Simulation of Mobile Application for Continuous Operation Management Assistive System in a Micro and Small Enterprise

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DECLARATION OF ORIGINALITY

I declare that this report entitled "**Simulation of Mobile Application for Continuous Operation Management Assistive System in a Micro and Small Enterprise**" is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

Signature :

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Date : _____17/4/2020_____

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ABSTRACT

This project is about to develop a Simulation of Mobile Application for Continuous Operation Management Assistive System in a Micro and Small Enterprise application to simplify and increase the quality of the company daily operation system. A systematic operation company can improve the company working environment quality and also bring more benefit or opportunity to become larger company.

The main focus of this project is to develop a mobile application that allow company can schedule their daily operation progress by using this application. Not only than that, the application provides advance calculation system that able to calculate the tasks to workers. The calculation system including the company import and export of the company and employee management.

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LIST OF ABBREVIATIONS

UI	User Interface
RA	Retrofit Android
SB	Spring boot
GPS	Global Positioning System
HR	Human Resource
OS	Operating System
IDE	Integrated Development Environment
RAM	Random-access memory
IX	Import Export

CHAPTER 1 INTRODUCTION

1.1 Problem Statement and Motivation

In the daily of the operations of a micro and small enterprise company, proprietor will frequently use mobile to contact subordinate by taking phone call or texting messages to transfer daily task and data. In this transmit process, proprietor require do many times to contact different role of the subordinate every day. Every transmit process, users who was involved in have high possibility to be forgot or lost the data because they didn't record down the data. Or even sometimes it causes miscommunication among people example like misunderstanding the meaning of the same wo (rasel, 2013) rd. This process will cost a lot of time, proprietor and subordinate need to keep bunch of data in their mind to make sure the task or data that be given will be complete and will not delay the company operation every day.

Another problem that causes inefficiency of company daily operation process is the warehouse management and deliver decision making process. In traditional warehouse management, it may happen some common problem such as unpredictable lead time (DMS, 2015)due to lack of communication or giving wrong information example the stock manager requires to manage warehouse every morning and report to the proprietor. The proprietor will check the orders that haven't deliver and manage which order can be deliver immediately. In this process the proprietor will waste many times to manage the orders process and this process may have a possibility will make wrong decision.

Other than that, proprietor require manage the tasks to all workers while the products are need from orders that received. When the orders require more than one product and there are not enough stock in warehouse, proprietor must calculate the total quantity of the products that needed and analyze and distribute the tasks to the workers that they are in charge to do the product. In this process, proprietor will waste a lot of time in calculating process and this may have a high possibility happen mistake or error in calculating process part.

Besides, unable to track workers working progress is one of the causes that affect inefficiency of company daily operation process. If didn't track the workers working progress, it may happen the worker are feeling conformable and feel big during working. "If you're comfortable with your current modus operandi, it can be very tempting to delude yourself that there's no need to change and avoiding progress monitoring is one way to do that," writes Jarrett. (writer, 2014). During everyday morning, a micro company worker requires punch card to register to record the day and time that he come to work and waiting the proprietor assign the daily task to them. But the time theft or buddy punching is a common problem among all business (The Disadvantages of Traditional on the Clock Punch in Systems, n.d.). In this case, proprietor unable to control his workers efficiently and may bring negative impact to the working environment like delay the daily company operation process.

So far from now on, there were only few applications that have provide the function to solve the problem even there are some application consist some function are similar but not there are not so advance to achieve it all. The project will develop an android application to solve the problem. This application will be created uniquely to give those micro and small enterprise company to help them increase their daily operation process and more efficient to reduce their manpower task. So, they can be more focusing on other task to increase their company quality.

1.2 Project Scope

The purpose of develop this project is delivery an android application that able to solve and enhance the daily company operation management system. This project application is developed on Android 6.0 Marshmallow due to most of the user are using android device. This company operation management system will be developed to solve the mentioned issue by providing an advance systematic and efficient operation management system to improve the company daily operation process easily. Besides, the operation calculation system will be implemented in this application in order to calculate the company daily import and export process and internal production line process. The employee system will be conducted to track every employee daily

performance and calculate the employee salary based on working hours. The main objective of this project is to create a new platform that conclude all useful functionality from different previous platform and also enhance and avoid the problems happen that facing by the previous platform.

1.3 Project Objective

- To investigate the aspects of mobile application for continuous operation management assistive system in micro and small enterprise
- To design a mobile application for continuous operation management assistive system in micro and small enterprise.
- To develop a mobile application based on the design approach to enhance and simplify the company daily operation process.
- To evaluate the proposal mobile application for continuous operation management assistive in micro and small enterprise.

1.4 Impact, Significance and Contribution

Currently there is were only few platforms that exclusive for continuous company operation management assistive system. Different company have their own daily operation process, and some of their operation process are not systematic and not efficiency. This project is developing an exclusive platform that provide a systematic and efficient daily operation management system to support company operation. The application is to create a platform that have advance functionality and avoid the issue of the previous platform as mentioned above such as simplify the operation management process and increase the company productivity every day. This application will high priority targeting on the micro and small company that just public. Having a high-quality continuous company operation management system will result a high-quality and productive company, for long run, it will benefit a micro company to be a large international company.

1.5 Background Information

This project application is an android base and its device minimum requirement is mobile device that can support android version 6.0 Marshmallow this is because this android version is the lower version and most of the user are using this in the market. So, this application is developed base on this android version to fulfill the market needs. The application UI are being developed by using dynamic output, this is for the application can be support any resolution of the device. This project is using android studio to develop, because android studio is free open software development tools and it support java programming languages to develop the android applications. Android studio is the most suitable android development tools to develop this project application.

Besides that, to archive this project completely, this application consist front end and back end service, for the front end is Android Studio which is develop the UI and simple calculation process and the back end is Web Service Server which is control the data transmit process between front end and database. Besides that, Web Service is the main soul in this application because most of the calculation process of this application is very heavy and hard to be handle such as calculating daily operation task which related to database.

In this project, the way that front end able to communicate to the web service is using Retrofit Android (RA). RA is a REST Client Library used in Android and Java to create an HTTP request and get HTTP response from REST API. The Web Service Server in this project is Spring Boot (SB) with using IntelliJ IDEA development tools, SB is an open source Java-based framework and it’s easy to understand and develop spring applications. SB receive the HTTP request either using Get Method or Post Method from the front end and send back by using HTTP response.

CHAPTER 2 LITERATURE REVIEW

2.1 Study of Micro and Small Enterprise

Micro enterprise is basically defined as a business which only employing nine people or fewer and having a turnover or balance sheet less than a certain amount. For an example, in Malaysia, only those business which had sales turnover of less than RM300,000 can register as a micro enterprise (SME Corp Malaysia, n.d.). Around the whole world, most of the micro enterprise are family business which only employing one or two persons. And most of the owners of a micro enterprise are primarily interested in earning money to support their families. The concepts of micro enterprise were pioneered in 1976 by Muhammad Yunus, who also is the founder of the Grameen Bank, in Bangladesh (O'Brien, 2014).

Small enterprises are privately owned partnership, corporations that have lesser employees or less annual revenue than a normal-sized enterprise. While it also can be classified according to other methods, such as shipments, assets and others. In Malaysia, the definition of small enterprise and micro enterprise were different. For those business which had sales turnover from RM300,000 to less than RM15 millions or having 5 to less than 75 employees, they were categorize as Small and Medium Enterprise. Not only in Malaysia, but in many countries, some professionals operate some very small business, such as dentist, clinic doctors, and lawyers. Although these professionals can work for large and famous companies or organization, they still choose to have their own business, it is because some small enterprise, such as home accounting, may only require a business license to start a business (Small business, n.d.). Also, there were to many jobs and stress compare to those big company.

2.2 Relationship between mobile application and micro and small enterprise.

Desktop or laptop was the most popular device which people choose to search in the internet during the past few years. But along with the development of society, most people in the world have at least one mobile device nowadays. And according to a study online, it said that there were over 80% of users using mobile device to surf the internet in 2019, also there were more than ¾ teen regularly made purchase online these days (101 Mobile Marketing Statistics And Trends For 2020, 2020). From the information stated above, and obviously the growth of the mobile device were increasing in a very high speed.

So, as an owner of a micro or small enterprise, the easiest and efficient way to grow your own business is implement usage of mobile device in the business operation. It can be providing a mobile application to the customer in order to attract them and increase the sales, or even implement mobile application during the daily business operation itself in order to reduce the heavy workload of the employees with a more efficient way.

Even though there were lots of benefits while implementing mobile device to the business, but some of the owner were still thinking that I already had a desktop system which can help the operation of the business, why should I need mobile application? This is a very common question for micro and small enterprise with limited resources and budgets (How Small Business Can Benefits from Mobile Apps, n.d.).In fact, a native system and mobile application should work together in order to accomplish the business marketing objectives or advance the revenue goals.

Not only native system, mobile website was also one of the products which was gradually replaced by mobile application. Also, many owners of micro and small enterprise fail to differentiate the usage of mobile website and mobile application, especially in the marketing session. First, the marketing objective of mobile website was to attract more new customers, and the mobile application was to create loyal customers. Also, the user interaction of the mobile website was way too simple, it only allowed the users visit, complete the activity they want and leave the website. But mobile application was a two-way and ongoing method, it allowed to push notifications but also enable on-demand communication.

With the Mobile application in enterprise, entire enterprise can be operating onto the internet. Enterprise databases can remotely access and update from anywhere anytime, with the device had equipped with the mobile application and by anyone with permission to access the service. Other than that, mobile application is able to bring lots of benefits, not only on marketing, but it also able to improve the efficiency during the business operation. First of all, mobile application able to prevents error. Many errors during the business operation were due to human mistakes. Example like, a messy handwriting on an important document, wasting time on resubmitting paperwork. Mobile application can prevent most of these kind of common and annoying mistakes with a much efficient way. Other than that, enterprise mobility solutions come from everywhere. Mobile application developer able to create an application for any purpose, from streamlining standard business processes which take longer on a desktop – to creating an innovative and creative ways to handle all the operations more efficiently.

2.3 Related Work - Daylite

2.3.1 Introduction

Daylite is a mobile application project that started by Marketcircle in 1999. Marketcircle is a large team that conducts 37 people today. The purpose of they create the Daylite mobile application project is helping a small business grow with incredible apps made exclusively for Mac, iPhone, and iPad. This application can be found in the App Store by Apple. This mobile application is developing base on native apps instead of web apps because even though don't have internet access the application still can work correctly.

Daylite mobile application covering some business operation management features such as project management features, apple supported features, CRM & sales features, and additional features. For the project management features is to let the leader or the boss of the company manage a project by distributing the task to the team, tracking the task progress and manage the documentation of the project. For the apple supported features is this application can cross over to use or get data with the IOS internal features example to sync your contact and apple calendar to Daylite contacts and calendar, multitasking on iPad

and so on. For the CRM & sales features is to let the leader or the boss of the company can manage their company sales between customer example interaction tracking with the customer, reporting of sales, project, task and customize reports by using report engine.

2.3.2 Application Review

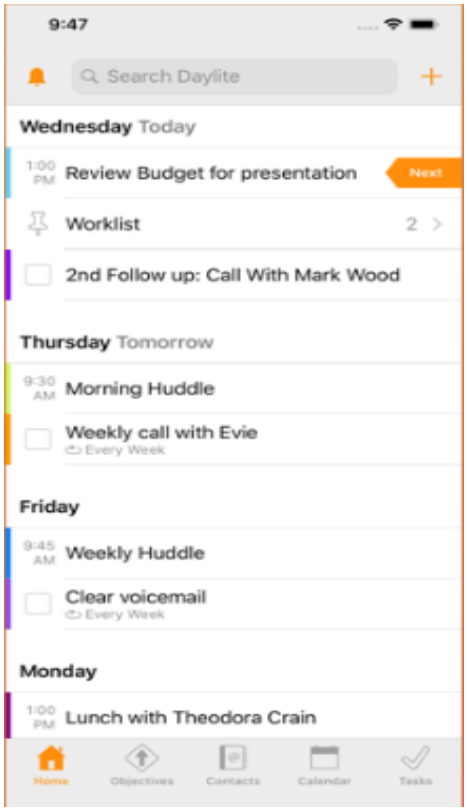


Figure 2.3.1: Daylite Homepage

In figure 2.3.1, it shows that the design and output of Daylite's homepage. The application will show all the worklist, memo, reminder for that day until the rest of the days.

