


Hong Kong Institute of Vocational Education
Department of Information Technology (Tsing Yi)
HD in Software Engineering
ITP4522 Software Project Management &
Quality Assurance (SPMQA) (2021/2022)

Requirement Specification Report

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We declare that this is a group project and that no part of this submission has been copied from any other student's work or from any other source except where due acknowledgement is made explicitly in the text, nor has any part been written for us by another person.

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1. Study Background

1.1. Company's Background

Better Limited which provides a completed one-series electronic appliance retail services for customers is a large-scale electronic appliance retail store. It supplies small to large electronic appliances, for instance, mobile phones, television, air conditioner for customers to choose from. After payment, customers can enjoy our free services such as delivery and installation services. Completed services are of utmost importance when it comes to achieving the purpose of the company.

Over the past few years, the business of Better Limited has been growing up. Thus, our company has a clear labour division for six departments, including retail stores, inventory, accounting, purchase, technical support, and information technology. The Retail Stores Department is responsible for two retail stores at Kowloon Bay and Tsuen Wan. The Inventory Department is in charge of a 6000 sq/feet warehouse in Kowloon. The Accounting Department, Purchase Department, Technical Support Department, and Information Technology Department are set up in the Kowloon head office.

Owing to the "Outline Development Plan for Guangdong-Hong Kong-Macau Greater Bay Area " from the Hong Kong Government, Better Limited discovered that there are opportunities to expand the business to the Greater Bay Area such as Guangdong and Macao. In order to meet the Chinese shopping boom, the company prepares to add the electronic payment functions to the order system and develop an online store.

Having huge room for improvement, Better Limited is designed to develop an efficient e-system in order to enhance the company's management. The company's target is boosting competitiveness by providing convenient services and functions for customers and staff.

1.2. Project Background

Following technology development and business expansion, the CEO of Better Limited considered that the expenditure of the company's operation and data storage should be reduced and evolve to use the computerized management system.

The CEO requires our project team to build a computerized management system, an android device for the delivery team and technical support team, and digital payment for the retail stores and online store's order system. In addition, the document to the customer, information should be viewable and traceable in the new computerized system, which must be compatible with the new online store. The company also applies standalone PCs and electric spreadsheets to manage the delivery services. The data of different officers' PCs cannot be readily shared, so the new server should be purchased for the new proposed system.

The project will be divided into several parts, involving planning, analysis, design, control, testing, execution. In summary, data consistency is fundamental to building a computerized management system.

2. Scope

The computerized management system can be connected with the database and all departments can store all information in there through a network. There are some functions for staff to use. We will also develop a website and mobile application for the online store.

Language

- ♦ JavaScript (react.js, node.js, react native)
- ♦ HTML
- ♦ CSS

2.1. Key Stakeholders

- CEO
- Customer

- **Sale Department**
 - Sale manager
 - Sale representative

- **Inventory Department**
 - Inventory clerk
 - Goods Inwards clerk
 - Delivery workman

- **Purchase Department**
 - Purchase manager
 - Purchase clerk

- **Technical Support Department**
 - Technical support manager
 - Technical support clerk
 - Installation Workman

- **Accounting Department**
 - Accounting manager
 - Accounting clerk

- **Information Technology Department**
 - Information Technology officer

2.2. Project Milestones

This project will start on the 1st April 2022 and is expected to end on 20th December 2022. These are the highlight milestones as follow:

Milestone 1: Completed database system and POS System (24th June 2022)

