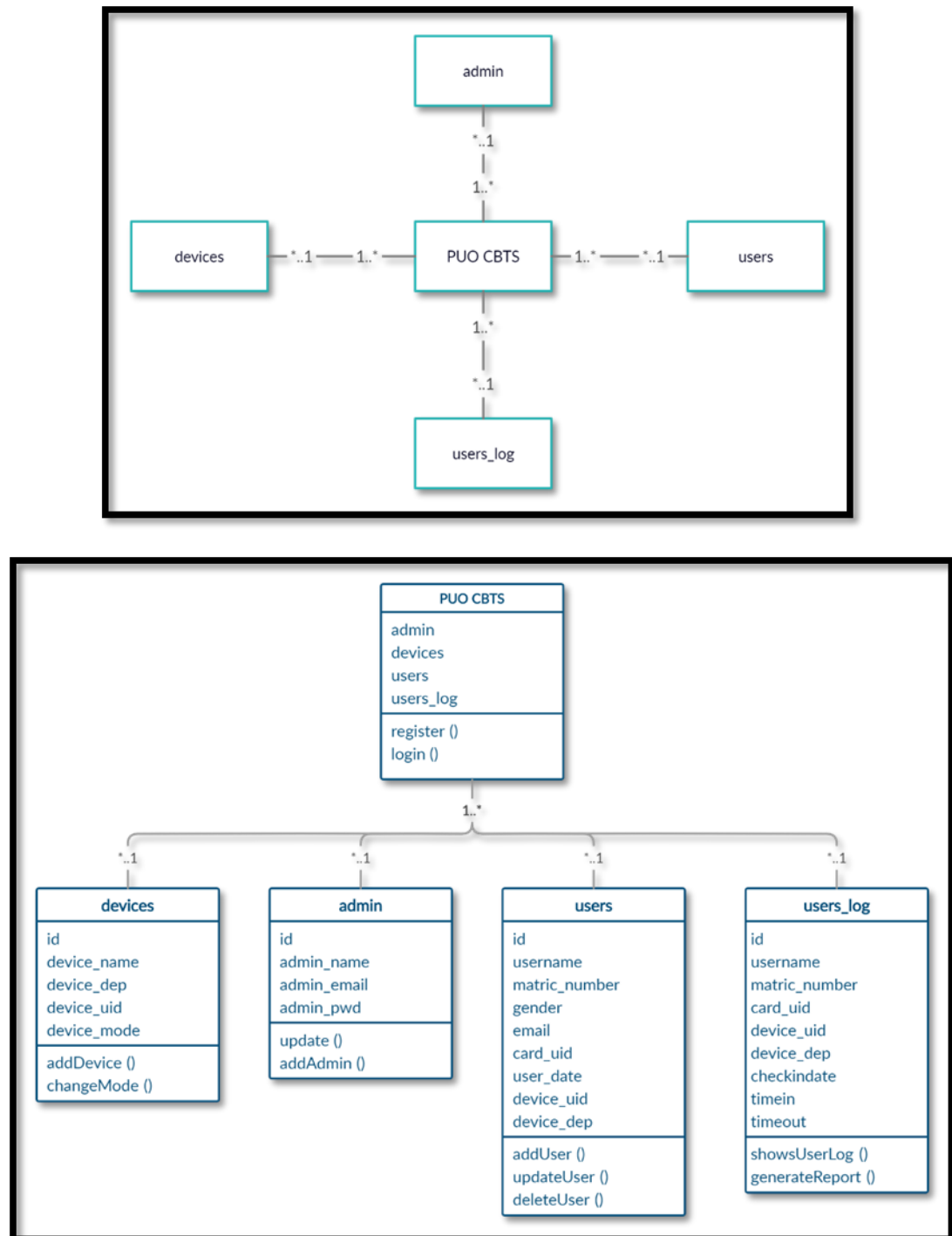


Figure 3.3 Database Structure Diagram

3.2 Physical Design

3.2.1 The circuit of RFID RC522.

- The RFID in this project is for authorized user from Ungku Omar Polytechnic that have matric card. It functioning to read information of the user for track the user location while on the Polytechnic.
- The RFID is located in front of the Terminal for scanning the matric card.