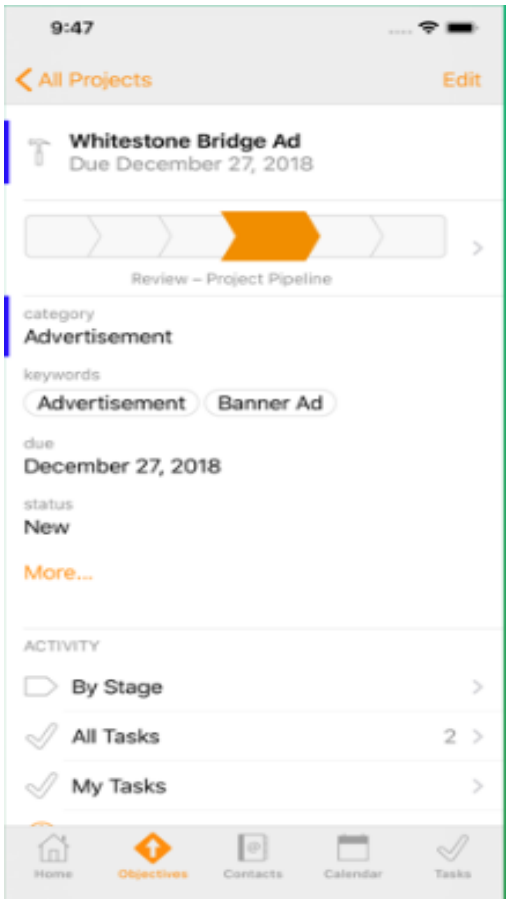


Figure 2.3.2: Daylite Objective function

In figure 2.3.2, it shows all the objectives which created by the user. The users were able to track the status of the projects or deals.

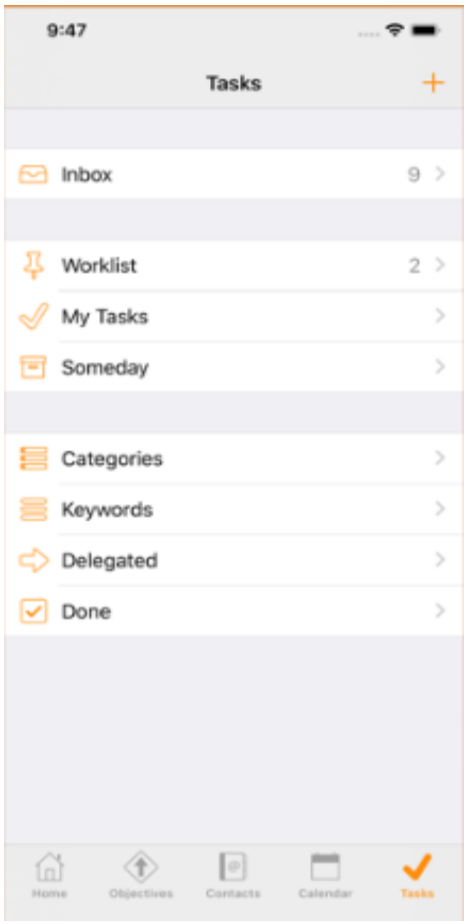


Figure 2.3.3: Daylite Task function

In figure 2.3.3, it shows the page which user able to view all the on-going tasks and completed tasks, and inbox messages.

2.3.3 Advantages and Disadvantages

Advantages	Disadvantages
Free to all iOS users Daylite is a free or charge mobile application, which is very friendly for those micro and small enterprise who only have limited budget.	**Only for iOS users** Daylite only support iOS operating system, but Android users are the majority in the market nowadays. So, it cannot satisfy all the users.
Support many kinds of operation management function In order to provide a more efficient way to help the users. Daylite provide different kind of functions, example like objective function, assign task function and more.	**UI design are not user friendly** Users required to study all the function buttons before they use it, in order to know how to work with this application.
Able to work without internet Some functions like task reminder, and view task and objective history were able to work correctly even without internet.	**User might miss some important messages** Sometimes the internet connection might affect the application fail to update the newest information to the users.

Table 2.1: Advantages and Disadvantages of Daylite

2.3.4 Comparison Between Proposed Application

Daylite	Proposed Application
Only for iOS users Daylite only support iOS operating system, but Android users are the majority in the market nowadays. So, it cannot satisfy all the users.	**Only for Android users** Even though the proposed application only support Android users, but the majority of mobile device users were using Android OS, so it able to serve more users than Daylite.
Using cloud based Daylite now force their users to change from backend to cloud based. But the synchronization of the data between users' devices were bad. (Daylite Reviews, n.d.)	**Support backend only** Although proposed application only support backend server, but it does not have any data synchronization issues.
More emphasize on HR operation Daylite is an application which scheduling and managing users' tasks and time.	**Not only HR operation but also warehousing and order management** The proposed application not only help the enterprise managing their HR operation, but also tracking all the import and export goods and orders.

Table 2.2: Comparison between Daylite and proposed application

2.4 Related Work – Info Tech Mobile

2.4.1 Introduction

Info-Tech Mobile is an industry mobile attendance application with face recognition and GPS integrated with complete HR software. Info-tech company is the one who creates this software and it is up to 21 years' experience in Singapore. The company has dedicated 70 staff and reach 3 thousand customers.

This mobile attendance application is using a real-time tracking system to track the use to clock in and out from anywhere using their mobile device. It's using GPS information to guarantee the user is on the right place clock in and out to work. Its built-in face recognition technology to verify the users face. The process of face recognition of the user can be multiple 20 users in one minute. This is making sure there is not fake or buddy cheat clocking. This system is integrated with another system which is Time Attendance and Payroll software system to calculate the user salary information.

Info-tech Time Attendance system is a cloud base software system which receives from the Info-Tech Mobile Application real-time and calculates the useful information like lateness, overtime, etc. After the calculate the information, it will automate upload to the Payroll software to calculate the user salary information.

2.4.2 Application Review

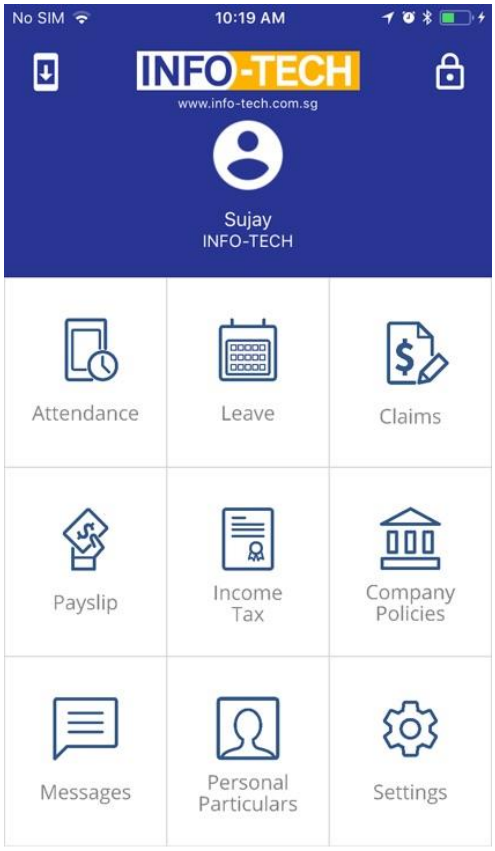


Figure 2.4.1: Homepage of Info Tech Mobile

In figure 2.4.1, is shows all the function that provided by Info Tech Mobile.

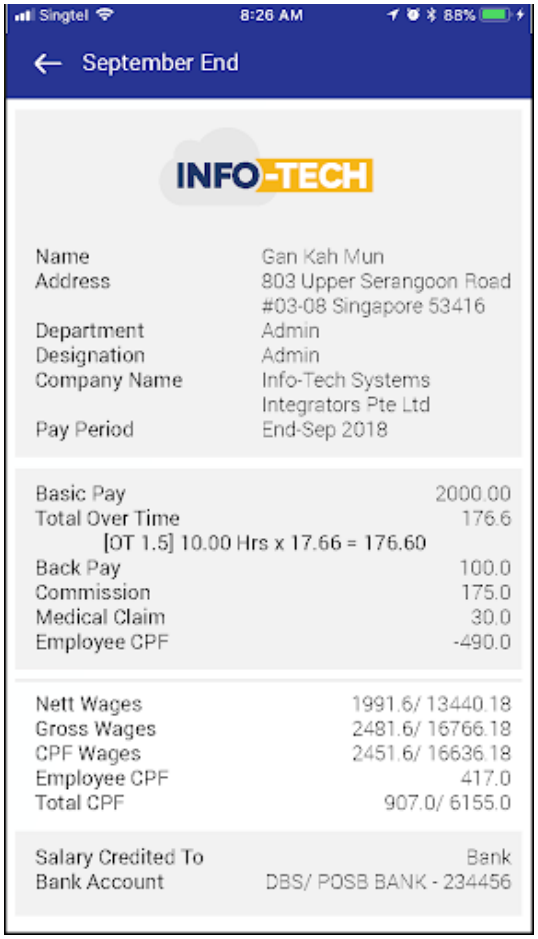


Figure 2.4.2: User personal information

In figure 2.4.2, it shows all the user basic information which they key in during the register session.

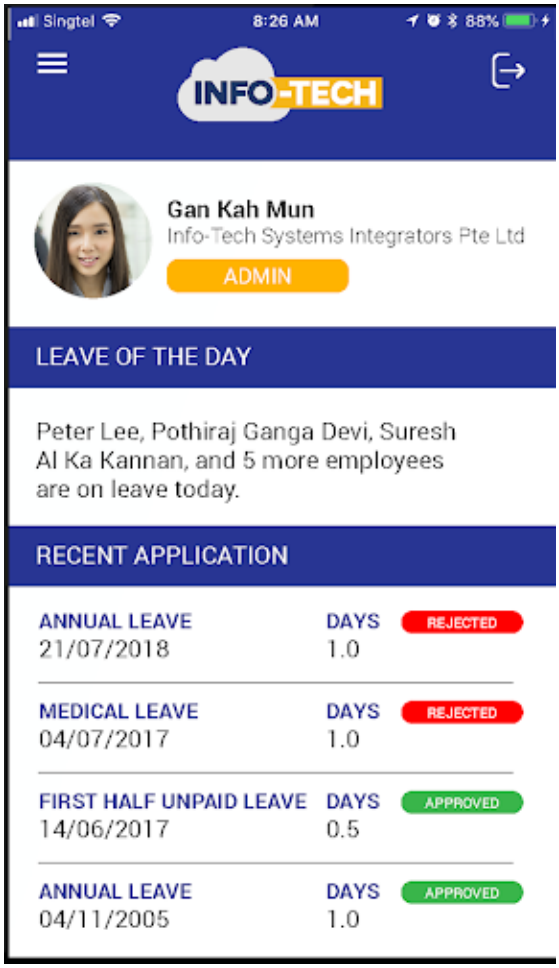


Figure 2.4.3: Leave information

In figure 2.4.3, it shows all the leave information of a particular user. Example like, this user had applied leave for what reason and the date. Also, the leave was approved or not.

2.4.3 Advantages and Disadvantages

Advantages	Disadvantages
Using face recognition technology Info Tech Mobile is using image processing as build-in face recognition technology to avoid fake or cheat attendance happen.	**Time consuming** Due to some reasons, the mobile device might take a very long time to recognize the users' face.
Support iOS and Android user It was very convenient since most of the user in the market nowadays were using these two types of mobile devices.	**Serious bugs after update** Sometimes, a new update will occur some serious bug which might reduce the user usage of this application.
High-level security Due to this application needs to store many users personal information, example like bank account number and address, the database and network security for this application is trustworthy.	**Not free to all users** This application is not free for the users. Company requires to subscribe plan in order to having their services.

Table 2.2: Advantages and Disadvantages of Info Tech Mobile

2.4.4 Comparison between proposed application

Info Tech Mobile	Proposed Application
Focus on tracking employees' attendance and salary calculation Info Tech Mobile is like an advance punch card machine, it tracked all the employees' attendance and leaves, and based on their attendance to generate their salary.	**Not only HR operation but also warehousing and order management** The proposed application not only help the enterprise managing their HR operation, but also tracking all the import and export goods and orders.
Support iOS and Android user It was very convenient since most of the user in the market nowadays were using these two types of mobile devices.	**Only for Android users** Even though the proposed application only support Android users, but the majority of mobile device users were using Android OS, so it still able to serve majority of the users.
More suitable for bigger organizations Due to the functionality of this application, it is more suitable for those organization which having many employees. Because a small enterprise which only having around 10 persons were no need to implement this kind of application.	**Suitable for every size of organizations** The proposed application is helping the company to manage their order and goods. So, as long as the company were having a goods transaction with their customers, the proposed application is able to solve their problems.

Table 2.4: Table of comparison between Info Tech Mobile and proposed application

2.5 Related Work – Bitrix24

2.5.1 Introduction

Bitrix24 was originally “Bitrix”, it was founded by Sergey Rizhikov and four Russian businessmen in 1998 (What is Bitrix24 - And How to Unify your Whole Business, n.d.). Over time, the company wanted to satisfy their customers requirements, so they decided to release Bitrix24 Cloud in 2012. As a collaboration application, Bitris24 offers collaboration, CRM, project management, document management, time management and HR management. These focuses included features like chat function, video conferencing, invoice generator, sales report generator, file storage, employee request workflows, and more.

Bitrix24 focuses on 5 areas, which is communications, project management, CRM, live chat function and website builder. First, Bitrix24 provided a function call activity stream. It allows users a high-level overview of any variation that have taken place within their team or company. For the project management, it does many similar things that other project management tools do. It provided Gantt charts function, Kanban function, report generator which can generate a decent excel report and more. Next is customer relations management (CRM), it was an increasingly important component of every business. And Bitrix24 included views with detailed contact descriptions also the reports that aggregate all contact data.