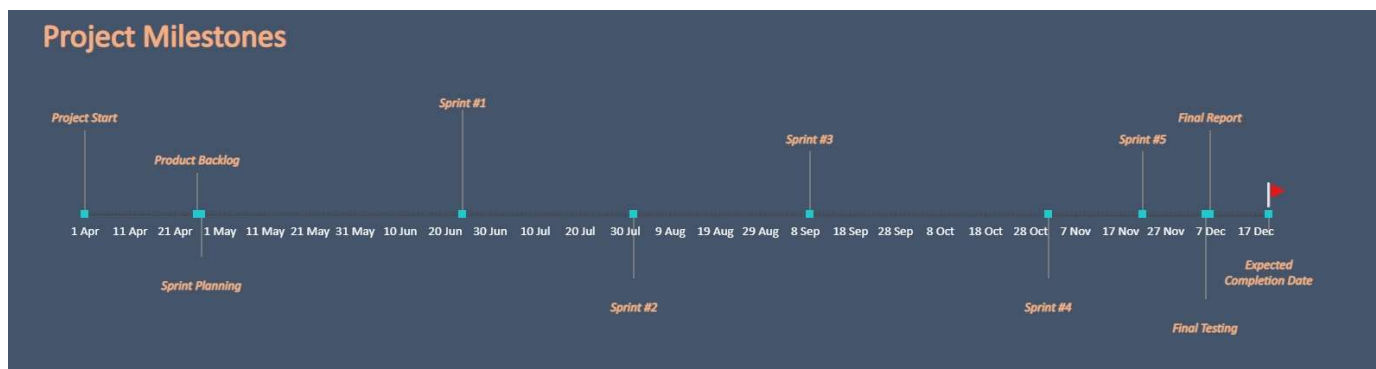
Milestone 2: Completed sales delivery note function, re-stock function, etc... (1st August 2022)

Milestone 3: Completed notification system, data analysis System, etc... (9th September 2022)

Milestone 4: Completed checking system, online store (1st November 2022)

Milestone 5: Completed final implementation (22nd November 2022)

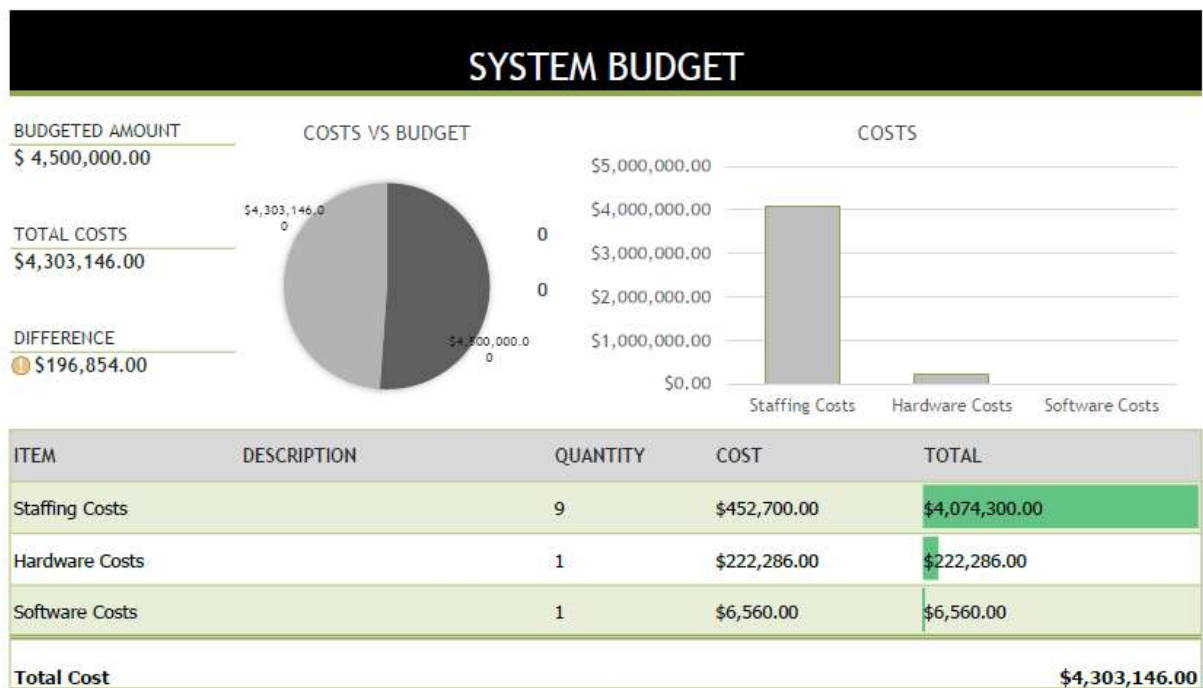
Milestone 6: Final report and testing (Middle December)



2.3. Project Budget

There will be a budgeted \$4,500,000.00 by the project sponsor (Better Limited) and the estimation of the development cost is around \$4,303,146.00 excluding the operational cost.