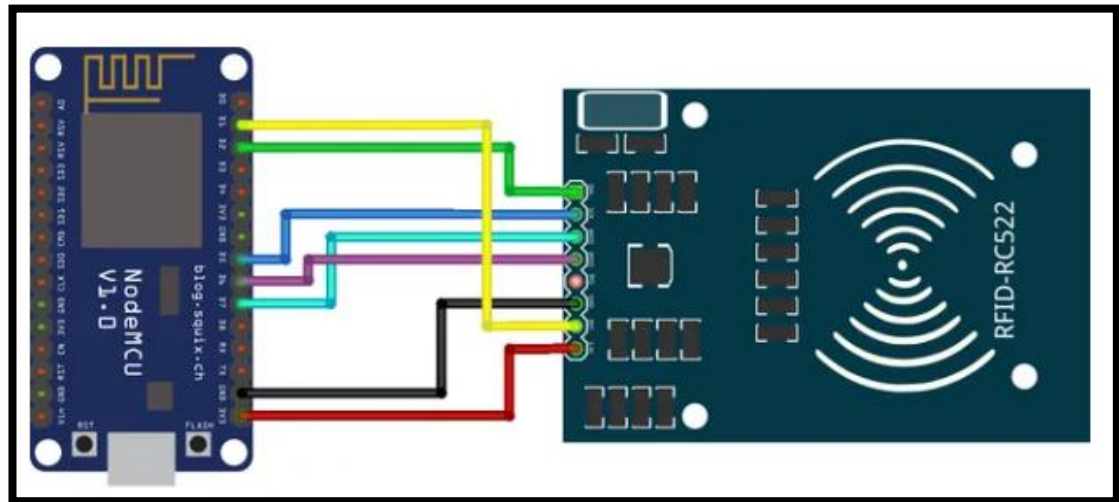


Figure 3.4 Circuit RFID with Node MCU

3.3 Prototype

3.3.1 Outside

- The figure 3.5 show description the outside of the system terminal
- Blue LED light to indicate if the user is successfully entry data or exit at their data log.
- The “scan here” is for user to scan their matric card.

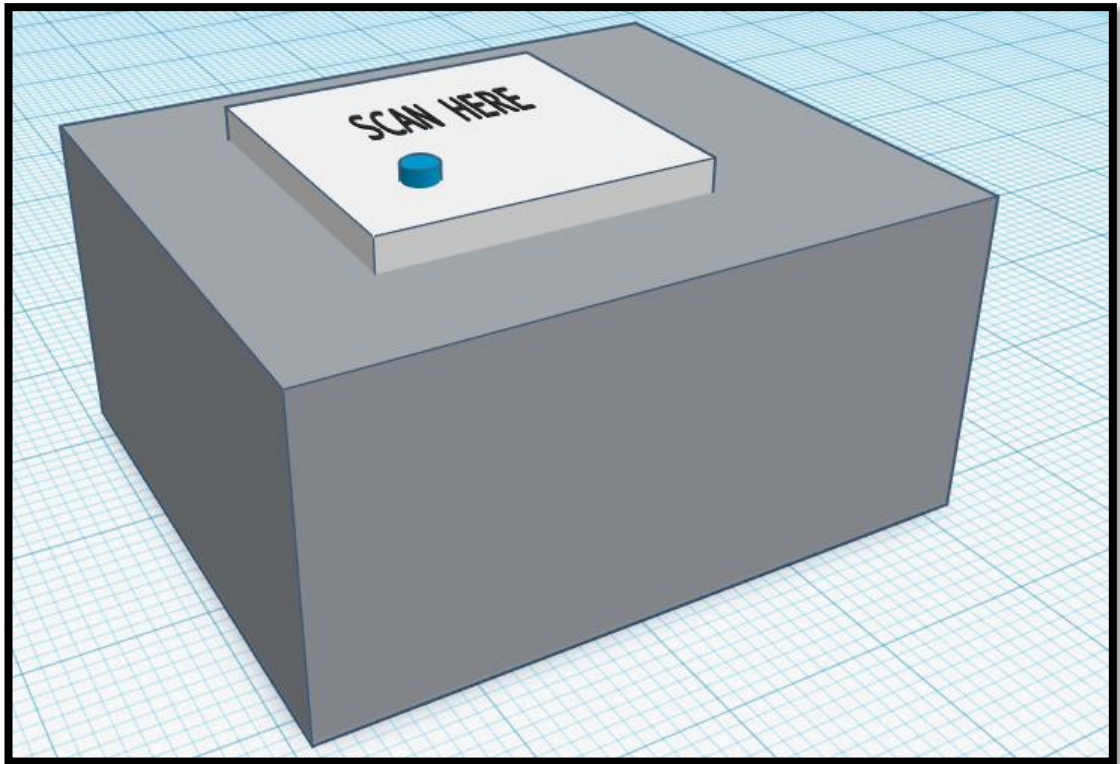


Figure 3.5 Outside of the PUO CBTS Terminal

3.3.2 Inside

- The red box at inside the box is indicate hardware NodeMCU.
- Yellow box indicates the position of the RFID RC522 is facing up.
- Blue circle is LED located beside the RFID scanner.