Another area where Bitrix24 excels is their “deals” function. Deals were a CRM objects which contain the interaction between employees and customer pertaining to a transaction. The deal dashboard makes it easier to always detect where is the sales opportunities for a company. The deals dashboard all the users immediately see the value of all deals at each stage of the process, from prospective sales to final invoice. (What is Bitrix24 - And How to Unify your Whole Business, n.d.)

2.5.2 Application Review

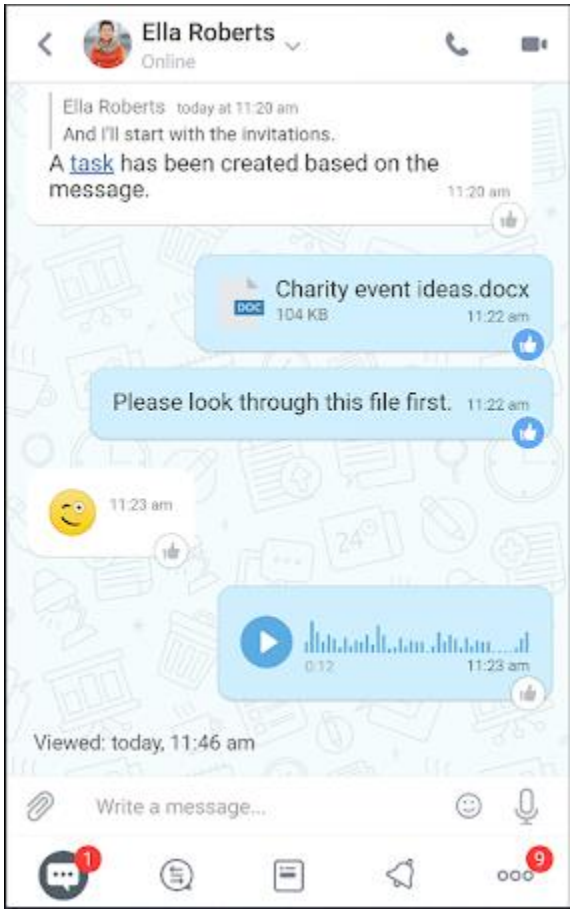


Figure 2.5.1: Communication function

The figure 2.5.1 shows that the communication function of Bitrix24, it allows users to communicate by texting, sending emojis, audio recording, and sending text file to each other.

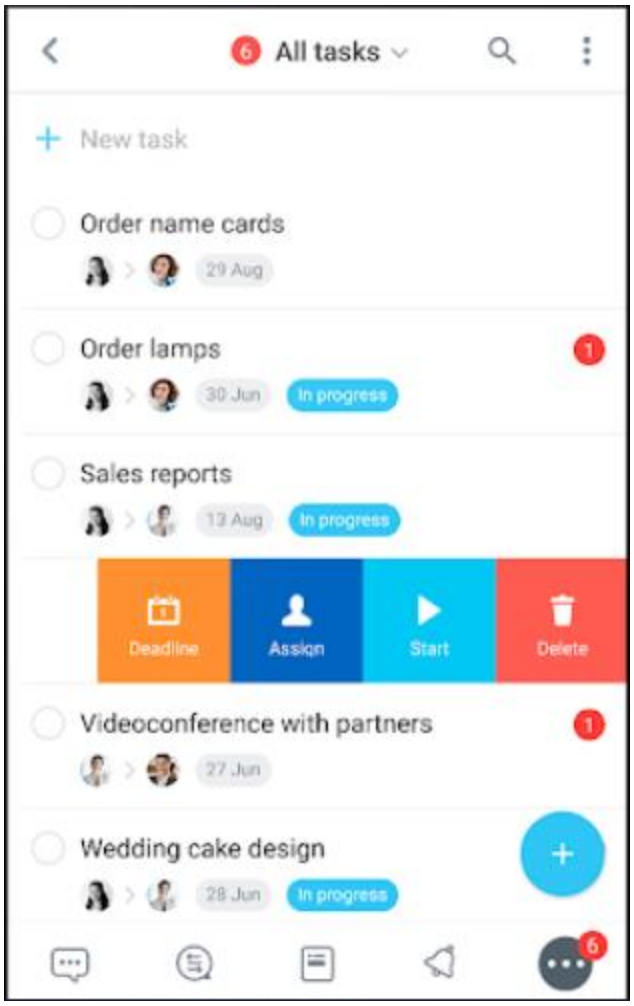


Figure 2.5.2: Task management function

Figure 2.5.2 shows the task management function, it allows user to create a new task. During the creation, users allow to set a deadline, assign the task to another users, start the tasks with time counting down and delete the task anytime.

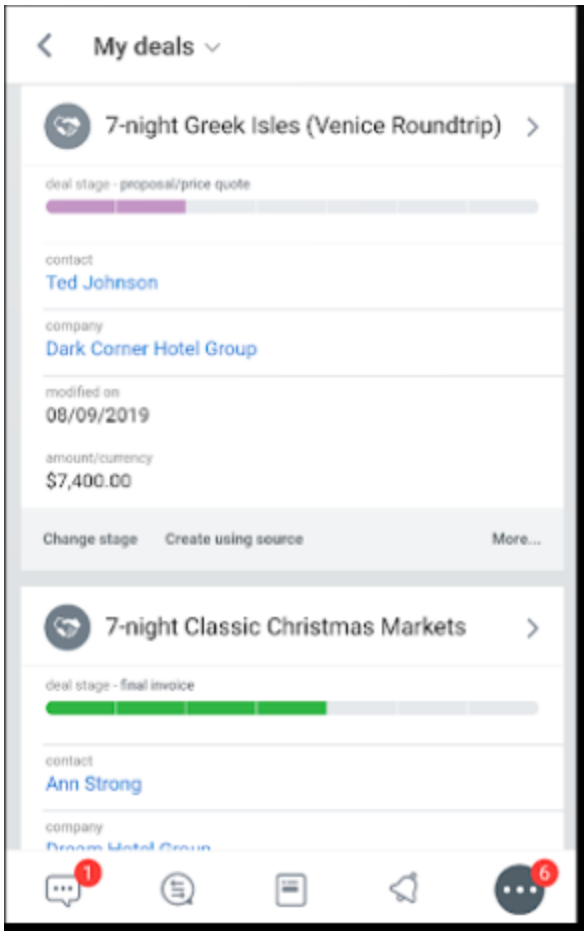


Figure 2.5.3: Deals function

Figure 2.5.3 shows the deals function, it allows users track all their deals process from prospective sales to final invoice. And all the details of that deals, example like contact and company for that deal, or show the modified date and amount of the deals.

2.5.3 Advantages and Disadvantages

Advantages	Disadvantages
CRM Integration Allow business able to centralize information, project, and tasks all in one. Users were no need to user several applications in order to solve different issues.	**Unfriendly User Interface** Due to Bitrix24 have lots of function, the user interface especially for mobile version take some time to learn when it comes to day to day usage.
Secure Communication Allow users manage not only internal but also external communication using solid and secured modules. Bitrix24 supports virtual telephone calls. Meanwhile, access permissions were required from the user in order to continue social searches.	**Limited Function in Mobile Version** Although the desktop version was powerful, but some of the useful function are only provided in desktop version.
Better Company Structure Using Management Tools The services provided by Bitrix24 were designed to organize and improve users' business process. It comes with a wide array of management tools example like, planning, task reporting, employee directory and more.	**Overload Information** Especially for those users who had a lot of task and other reminders, the system will keep on pushing all the notifications to the user all the time.

Table 2.5: Advantages and Disadvantages of Bitrix24

2.5.4 Comparison Between Proposed Application

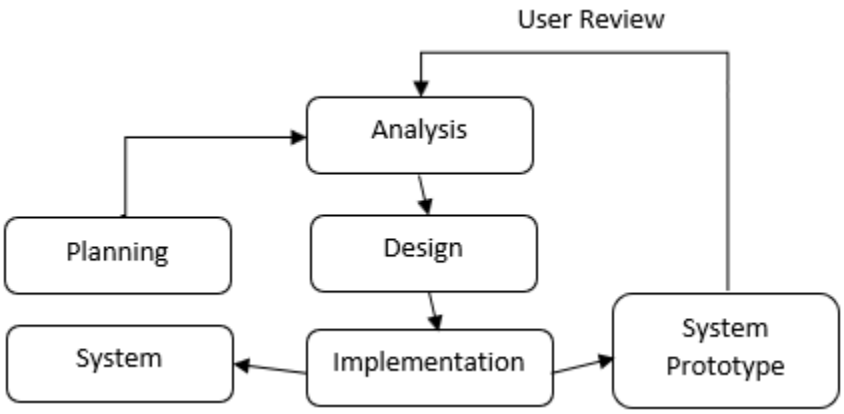
Bitrix24	Proposed Application
Support iOS and Android user It was very convenient since most of the user in the market nowadays were using these two types of mobile devices.	**Only for Android users** Even though the proposed application only support Android users, but the majority of mobile device users were using Android OS, so it still able to serve majority of the users.
Support Media Social Login Almost everyone has their own social media account nowadays. So, Bitrix24 allow user to login with their own social media account rather than creating another new account, which save times and reduce the issues of users need to remember to many id and password.	**Support IC Login Only** Users required to user their own identification number as their login ID. Although this is bit inconvenient compare to Bitrix24, but it is much more secure. Because users can create as many social media accounts as they like, which mean it might cause a lot of fake accounts in Bitrix24.
Some Functions are not Highly Connected with Business Operation Example like Bitrix24 allow users to post their own status just like Facebook done, and it allow video communication between users which also not highly connection to business operation.	**Every Function were Born with Purpose** Every function in the proposed application were having their own purpose. Each of them were able to really help the company to simplify and reduce the jobs.

Table 2.6: Comparison Between Bitrix24 and Proposed Application

CHAPTER 3: PROPOSED METHOD/APPROACH

3.1 Design Specification

3.1.1 Methodology



The software development model that used in this project is the prototyping model. Prototyping Model is a system development method which is developing the application built, tested and reworked the prototype and keep interaction with the end-users until reach the user requirement and where the product can now be successfully developed. This model is let the user get closer to see the application progress to ensure this project application reach user requirement. This model works best in scenarios that do not require specific documentation and not necessarily require all requirements are known in detail ahead of time due to continuous changing user requirements.

1. **Planning**

The Prototyping Model starts with the planning phase, this is to improve the spatial learning and cognitive mapping skills. Before starting this project, developer need to estimate the resource and cost to develop this project.

2. **Analysis**

The Analysis is the second phase of Prototyping Model; developer will be gathering all requirements from the user of the system by interview and analyze their expectation and wants from this application to avoid keep rework and wasting time and cost.

3. **Design**

Design is the third phase of the Prototyping Model. In this phase, the developer will roughly design the system by creating some UML diagram (e.g.: Activity diagram, use case diagram and etc). Developer will design user interface for the application by using sketched on a paper or use simulator software design and use diagram show to user how the application flow will be like. This design phase will help to give a specific direction where want to develop the prototype system.

4. **Implementation**

In this phase, the developer will develop this application system based on the final idea and start to combine the idea with user interface. Developer will analysis the work structure and resolve into release efforts so the prototype system can be complete on time and easy to trace the process of development.

5. **System Prototype & User Review**

In this phase, the prototype of the application system is done and ready to present to the user for an initial evaluation. After user review the prototype system, user feedback some comment and suggestion to the developer, which part of the application system can be improving or advance it to be same with the user expectation. If the user is not satisfied with the current prototype, the developer requires to redevelop the prototype according to the user feedback information. This process will carry on until user satisfied the prototype system.

6. System

This is the last phase of prototype models; in this phase, the prototype system will fulfil all user requirements and developer will develop the prototype system to be a complete version of the application. Developer will deliver the complete version of the application to user to use.

3.2 Functional Requirements

1. **This application allows new user register account under the application.**
   Whenever a new user wants to use the application, the application will asks user to register their own account by giving their personal information, then the system will validate the data to make sure all data that submit from user are fulfill the system requirement.
2. **This application able to let user register group under the application.**
   User who are the proprietor of the company able to register different role of group under this application and control the authority of the role of group that can use the functionality of the application.
3. **This application able to let user register their account under the group.**
   User who are the proprietor of the company able to assign subordinates to different role of group under this application. This action will let all the workers know which worker is their working partner and may increase their tacit understanding in their work.
4. **This application able to let user manage the warehouse easily.**
   User who are under the warehouse group able to report/update the warehouse stock under this application. This action can let proprietor check and manage the warehouse easily in anytime.
5. **This application able to let user manage the import export order easily.**
   User who are in charge of the import export (IX) order able to control the company daily IX under this application.
6. **This application able to generate import export report.**
   By default, system will auto generate the import export weekly and monthly report. The proprietor able to control the generating import export report time or days per month. So that the proprietor able to view and analyze to make decision marketing for the company.