Budgeted Amount	\$4,500,000.00
Staffing Costs	\$4,074,300.00
Hardware Costs	\$222,286.00
Software Costs	\$6,560.00
Total Costs	\$4,303,146.00



3. System Request

Project Sponsor:	Better Limited
Current Needs:	<ol style="list-style-type: none">1. All data are manually recorded such as handwritten2. Selling electronic appliances online3. Expanding business to the Great Bay Area4. Lack of data exchange from department to department
Requirements:	<ol style="list-style-type: none">1. Staff will use an electronic spreadsheet to record data2. Computerized data in the database3. Out of stock notification4. Web and Mobile Application for online store5. Provide digital payment on the ordering system6. Handle data with CRUD. (Function of Create, Read, Update, Delete)
Value:	<ol style="list-style-type: none">1. Improve the utilization of resources and reduce error2. Improved client service through greater flexibility3. Increase customer source4. Improve data inconsistency

4. Feasibility Analysis

The new system's main task is to centralize all information about company operation in the soft copy instead of hard copy and improve the problem of information contradiction. The system will allow authorized users to utilize these computerized management systems.

4.1. Technical Feasibility

Computerized management systems, websites, and mobile applications are feasible technically and have some risk. There are four considerations of risk that we should evaluate.

The risk for staff using databases, applications, web, mobile app systems is moderately high. Using a paper-based system for a few years, the staff have little experience with electronic records and operating the web-based system. In addition, the information technology officers lack database skills to manage the data.

Due to having a mature project team, the risk of familiarity with the technology is low. The project group has strong knowledge of the company's existing intranet, web-based system, Android system, databases, app building, and Internet technology. We are planning to apply JavaScript (react.js, node.js, react native), HTML, and CSS to build the computerized management system, website, and mobile applications. Besides, an IT Consultant can provide functional help and suggestions in the technical problem when the developers encounter any development barrier.

The project size is considered a medium-low risk. Although our project team size is small, there is business user commitment from the CEO. Owing to the development methodology of agile, this project time frame is flexible. We will have a clear direction and enough time to do it.

The existing technical infrastructure should have good compatibility. Internet infrastructure is already in place, so the ISP can help the company solve the internet problem. Thus, it can save money in training staff about internet use. Apart from the internet, digital payments already have complete technology, which is managed by third-party payment service platforms such as Octopus, Alipay, WeChat Pay, Visa and Master. These platforms have enough technology to offer problem-solving services for the company when retail store employees have any trouble with electronic payment.

4.2. Economic Feasibility

The one-time development cost of these systems and the online store is \$4,303,146.00, which includes development team salaries, consultant fees, hardware, and software excluding the cost of update and repair.

The operational cost should be spent \$772,103.97 per year, spending on software licensing fees, communications charges, hardware repairs cost and operational staff cost, and cost of user training. We will suggest that the company should hire 1 to 3 programmers in information technical officers to control the database.

The computerized management system brings huge tangible benefits for the company. It can reduce hiring costs. For instance, the database system stores the information instead of handwritten information, which no longer demands the staff to do the paperwork for the hard copy. After that, it can economize miscellaneous expenses such as paper, and postage fees.

Finally, computerized management systems supply plenty of intangible benefits. Due to keeping track of retail store and warehouse stock level easily, these convenient systems reduce employee workload and increase employee motivation. Therefore, employees can focus on providing higher quality customer services, which raises customer satisfaction rates. Having a good response from customers, enhanced the company's competitive position through the expansion of the brand into the electronic appliance market. Having clear data processing, the company can reduce data inconsistency processes and can get better supplier relations. In addition, the online store has a good chance of significantly enhancing the company's profit. Therefore, applying a complete computerized system plays a vital role in increasing brand recognition.