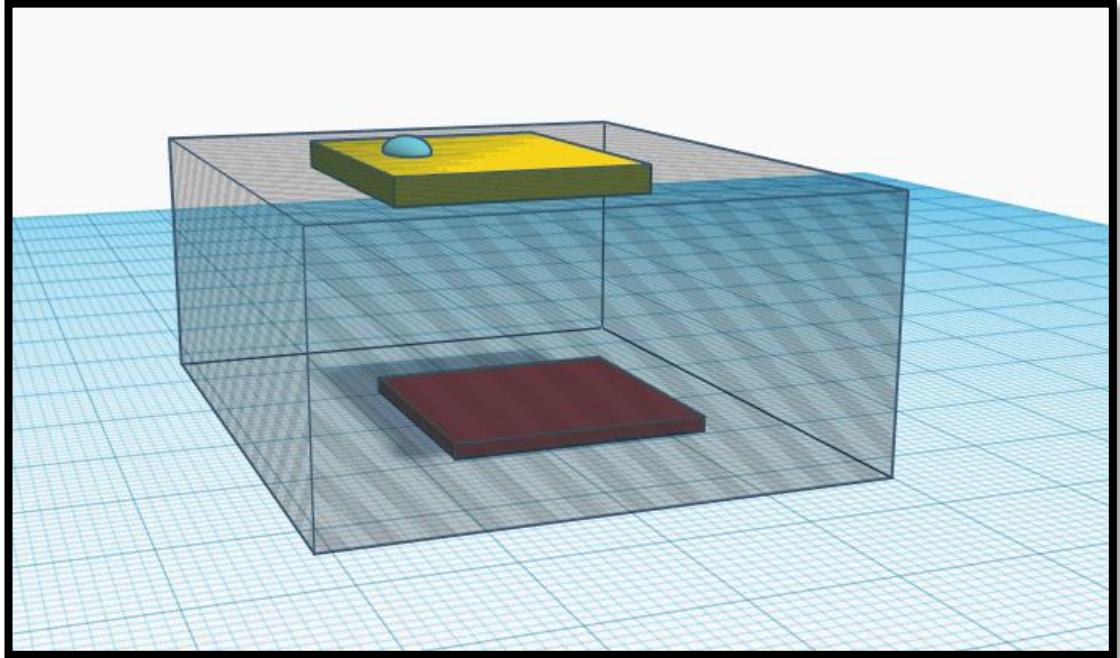


Figure 3.6 Inside of the PUO CBTS Terminal

3.3.3 Interface of the PUO Cloud Based Tracker System database.

- Figure 3.7 shows interface for login to the database
- Database is protected by user email and password



Figure 3.7 Database login

- In figure 3.8 shows all the user that have been register to the database.
- Shows user information such as matric number, gender, card id, register date and department.

PUO Cloud Tracker

Users

Manage Users

Users Log

Devices

Admin

Log Out

HERE ARE ALL THE USERS

ID NAME	MATRIC NUMBER	GENDER	CARD UID	DATE	DEPARTMENT
23 Nurain Ayyikn binti Kamal	191025	Male	7952997	2020-11-12	JTMK
22 Muhammad Fuad bin Razaid	192012	Male	23211183120	2020-11-12	JTMK
21 Nur Farhana binti Azema	181029	Female	819714127	2020-11-12	JTMK
20 Intan Aina binti Saad	181065	Female	8133205192	2020-11-12	JP
19 Imran bin Abdullah	192021	Male	813479220	2020-11-12	JTMK
18 Nur Masarah binti Ameri	191003	Female	8374850	2020-11-12	JP
17 Muhammad Zaki bin Zuhri	201203	Male	8052120	2020-11-12	JTMK
16 Muhammad Iqam bin Rahman	181102	Male	7941203181	2020-11-12	JTMK
15 Azfar Hakimi bin Foad	171098	Male	48583505679128	2020-11-11	JKA
14 Muhammad Izzat	181105	Male	824754255	2020-11-12	JTMK

Figure 3.8 User information

- In figure 3.9 shows manage user tab.
- All user information can be modified at this tab.
- Admin can change, update or add new user.