7. **This application able to push notification to user if there is any new activity.**
   If proprietor want update any news or system received any new activity such as user who are able to view the export orders able to receive the notification that push by system when there have incoming new orders received or after the system calculate the daily task and assign to every worker, worker will receive the notification about the task push by system.
8. **This application able to let user to create/update/delete orders.**
   User who are under the salesman group are able to create/update/delete the orders that send by himself under this application. The user who are able to view export orders can view all the orders by list and quickly make some decision if need.
9. **This application able to manage the workers information.**
   System will record every workers information when they registered and track their daily working hours. System will calculate workers salary base on their working hours when proprietor required under this application.
10. **This application able to perform Daily Task calculation.**
    System will check all the orders that haven't export and calculate which order are available to be deliver base on warehouse stock data. If the warehouse is not enough stock to fulfill, the system will calculate the total quantity of the product that require and also calculate the product production task and distribute the different task to the workers to produce.
11. **This application able to control workers task and generate task report.**
    All user able to submit the daily task after they complete the task under this application. For those users that unable to complete the current day task will bring forward to the next day until they complete the task. So, the proprietor able to track and analyse workers performance by the task report from this application.

3.3 Non-Functional Requirements

1. **Availability**

   This application must operation 24 hours without downtime to make sure all user is able to access to use it and also avoid delay company operation process. For example, user able to use the application after working hours or facing some emergency case require to use the application.

2. **Performance**

   The application must perform lag free on every device even in different Android versions. Most functionality of this application are handling by the backend server and user devices only send request and receive response from the server.

3. **Maintainability**

   The application will be able to get remodified, enhanced, and fixed errors and bugs. To improve users' experience in the future, the application need to come out with new features and designs.

4. **Supportability**

   The application should be support most of the device resolution and application also support 6.0 Marshmallow Android version.

3.4 Software and Hardware requirement

1. **Platform**

   The application will be built on mobile platform. The mobile application provides many powerful functionalities that unable to done in computer and useful advantage such as easy of accessibility and portability.

2. **Operating System**

   This application is using Android operating system. Compare with IOS OS, Android OS have larger user base and Android is the open source and it can support cheaper device. To ensure this application able to serve most of the user in the world, Android is the most suitable OS to this application.

3. **Programming language**

   Java was chosen as the main language to develop this application due to it's scalability. Java is statically typed language; if the application having some error, developer require solve the error in order to let the application can be built and run smoothly. This may reduce the chances to have odd and unexpected errors happen. The optimized performance of Java also one of the factors that choose Java as the main language to develop this application, improved JVM and JIT compiler, as the performance increase, it allows this application to handle more complex process and run faster.

4. **Database**

   For this application database, MySQL is chosen to store all the data of this application. MySQL is high availability, it able to process millions of requests and thousands of transactions consistently while ensuring the memory cache and high speed. The application will generate a lot of requests to database also, retrieve and update the data frequently.

5. **Development Device and Integrated Development Environment (IDE)**

   The main device to develop this application is a laptop, and another desktop pc which is hosting the back-end server. Android studio will be installed in the laptop as main IDE to develop the front end of this application. IntelliJ IDEA will act as main IDE to develop the back-end server of this application

   Android Studio is an IDE that allow developer to develop Android application in an easier way such as design user interface with drag and drop function, auto complete code syntax and so on. Other than that, it provides its own simulator to test the run of the application on multiple size or types of Android devices with different Android versions. There are majority of Android application developers were using Android Studio as their first development kit, so there are a lot of information, solution, ideas and troubleshooting about Android Studio can be found on the internet (Android Studio, n.d.).

   IntelliJ IDEA is an IDE largely meant for Java. It supports many other programming languages such as Python, Lua and Scala. It is the one of the best programming tools based on Java, which make it easy to use and well design. It has advanced error checking features which allows faster and easier error checking. (IntelliJ IDEA, n.d.)

   Laptop Specification:

   - Model: Asus K45VD
   - Operating System: Window 10 Home Single Language/64 Bit
   - Processor: Intel Core i5-3230M @2.6GHz
   - RAM: 8GB

   Desktop Pc Specification:

   - Model: IntelH61M
   - Operating System: Window 10 Pro N /64 Bit
   - Processor: Intel Core i3-3210 @3.2GHz
   - RAM: 6GB
   -

Smartphone & Android Simulator:

- Model: Nexus 5 and Oppo A77
- Operating System: Android 6.0 Marshmallow

3.5 System performance verification plan

3.5.1 Performance Test

This performance test is to test and ensure this application performance is performing under the expectation. This test will be focusing on performance speed, and stability of this application. Developers will test this application on several devices from high end devices to low end devices. All functionality of this application will be tested to make sure that is no performance issue and enhance and improve it before release to User.

3.5.2 Stability Test

This stability test is to test the application can be function overtime without happen any crash and failure. Developer will test the connection stability between server and client by sending some important requests and do some data processing such as create/read/update and delete actions. This stability test is focusing on testing effectiveness of application system and ensure the application system able to handle all the requests and response from the server without crashing or failure happen.

3.5.3 Installation Test

Installation test is to test this application whether is able to perform on several devices to verify the installation process is smooth and free error. This testing will cover application install and update when there is a new version of this application release.

3.5.4 Functional Test

Once the application are done, the developer will perform functional testing to test every part of the function are able to work correctly and work same as requirement and expectation.

3.6 System Review

For the system review, the structure of this application are presented by some diagrams. These diagrams will carry out the purpose of every function and describe in more details and application developer will develop the application base on the diagrams as functional blueprint to make sure the application is developed according to the plan.

3.6.1 Use Case Diagram

3.6.1.1 Use Case for User in Operation Management Assistive System

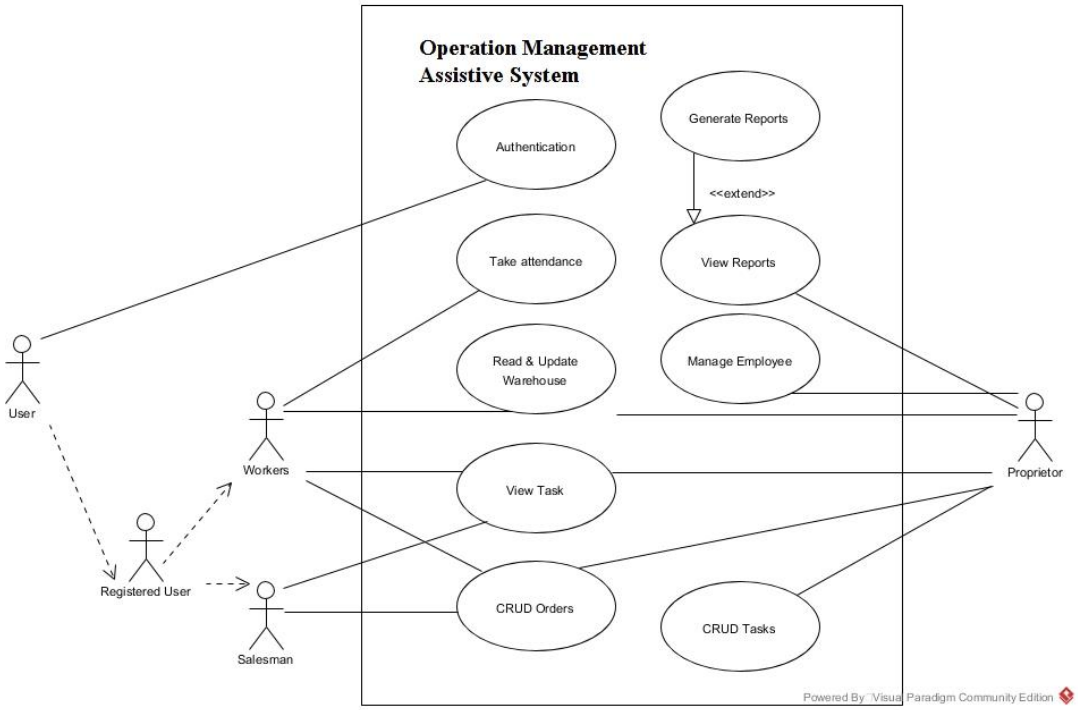


Figure 3-6-1: Use Case for User in Operation Management Assistive System

Use Case

Use Case for User in Operation Management Assistive System

User Involved

- New User: New user without account
- Registered User: User who have account but waiting proprietor assign roles under this application
- Workers: User who are working inside the company
- Salesman: User who are working outside the company
- Proprietor: User who are take in charge and manage the company

Description

This system require authentication to all user, every new user require register an account before login access to use this application. After user become registered user, user able to login but he unable to use any function due to new user doesn't have any roles. After proprietor assign their roles, the user able to view their roles job tasks and description of the roles. All workers require take attendance everyday so they can receive and view their daily tasks that auto distribute from the system or proprietor.

One of the user roles is salesman, who are working outside the company. His job is public relation with customers and take orders back to company. So, salesman able to create, read, update and delete the orders that they own create. Another user role is workers, who are working inside the company, their job is help running the company such as production line and import and export of the company. Other than that, some of workers have privileges to read and update the warehouse and some of them who oversee import export can read, update and delete the orders.

The proprietor has high privileges of this company, he able to manage the employee such as assign or change employee roles or change the employee salary rate. The proprietor able to view any types of report base on weekly, monthly or year. The proprietor able to create, read, update and delete the tasks.

3.6.1.2 Use Case for System in Operation Management Assistive System

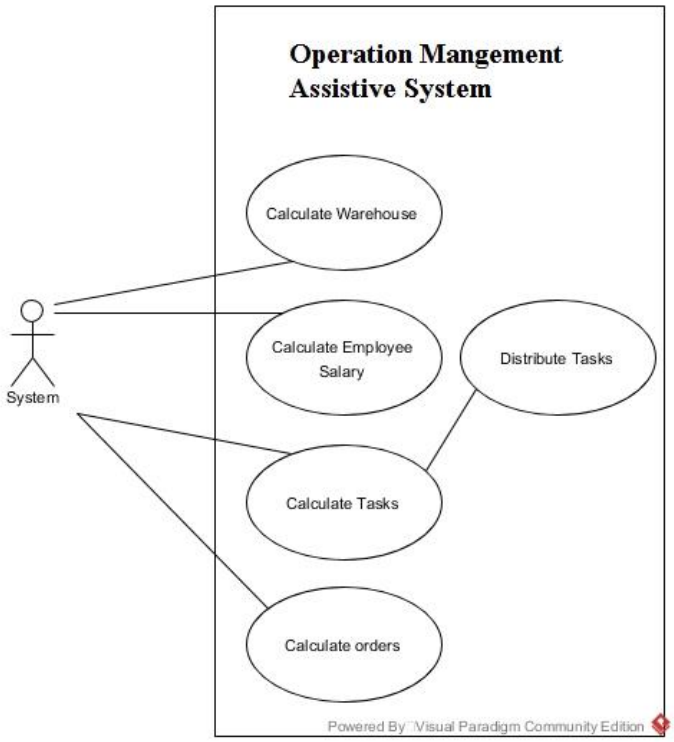


Figure 3-6-2: Use Case for System in Operation Management Assistive System

Use Case

Use Case for System in Operation Management Assistive System

User Involved

- System: System

Description

The job of this application system is to perform many function calculations. Every day the system will calculate the total orders that received from yesterday and make calculation of compare with current warehouse products quantity. If the orders requirement products are over the warehouse products, the system will make a calculation of each product production process and distribute the task according the user roles. Every end of the month, the system will auto calculate the employee's salary base on employee every day working hours with their employee's own salary rate.