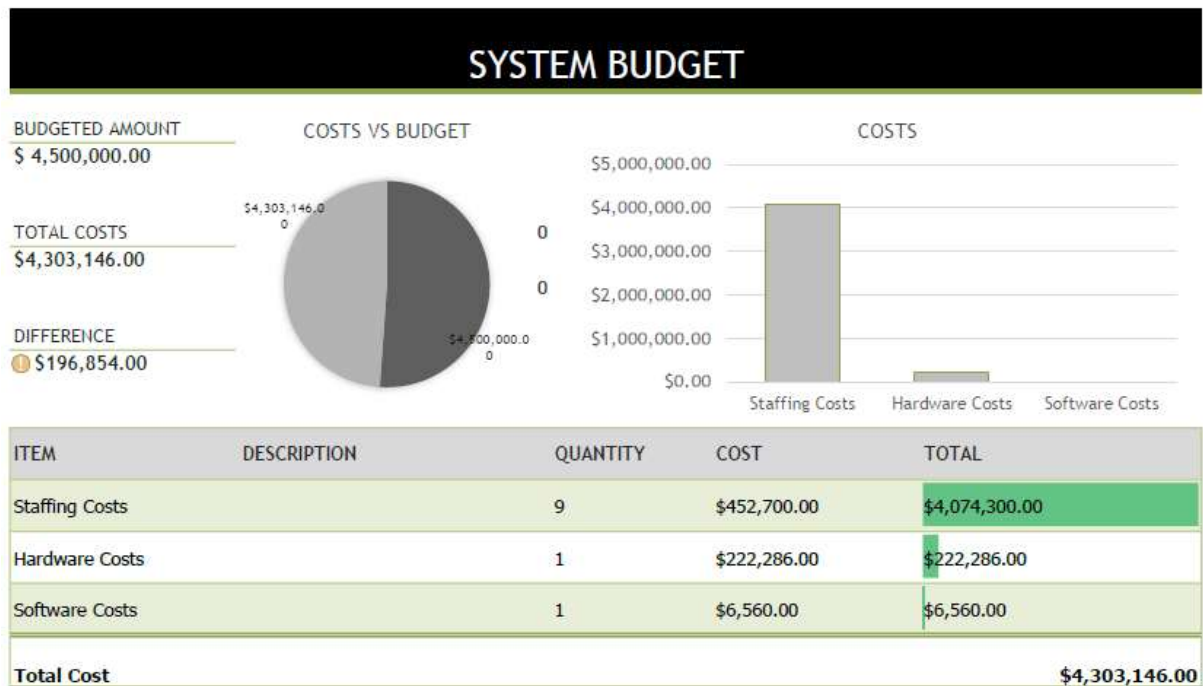
4.3. Organizational Feasibility

After the project, the top management of the company has strong support in the transaction because staff will use the system to store the customer and goods information. Also, the users of the system are expected to appreciate the new system. The Sales department expects the system can enhance the store's efficiency and image and the accounting department expects the system can improve the problem of data inconsistency. Facing any problem, consultants with expertise in similar applications to assist with the project and the staff need some training before using the system.

5. Planning

5.1. Budgeting

There will be a budgeted \$4,500,000.00 and the estimation of the development cost is around \$4,303,146.00 in 9 months excluding the operational cost.



5.2. Hardware

5.2.1. Computer

There will be twenty computers for the retail stores (2+2), office(8), and warehouse(8).

Each computer costs \$6,157.00

Item	Description	Qty	Price
CPU	Intel® Core™ Rocket Lake i5-11400 Processor 2.60 GHz Cache 6 Core 12 Thread LGA1200	1	\$1,399.00
Motherboard	ASRock B560M-HDV R2.0 M.ATX	1	\$660
RAM	Kingston ValueRam DDR4 2666MHz 8GB Ram KVR26N19S6/8	2	\$299
PSU	FSP HV PRO 550 80Plus 550W Bronze PSU	1	\$349
HDD	WD Blue WD10EZEX 1TB 7200rpm 64MB 3.5 Inch HDD	1	\$305
SDD	Kingston KC2500 500GB M.2 NVMe PCIe4 SSD	1	\$499
Case	AeroCool Corporate Series CS 103 M.ATX \$199	1	\$199
Monitor	ASUS VP248H 24" 1920x1080 1ms Monitor	1	\$1,200.00
Keyboard	Logitech K780	1	\$599
Mouse	Logitech M585 Multi-Tasking Mouse	1	\$250

5.2.2. Printer

There will be four printers in retail stores, warehouses, and office for document printing.