PUO Cloud Tracker																																																																								
Users	Manage Users	Users Log	Devices	Admin	Log Out																																																																			
ADD A NEW USER OR UPDATE HIS INFORMATION OR REMOVE HIM																																																																								
<div>1 User Info</div> <div>User Name...</div> <div>Matric Number...</div> <div>User Email...</div> <div>2 Additional Info</div> <div>User Department:</div> <div>All Departments</div> <div>Female Male</div> <div>Add User</div> <div>Update User</div> <div>Remove User</div>			<table> <tr> <th>CARD UID</th><th>NAME</th><th>GENDER</th><th>MATRIC NUMBER</th><th>DATE</th><th>DEPARTMENT</th></tr> <tr> <td>✓ 7952997</td><td>Nurain Ayyikn binti Kamal</td><td>Male</td><td>191025</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>23211183120</td><td>Muhammad Fuad bin Razaid</td><td>Male</td><td>192012</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>819714127</td><td>Nur Farhana binti Azema</td><td>Female</td><td>181029</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>8133205192</td><td>Intan Aina binti Saad</td><td>Female</td><td>181065</td><td>2020-11-12</td><td>JP</td></tr> <tr> <td>813479220</td><td>Imran bin Abdullah</td><td>Male</td><td>192021</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>8374850</td><td>Nur Masarah binti Ameri</td><td>Female</td><td>191003</td><td>2020-11-12</td><td>JP</td></tr> <tr> <td>8052120</td><td>Muhammad Zaki bin Zuhri</td><td>Male</td><td>201203</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>7941203181</td><td>Muhammad Iqam bin Rahman</td><td>Male</td><td>181102</td><td>2020-11-12</td><td>JTMK</td></tr> <tr> <td>48583505679128</td><td>Azfar Hakimi bin Foad</td><td>Male</td><td>171098</td><td>2020-11-11</td><td>JKA</td></tr> <tr> <td>12161246151</td><td>Muhammad Haziq</td><td>Male</td><td>181189</td><td>2020-11-11</td><td>JTMK</td></tr> </table>				CARD UID	NAME	GENDER	MATRIC NUMBER	DATE	DEPARTMENT	✓ 7952997	Nurain Ayyikn binti Kamal	Male	191025	2020-11-12	JTMK	23211183120	Muhammad Fuad bin Razaid	Male	192012	2020-11-12	JTMK	819714127	Nur Farhana binti Azema	Female	181029	2020-11-12	JTMK	8133205192	Intan Aina binti Saad	Female	181065	2020-11-12	JP	813479220	Imran bin Abdullah	Male	192021	2020-11-12	JTMK	8374850	Nur Masarah binti Ameri	Female	191003	2020-11-12	JP	8052120	Muhammad Zaki bin Zuhri	Male	201203	2020-11-12	JTMK	7941203181	Muhammad Iqam bin Rahman	Male	181102	2020-11-12	JTMK	48583505679128	Azfar Hakimi bin Foad	Male	171098	2020-11-11	JKA	12161246151	Muhammad Haziq	Male	181189	2020-11-11	JTMK
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12161246151	Muhammad Haziq	Male	181189	2020-11-11	JTMK																																																																			

Figure 3.9 Manage User

- Figure 3.10 shows user log tab.
- User log tab shows information about user travel log such as date, time in and time out from terminal area.
- User travel log information also can be filter or export to excel.

ID	NAME	MATRIC NUMBER	CARD UID	DEPARTMENT	DATE	TIME IN	TIME OUT
77	Muhammad Iqam bin Rahman	181102	7941203181	JTMK	2020-11-12	08:00:32	09:00:52
76	Muhammad Haziq bin Zulkarnain	181186	12161246151	JTMK	2020-11-12	08:46:47	09:00:08
75	Muhammad Faiz Izzuddin bin Ikh	171093	21729204109	JTMK	2020-11-12	08:14:42	08:14:55
74	Muhammad Fuzad bin Raziyd	192012	2321183120	JTMK	2020-11-11	23:20:19	23:20:31
73	Muhammad Haziq bin Zulkarnain	181186	12161246151	JTMK	2020-11-11	23:10:07	23:10:27
72	Muhammad Iqam bin Rahman	181102	7941203181	JTMK	2020-11-11	23:00:53	23:01:04
71	Muhammad Haziq bin Zulkarnain	181186	12161246151	JTMK	2020-11-11	22:51:30	22:51:39
70	Muhammad Iqam bin Rahman	181102	7941203181	JTMK	2020-11-11	22:48:31	22:48:38
69	Muhammad Haziq bin Zulkarnain	181186	12161246151	JTMK	2020-11-11	22:40:15	22:40:29
68	Muhammad Faiz Izzuddin bin Ikh	171093	21729204109	JTMK	2020-11-11	22:34:33	22:38:58
67	Muhammad Fuzad bin Raziyd	192012	2321183120	JTMK	2020-11-11	22:24:06	22:38:30
66	Nurain Azyikin binti Kamal	191025	7952997	JTMK	2020-11-11	22:23:58	22:38:52