3.6.2 Activity Flow Diagram

3.6.2.1 Activity Flow Diagram for Register User Account

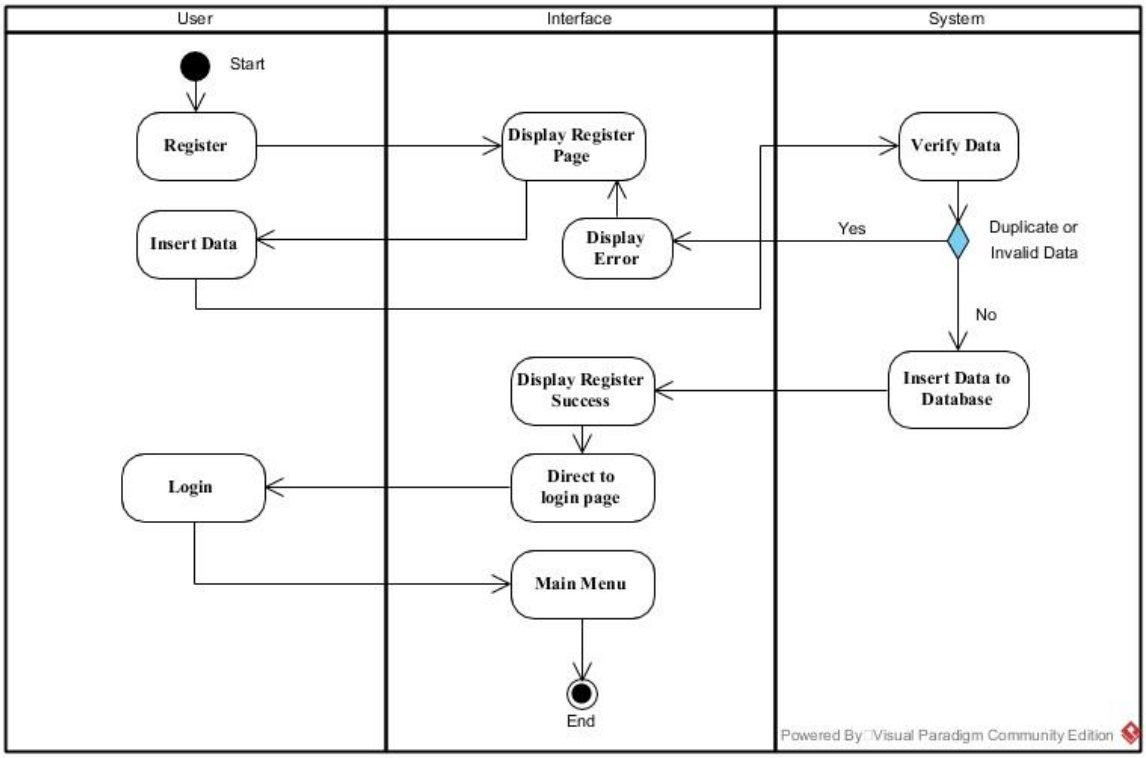


Figure 3-6-3: Activity Flow for Register User Account

3.6.2.2 Activity Flow Diagram for Read and Update Warehouse

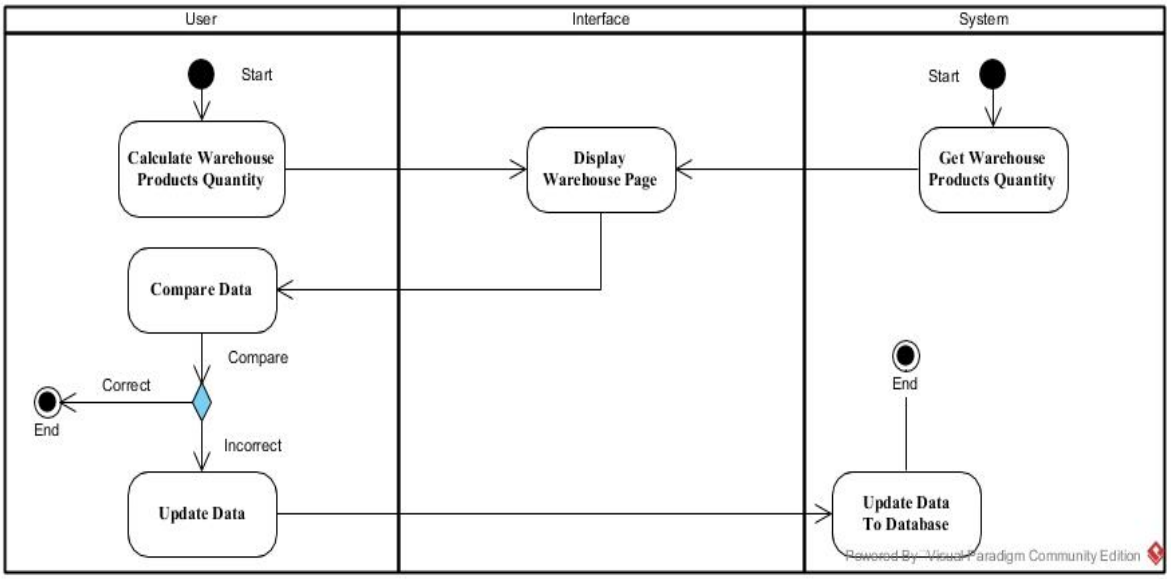


Figure 3-6-4: Activity Flow for Read and Update Warehouse

3.6.2.3 Activity Flow Diagram for CRUD Order

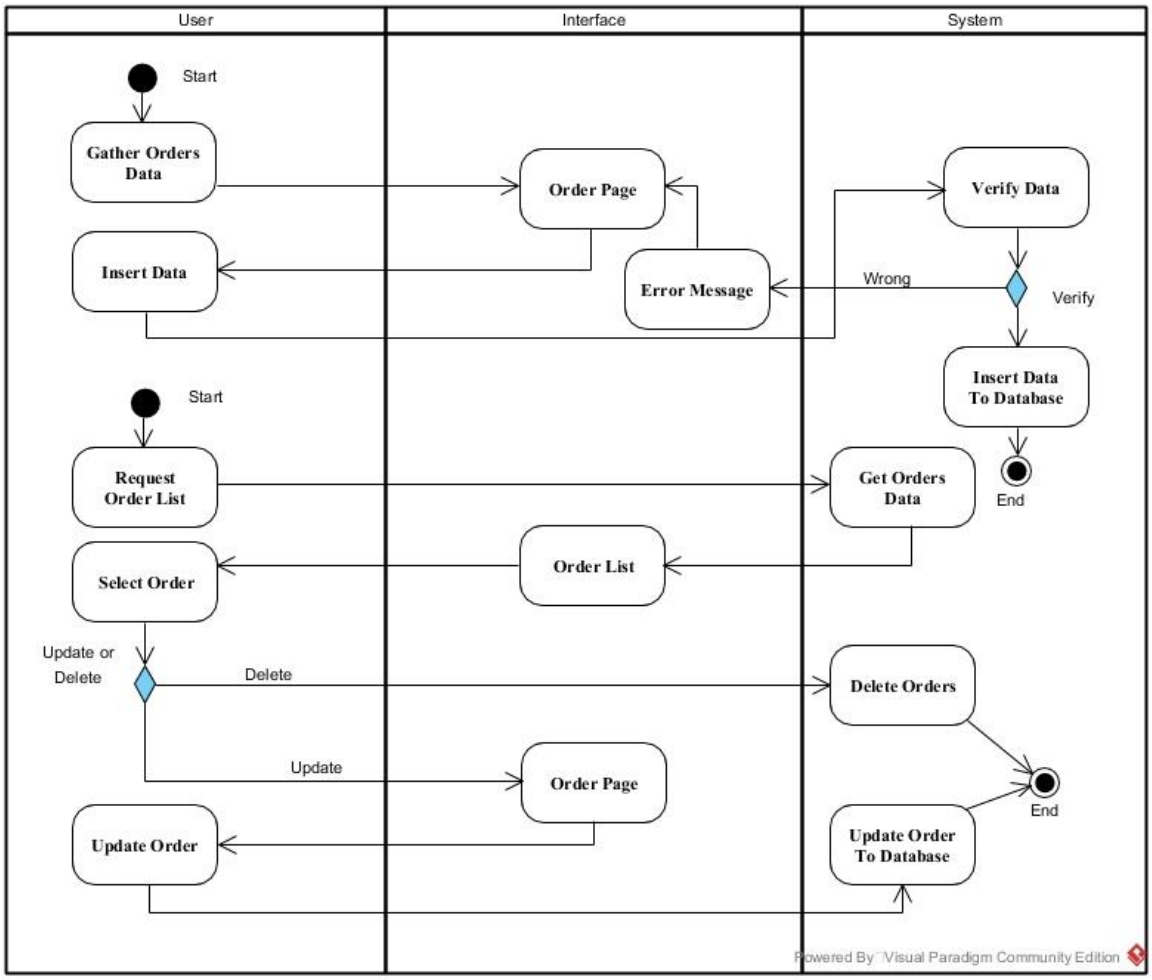


Figure 3-6-5: Activity Flow for CRUD Order

3.6.2.4 Activity Flow Diagram for CRUD Task

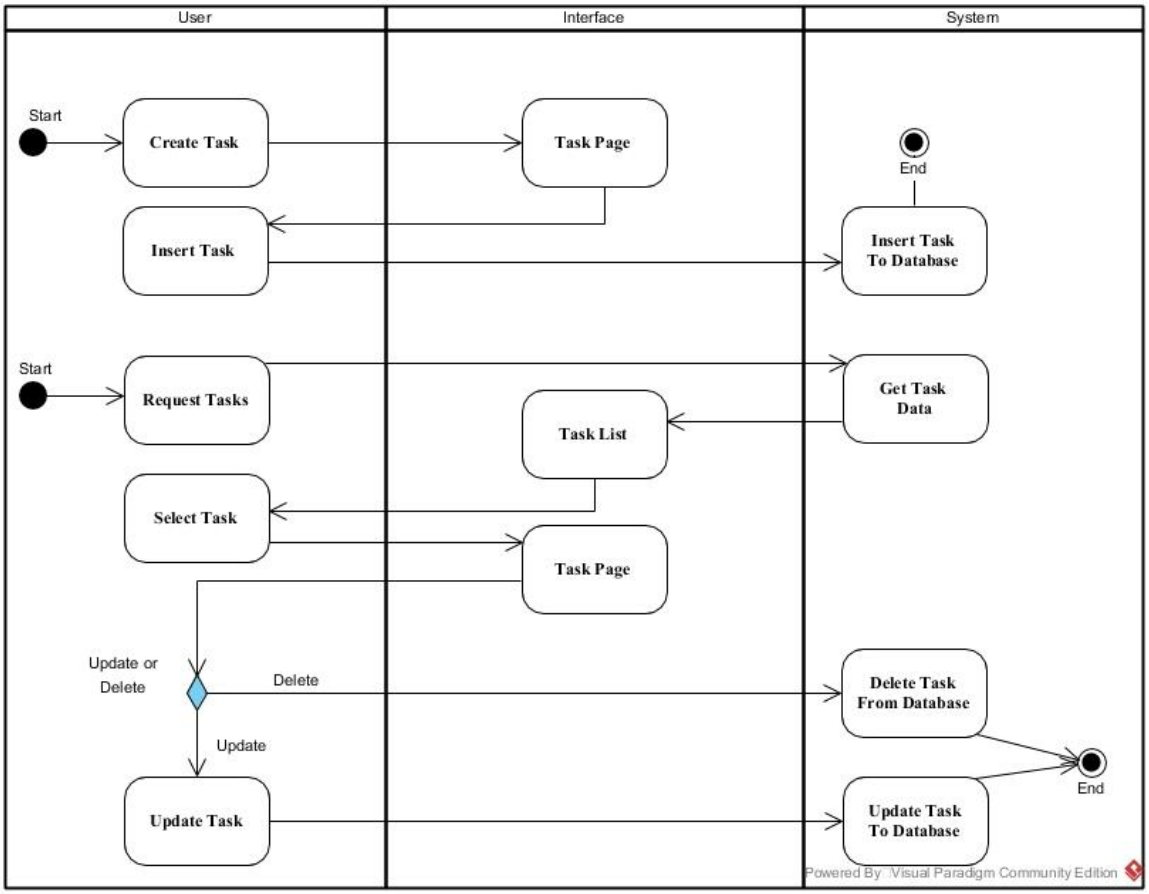


Figure 3-6-6: Activity Flow for CRUD Task

3.6.2.5 Activity Flow Diagram for This Application System

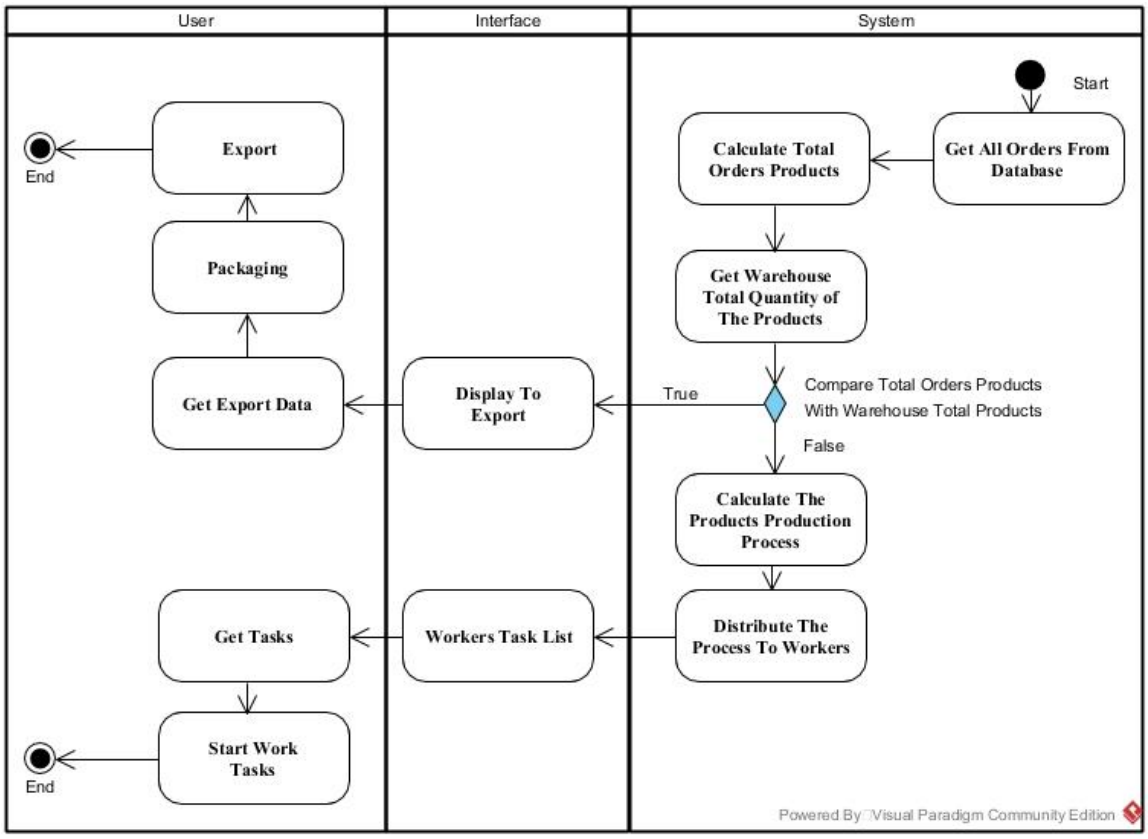
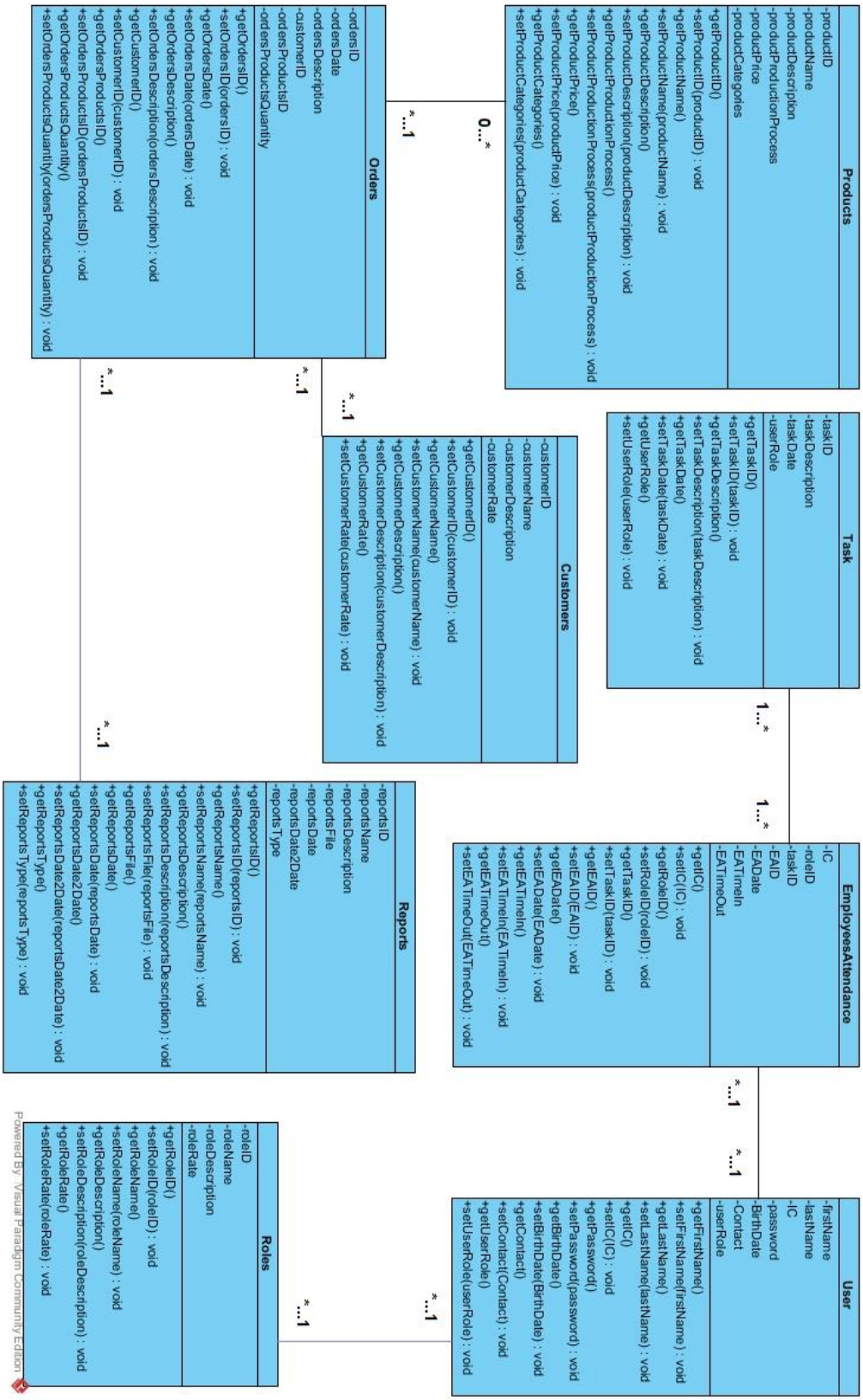


Figure 3-6-7: Activity Flow for This Application System

3.6.2.6 Class Diagram for Operation Management Assistive System



3.7 Implementation Issue and Challenges

There are few expected and unexpected challenges for this project. The unexpected challenge is facing some challenge when developing the auto calculation of tasks. When developing this calculation function, there are some bottleneck need to be considered and need to be solved to achieve the expectation of this project. This project had been involved too many new technologies to develop it, and these technologies are didn't learn in our course structure. So, extra learning effort is expected and also some bug and difficulty during the development process.

3.8 Timeline

3.8.1 To-Do-List

Project Start Date: 1/13/2020 (Monday) Display Week: 1

WBS	TASK	LEAD	START	END	DAYS	% DONE	WORK DAYS
1	**Planning**			-			-
1.1	Problem Statement	[Name]	Mon 1/13/20	Fri 1/17/20	5	100%	5
1.2	Project Scope		Sat 1/18/20	Wed 1/22/20	5	100%	3
1.3	Project Objective		Thu 1/23/20	Sun 1/26/20	4	100%	2