Each printer costs \$2,145.00

EPSON WF-C5790

5.2.3. Router

There will be four routers for both retail stores, head office, and warehouse. Each router costs \$2,199.00

ASUS ZenWifi AX (XT8) Mesh Wifi System

5.2.4. Android Device

The delivery workman and installation workman will use an android device to access the system. There will be ten android devices, and each device costs \$2,598.00

Samsung Galaxy Tab S6 Lite (LTE) P615

5.2.5. Barcode Scanner

The sales representative and inventory clerk will use a barcode scanner to scan the barcode for the goods information and calculate stock level. There will be ten barcode scanners, and each device costs \$659.00

Honeywell 1300G Laser Barcode scanner

5.2.6. Server

There will be four servers, including a web server, application server, database server, and a backup server. Each server costs \$12,300.00

Lenovo ThinkSystem ST250

DESCRIPTION	SPECIFICATIONS
Form Factor	4U chassis: Height: 430mm (16.9 inches), Width: 175mm (6.9 inches), Depth: 566mm (22.3 inches) Optional ST250 rack-mount kit
Processors	1x Intel® Xeon® E-2200 processors, up to 6 cores at 95W.
Memory	Up to 128GB in 4x DIMM slots using 32GB DIMMs 2666MHz TruDDR4
Expansion Slots	x1 lane PCIe Gen3 in x1 slot; x16 lane PCIe Gen 3 in x16 slot (for GPU); x4 PCIe Gen3 in x4 slot; x4 PCIe Gen3 in x8 slot
Network Interface	2x 1GbE ports standard; 1x 1GbE dedicated management port
Power	Dual-redundant 80 PLUS power supply unit (PSU) 550W; fixed PSU 250W; power efficiency up to Platinum; Energy Star 2.1 compliant
Operating Systems	Microsoft, SUSE, Red Hat, VMware vSphere. Microsoft Windows Client OS – Win10 tested