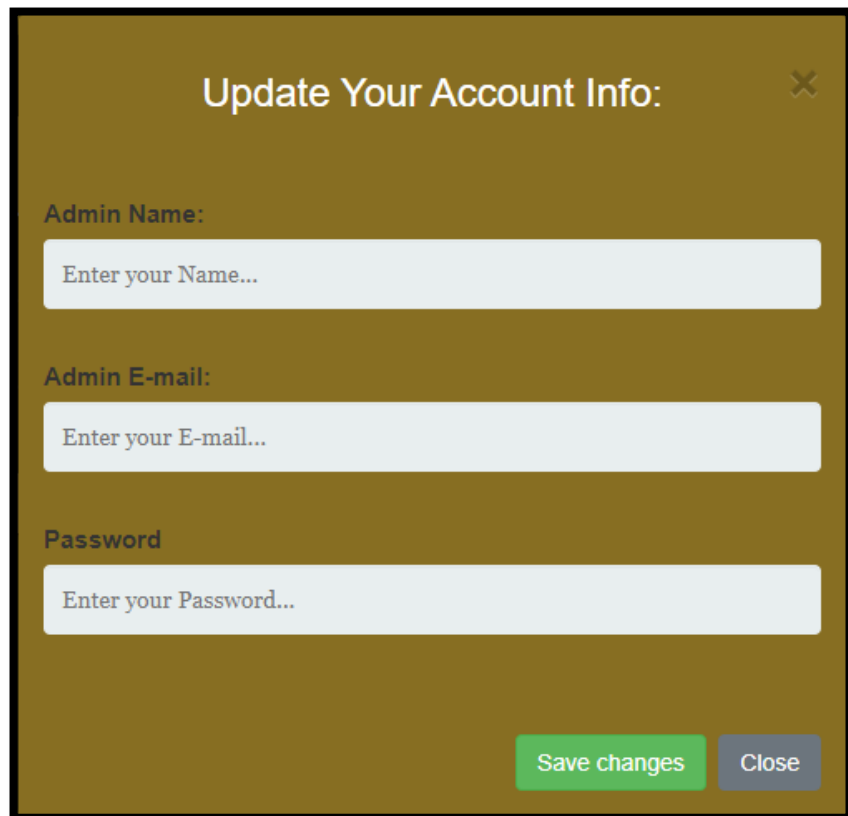
Figure 3.10 Users log

- Figure 3.11 shows devices tab.
- At the device tab, user can add new device if have any new terminal added.
- Device tab shows information about current terminal that have been install.
- The information is such as where is the terminal located, terminal department date and the current device mode.

Name	Department	Device UID	Date	Mode	Config
Surau JKA	JKA	337603d4c6852ea	2020-11-12	Enrollment Attendance	Config
Koperasi JP	JP	3dd015e82dc3ce35	2020-11-12	Enrollment Attendance	Config
Cafu JTMK	JTMK	63c3d8b5a17e928d	2020-09-24	Enrollment Attendance	Config

Figure 3.11 Devices

- Figure 3.12 shows admin tab
- User can update their admin account at this tab



The image shows a modal window titled "Update Your Account Info:" with a close button (X) in the top right corner. The background is a solid olive green. Inside the modal, there are three input fields, each with a label above it: "Admin Name:", "Admin E-mail:", and "Password". Each input field is a light gray rectangle with rounded corners and contains the placeholder text "Enter your Name...", "Enter your E-mail...", and "Enter your Password..." respectively. At the bottom right of the modal, there are two buttons: a green button labeled "Save changes" and a gray button labeled "Close".