1.4	Impact, Significance		Mon 1/27/20	Thu 1/30/20	4	100%	4
1.5	Target User		Thu 1/30/20	Mon 2/03/20	5	100%	3
1.6	Background Information		Mon 2/03/20	Sun 2/09/20	7	100%	5
2	**Literature Review**			-			-
2.1	Study of Similiar work		Mon 2/10/20	Wed 2/19/20	10	100%	8
2.2	Related Work		Thu 2/20/20	Mon 2/24/20	5	100%	3
2.3	Advantage		Tue 2/25/20	Sat 2/29/20	5	100%	4
2.4	Disadvantage		Sun 3/01/20	Thu 3/05/20	5	100%	4
2.5	Comparison		Fri 3/06/20	Tue 3/10/20	5	100%	3
3	**Desigining Product Architecture**			-			-
3.1	Design Specification		Wed 3/11/20	Sun 3/15/20	5	100%	3
3.2	Methodology		Wed 3/11/20	Sun 3/15/20	5	100%	3
4	**Product Requirement**			-			-
4.1	Functional Requirement		Mon 3/16/20	Thu 3/19/20	4	100%	4
4.2	Non-Functional Requirement		Fri 3/20/20	Mon 3/23/20	4	100%	2
4.3	Software and Hardware		Tue 3/24/20	Fri 3/27/20	4	100%	4
5	**System Review**			-			-
5.1	Use Case Diagram		Sat 3/28/20	Mon 3/30/20	3	80%	1
5.2	Flow Chart		Tue 3/31/20	Thu 4/02/20	3	80%	3
6	**Developing the product**			-			-
6.1	Preliminary work		Fri 4/03/20	Sun 4/12/20	10	30%	6
7	**Closing**			-			-
7.1	Conclusion		Mon 4/13/20	Mon 4/13/20	1	100%	1

Figure 3-8-1: To-Do-List

3.8.2 Gantt Chart

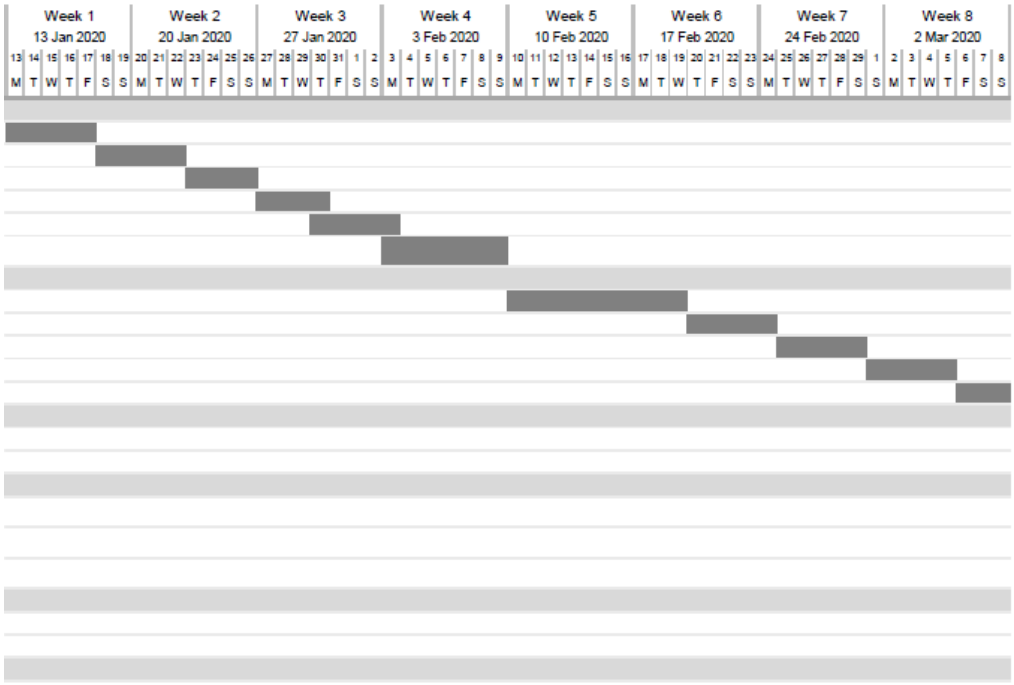


Figure 3-8-2: Gantt Chart for Project

3.8.3 Gantt Chart (Cont'd)

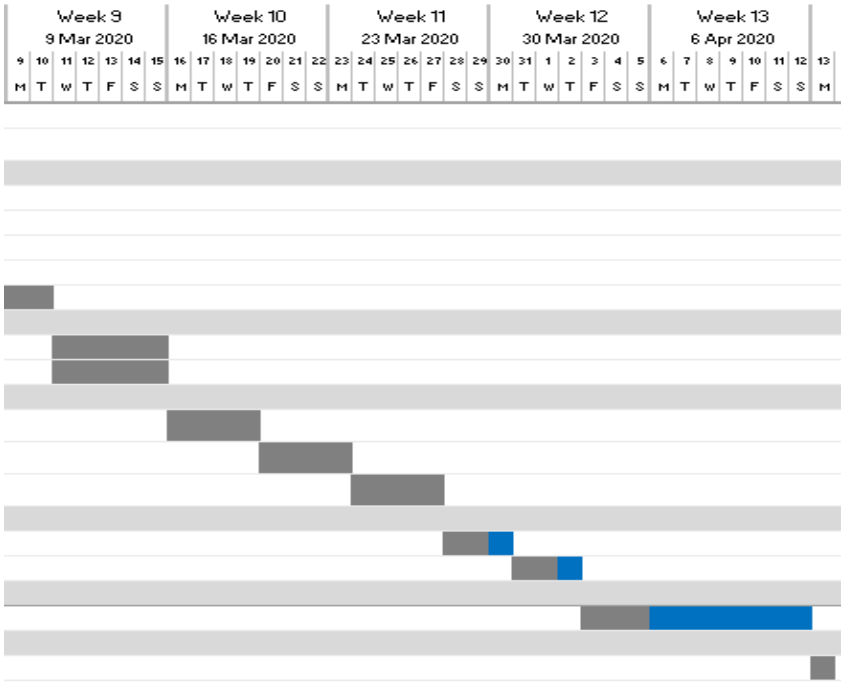


Figure 3-8-3: Gantt Chart for Project (Cont'd)

CHAPTER 4: Preliminary Work

4.1 Back End Server

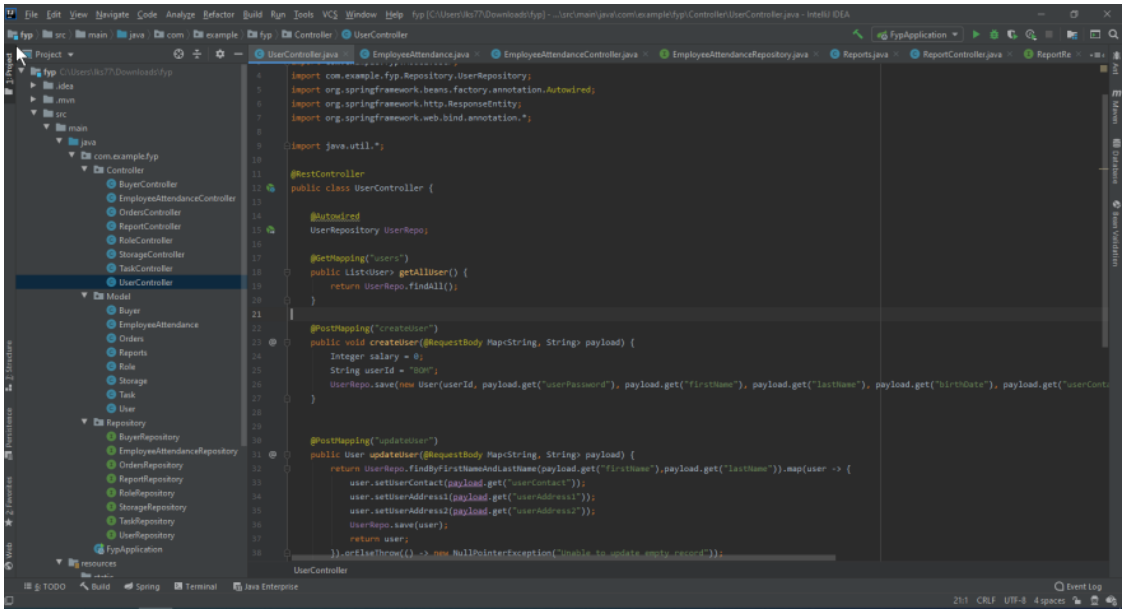


Figure 4-1: Back End Server

The diagram above show back end server, all the class that using in this project had been setup done including basic function create, read, update and delete function. So, the client side (Android Application) can send the request base on specify HTTP request to processing data.