HARDWARE BUDGET

BUDGETED AMOUNT

\$ 250,000.00

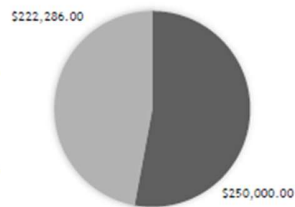
TOTAL COSTS

\$222,286.00

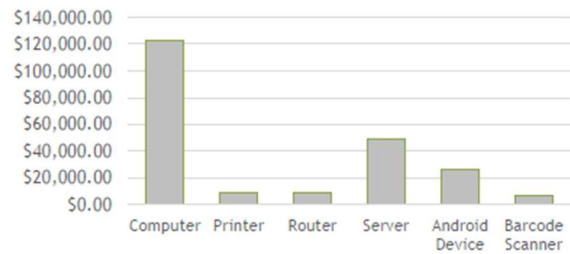
DIFFERENCE

\$27,714.00

COSTS VS BUDGET



HARDWARE COSTS



ITEM	DESCRIPTION	QUANTITY	COST	TOTAL
Computer		20	\$6,157.00	\$123,140.00
CPU	Intel i5-11400	1	\$1,399.00	\$1,399.00
Motherboard	ASRock B560M	1	\$660.00	\$660.00
RAM	Kingston DDR4 2666MHz 8GB	2	\$299.00	\$598.00
Power Supply Unit	FSP 550W Bronze PSU	1	\$349.00	\$349.00
HDD	WD Blue WD10EZEX 1TB	1	\$305.00	\$305.00
SDD	Kingston KC2500 500GB	1	\$499.00	\$499.00
Case	AeroCool Corporate Series M.ATX	1	\$199.00	\$199.00
Monitor	ASUS VP248H 24" Monitor	1	\$1,299.00	\$1,299.00
Keyboard	Logitech K780	1	\$599.00	\$599.00
Mouse	Logitech M585 Mouse	1	\$250.00	\$250.00
Printer	Epson WF-C5790	4	\$2,145.00	\$8,580.00
Router	ASUS ZenWifi AX (XT8) Mesh Wifi	4	\$2,199.00	\$8,796.00
Server	Lenovo ThinkSystem ST250	4	\$12,300.00	\$49,200.00
Android Device	Samsung Galaxy Tab S6 Lite (LTE) P615	10	\$2,598.00	\$25,980.00
Barcode Scanner	Honeywell 1300G Laser Barcode scanner	10	\$659.00	\$6,590.00
Total Cost				\$222,286.00

5.3. Software

5.3.1. Windows OS

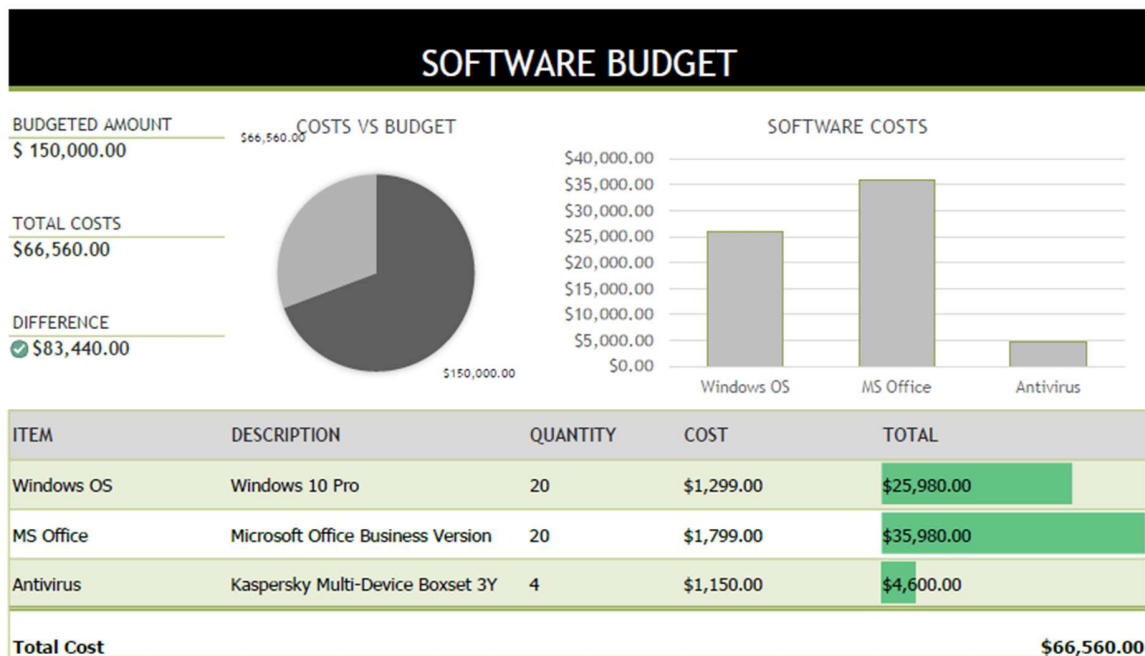
Windows 10 Pro Operation System \$1,299.00 * 20

5.3.2. MS Office

Microsoft Office Business Version \$1,799.00 * 20

5.3.3. Antivirus

Kaspersky Internet Security 2018 Multi-Device set 3 Years - 5 Devices Pack \$1,150.00 *4



5.4. Staffing

A staffing budget outlines the costs business plans to spend on employees for the project. We will hire a total of thirteen staff including one project manager, three frontend developers, four backend developers, one designer, two consultants, and two analysts. The project manager is responsible for leading and directing other staff for the completion of this project, especially monitoring, and controlling the sprints of the development. The frontend developer is responsible for determining the structure and design of web pages and ensuring the customer experience determines design choices. The backend developer is responsible for developing the application, also should be able to maintain and debug. The designer is responsible for asking the customer's needs and making a conceptual design to meet the system requirements. The IT consultant is responsible for following up on customers' needs and providing sales presentations, pre-sales, and after-sales activities, also providing IT solutions to the customers. The IT analyst is responsible for analyzing the current systems of the company, architectures, and processes, also, identifying risks for the development.