Figure 3.12 Admin

4.0 TEXT DESCRIPTION AND RESULT

4.1 Unit Testing Plan

Unit testing phase is a plan that conduct to detect any error on system. Table below shows the testing plan that was conducted.

4.1.1 Developer test the project

Unit Testing Plan (UTP)						
NO	Test Case Name	Test Procedure	Pre-Condition	Expected Result	Tester	Result (Pass/Failure)
1.	Authorized users scan using matric card.	The terminal read the user information for authorized user.	Users must to set the UID tag.	The user can know if the terminal area is congest or not.	Haziq	Pass
2.	Unauthorized user tried to log in to the database system.	Error message will pop up and will not let the unauthorized user enter the database.	User need to set up their login email and password.	Error message will pop up.	Faiz	Pass
3.	Filter user log by date	Database show filter user log without needing to export it.	User need to set specified date and time that their want to filter.	The database show filtered user log with specified time and date.	Haziq	Pass

Table 4.1 show Developer Test

4.2 Integration Testing Plan

Integration testing phase is a plan that conduct to test any error on system.
Table below shows the testing plan that was conducted.

Unit Testing Plan (UTP)						
NO	Test Case Name	Test Procedure	Pre-Condition	Expected Result	Tester	Result (Pass/Failure)
1.	Authorized users scan using matric card.	The terminal read the user information for authorized user.	Users must to set the UID tag.	The user can know if the terminal area is congest or not.	Iqram	Pass
2.	Unauthorized user tried to log in to the database system.	Error message will pop up and will not let the unauthorized user enter the database.	User need to set up their login email and password.	Error message will pop up.	Arif	Pass
3.	Filter user log by date	Database show filter user log without needing to export it.	User need to set specified date and time that their want to filter.	The database show filtered user log with specified time and date.	Zarul	Pass
4.	Identify if user matric card is successfully scan into the terminal.	The LED will light up if the user success to record their log at terminal.	None	LED is light up	Imran	Pass

Table 4.2 show User test

4.3 User Acceptance

Integration Testing Plan				
NO	Test Case Name	Acceptance User	Tester	Comment
1.	Authorized users scan using matric card.	The terminal read the user information for authorized user. Users must to set the UID tag. The user can know if the terminal area is congest or not.	Hanif	Pass
2.	Unauthorized user tried to log in to the database system.	Error message will pop up and will not let the unauthorized user enter the database. User need to set up their login email and password.	Mujahid, Syahmee	Pass
3.	Identify if user matric card is successfully scan into the terminal.	The LED will light up if the user success to record their log at terminal.	Zaki, Muhaimin	Pass

Table 4.3 show testing for User Acceptance test.

5.0 DISCUSSION

Based on the project objectives and goals, we have successfully managed to create the system where by students and staff of Ungku Omar Polytechnic are able to use, and an ideal alternative method for which we can use to enter any premises in the campus via The Cloud Base Tracking System. With the system implemented we are able to reduce time taken to enter into premises and manual labour needed to verify students whereabouts.

Based on this result, proudly to say that the result is positively good. Student are no longer needed to queue up to get into any premises and if an area is congested, staff are notified by the database. With that said, we will not deny that there are problems encountered while carrying out the project, such as while we indeed reduce time and increase productivity. The system faces overload of data entry that can affect the efficiency. However with every problems, there is a solution. We have summarized that the best to reduce the load on the system is that only one person at a time should scan at the Terminal.

There is room for improvement, which is not a possibilities rather needed for future uses as a people evolves. So does the system too.

6.0 CONCLUSION AND RECOMMENDATIONS

As a conclusion, with our project. We offer a technological based alternative solution that is aim to as secondary resort in the future, while current technologies are already far from perfect. Preparation before a crisis is indeed prove to be good investment. With the cloud based tracking system, Students of Polytechnic Ungku Omar now have the ability to seamlessly continue their course during their studies in the campus without the worry of inability to get to classes and campus premises or in a way could not be able to operate their smartphone to checking in. The main goal of our project in hope that it will be implemented throughout the campus will help as a redundant solution should current method fails.

We also that the future generations to come would look back on this method and system as the foundation of something greater that would suit the needs of those in time using the system. As the team currently conducting the project, we are proud to say that we are able to achieved this far with current technology and knowledge. Nonetheless, there shall always be room for improvement and upgrades.

7.0 REFERENCES

- **Websites**

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5. <https://www.peak-ryzex.com/blog/rfid-vs-barcode-comparison-advantages-disadvantages/>