4.1.1 Controller of Back End Server

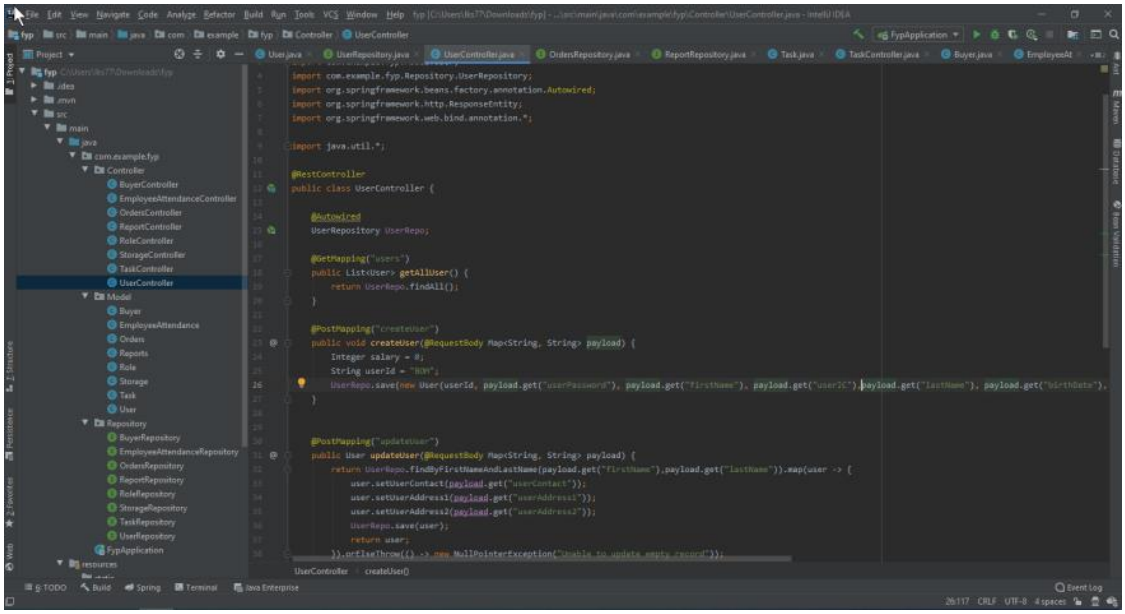


Figure 4-1-1: Controller of Back End Server

The diagram above show the controller, who is handling the http request include GET and POST method from client and response back after processing the data.

4.1.2 Class of Back End Server

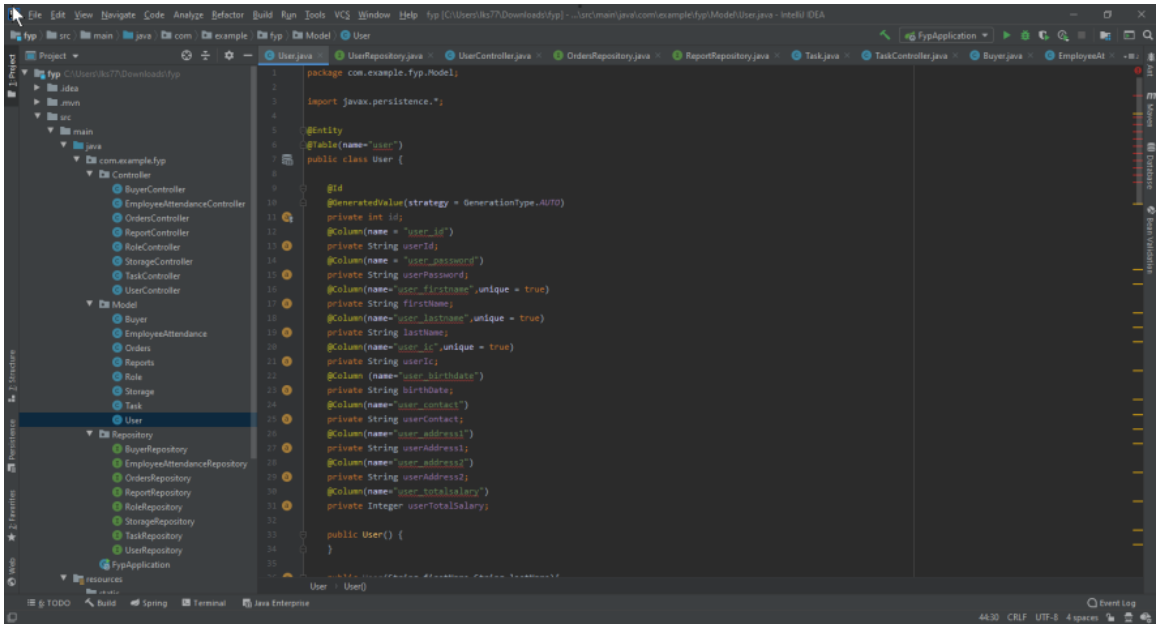


Figure 4-1-2: Class of Back End Server

The diagram above show all the class that using in this project.

4.1.3 Repository of Back End Server

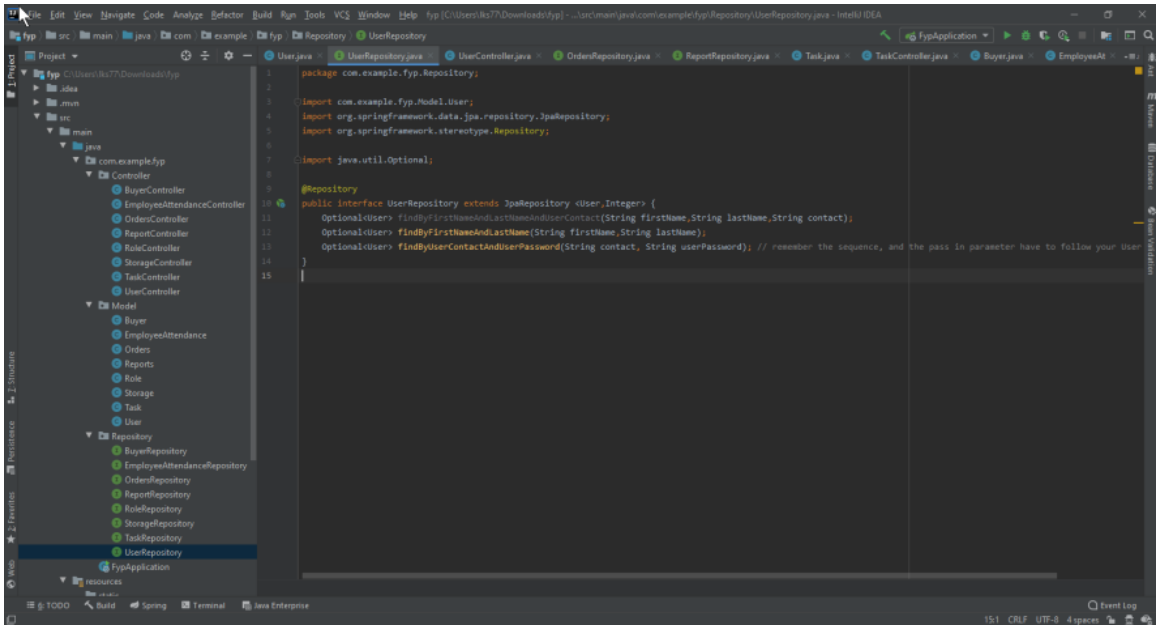


Figure 4-1-3: Repository of Back End Server

The diagram above show repository interface who is handling the data between database without using any SQL command.

4.2 Android Studio

4.2.1 Retrofit of the application

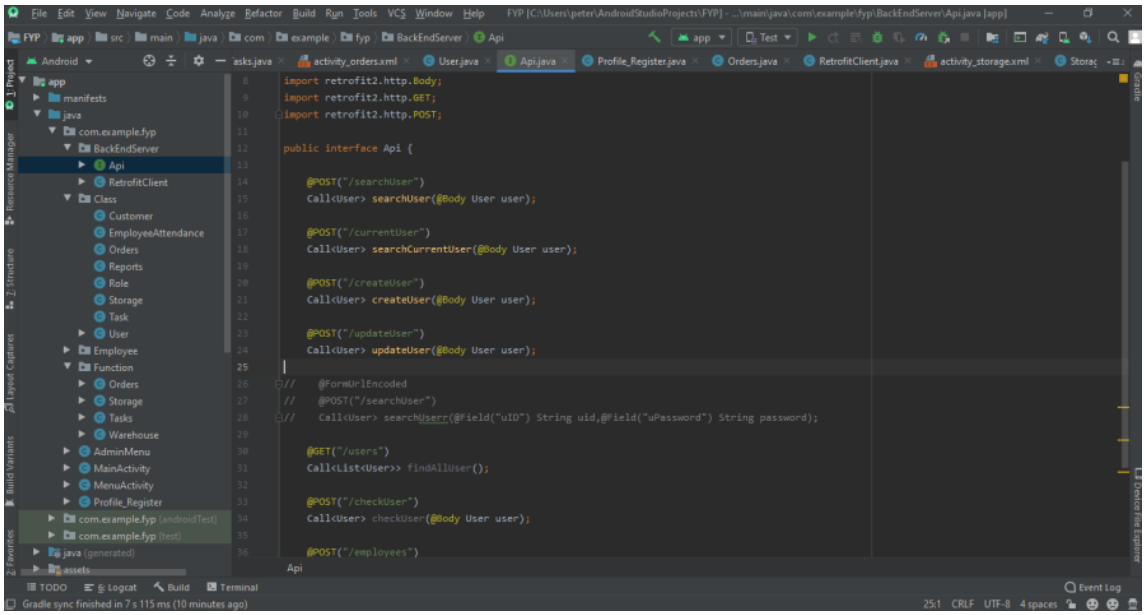


Figure 4-2-1: Retrofit of the application

The diagram above show the Retrofit in android studio. Retrofit is handling the HTTP request include Get and Post method to the server of this project.

4.2.2 Class of the Application

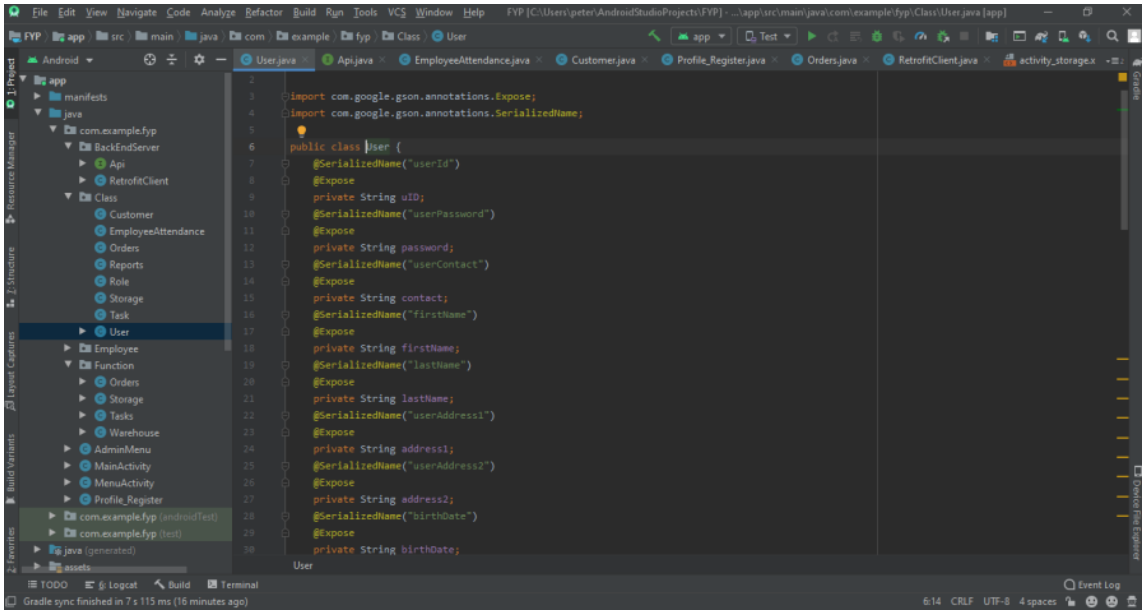


Figure 4-2-2: Class of the application

The diagram above show all the class that using in this project.

4.2.3 The Register and View Profile of the Application

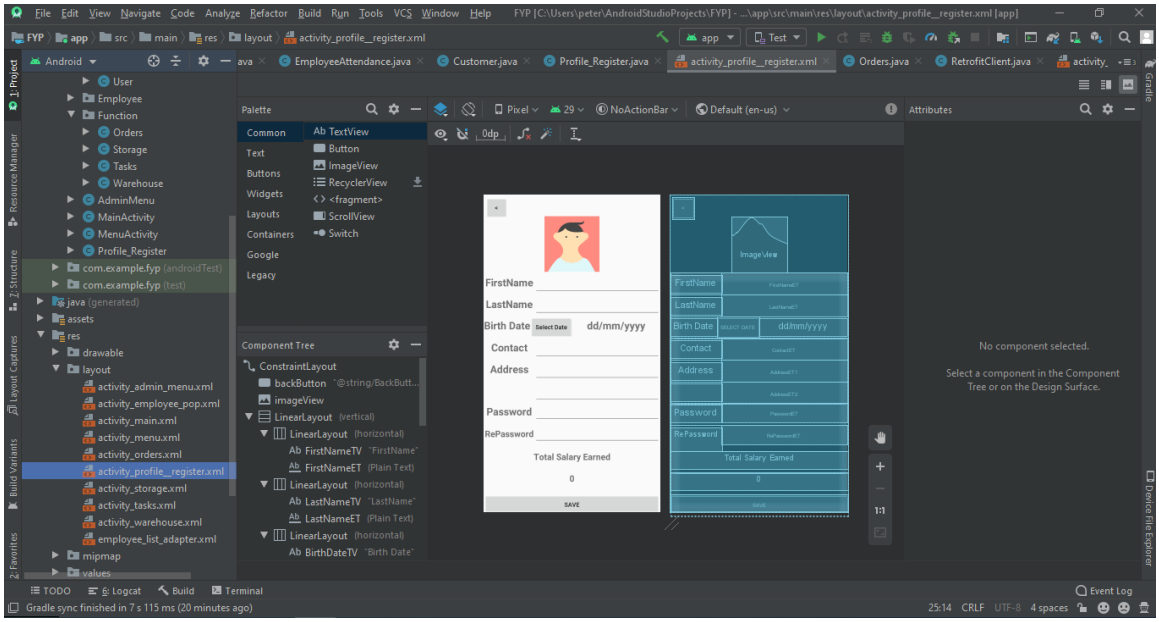


Figure 4-2-2: The Register and View Profile of the application

The diagram above show the register and view profile user interface of the user. This activity can be done register and view profile in same activity.

CHAPTER 5: CONCLUSION

5.1 Conclusion

In this project, the objective is to create a mobile application for continuous operation management assistive system which able to reduce and simplify the jobs of micro and small enterprise with an easier way. This project had come out with a system which allow user felt more convenient to manage warehouse, order, and workers. Also, keep on tracking every progress of daily tasks. During the development process, the application developer required to make sure that the outcome was matching to the plan and objective frequently. Following the system design and planned methodology was the most efficient way to make sure the project was developed according to the requirements. This project was expected to simplify and reduce the jobs for micro and small enterprise.

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IntelliJ IDEA

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Problems with traditional inventory and warehouse management systems

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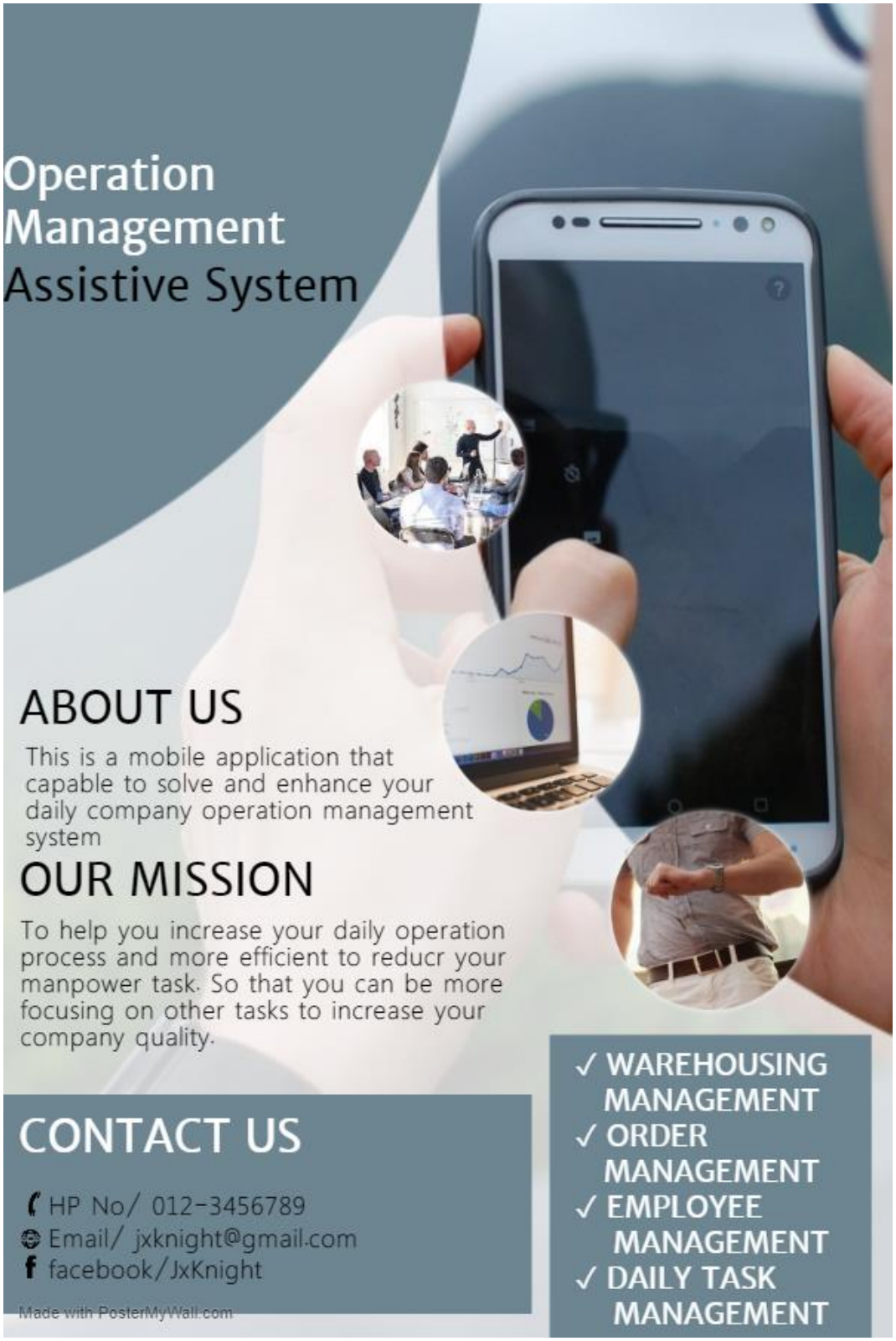
Risks of Not Tracking Your Progress

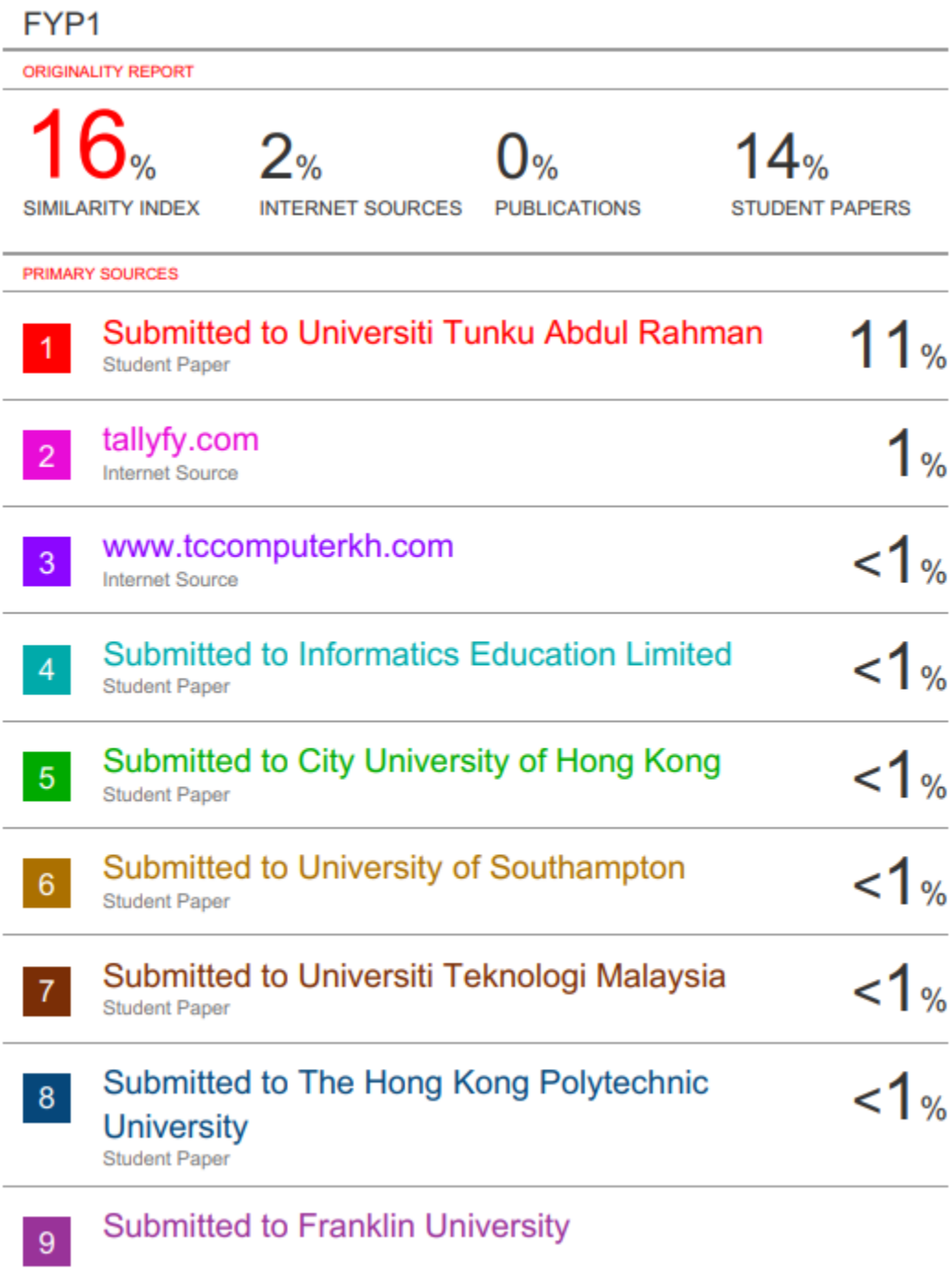
Available from: *https://www.inc.com/ilan-mochari/3-risks-not-tracking.html*

APPENDIX
FINAL YEAR PROJECT WEEKLY REPORT

POSTER


Operation
Management
Assistive System
ABOUT US
This is a mobile application that capable to solve and enhance your daily company operation management system
OUR MISSION
To help you increase your daily operation process and more efficient to reducr your manpower task. So that you can be more focusing on other tasks to increase your company quality.
CONTACT US
HP No/ 012-3456789
Email/ jxknight@gmail.com
facebook/JxKnight
Made with PosterMyWall.com
✓ WAREHOUSING MANAGEMENT
✓ ORDER MANAGEMENT
✓ EMPLOYEE MANAGEMENT
✓ DAILY TASK MANAGEMENT

PLAGIARISM CHECK RESULT



FYP1

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Student Id	13ACB05424
Student Name	CHUJIAXUN
Supervisor Name	Mr Kesavan a/l Krishnan

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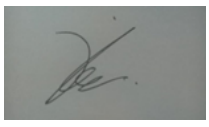
I, the author, have checked and confirmed all the items listed in the table are included in my report.  (Signature of Student) Date: 17/4/2020	Supervisor verification. Report with incorrect format can get 5 mark (1 grade) reduction. _____ (Signature of Supervisor) Date: 17/4/2020

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Full Name(s) of Candidate(s)	**CHU JIA XUN**
ID Number(s)	**13ACB05424**
Programme / Course	**BIS(HONS) INFORMATIONS SYSTEM ENGINEERING**
Title of Final Year Project	**Simulation of Mobile Application for Continuous Operation Management Assistive System in a Micro and Small Enterprise**

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