Position	Number	Salary/ Month
Project Manager	1	\$54,200.00
Frontend Developer	3	\$26,700.00
Backend Developer	4	\$34,000.00
Designer	1	\$22,000.00
IT Consultant	2	\$39,200.00
IT Analyst	2	\$41,000.00

Total 13 Persons
Project Duration ~ 9 Months
Total Salary(\$452,700.00 * 9) = \$4,074,300.00

5.4.1. Project Manager

Job Highlights

- NetSuite, Microsoft Office 365, and SharePoint
- Dynamic working environment
- Great exposure to technical transformation
- IT Project Management permanent role

Responsibilities

- Manage and lead the planning and implementation of IT technical projects (e.g. Cloud implementation, IT infrastructure projects).
- Manage project schedule, resources, and risks. Perform proper escalation to ensure project success.
- Ensure all the contractual commitments and deliverables are successfully delivered by vendors on time and within the budget.
- Conduct system analysis, implementation, testing, user training, and documentation on IT systems.
- Interface with customers on system implementation for business systems projects.
- Perform product evaluation, vendor selection, and procurement of IT solutions/products.

Requirement

- Degree in IT/ Computer Sciences/ Computer Engineering or related discipline
- 5 years solid experience in IT project management with technical knowledge.
- Certified in any PMP, Agile, or Scrum Master is preferred
- Key Competencies:
 - o Leading others
 - o Composure
 - o Interpersonal Savvy
 - o Business Acumen

5.4.2. Frontend Developer

Job Highlights

- Programming skills in HTML5, CSS3, JavaScript
- Experience in Node.js, React.js/Vue.js

Responsibilities

- Collaborate with Project Manager and other teammates in the development team to design and develop a well-structured front-end architecture system in an agile approach
- Collaborate with Backend developers to integrate new features and unique consumer-facing products
- Research and provide suggestions for product development strategies

Requirement

- Programming skills in HTML5, CSS3, JavaScript (Node.js and react native)
- Experience in Node.js, React.js/Vue.js is a plus
- Proficient in web development on WordPress
- Experience in open-source control systems such as Git and automated testing suites such as Jest
- Strong analytical, problem-solving skills and ability to pick up new technologies
- Good understanding of TDD mindset and functional programming
- Good sense of UI / UX design

5.4.3. Backend Developer

Job Highlights

- Knowledge in react native (JavaScript), Node.js
- Experience in IOT is a plus
- Passionate in technology is a must

Responsibilities

- Collaborate with Project Manager and other teammates in the development team
- Participating in application implementation and system enhancements
- System maintenance, troubleshooting, and periodically web/app deployment

Requirement

- Degree/Diploma in Computing Science or equivalent
- Minimum 3 years of solid and relevant experience in web service/ software development
- Proficiency in HTML5, CSS3, Node.js, and react native
- Familiar with different backend technologies, including Serverless, Oauth, and NoSQL
- Experience in cloud infrastructures such as AWS, GCP, and Azure
- Experience in IOT is a plus
- Application with less experience will be considered as Junior Developer

5.4.4. Designer

Job Highlights

- Knowledge of design techniques, tools, and principles
- Experience in IOT is a plus
- Passionate in technology is a must

Responsibilities

- Ability to solve complex problems with an analytical, systematic approach
- Ability to communicate and work well with the development team to ensure functionality in their design

Requirement

- Degree/Diploma in Computing Science or equivalent
- Minimum 1 year of relevant experience in web service/ software design
- Strong critical and analytical thinking
- Adept at problem-solving

5.4.5. IT Consultant

Job Highlights

- Bachelor's degree or above in IT
- Minimum of 2 years experience in IT support
- In-depth knowledge of PC Windows 10 and MS office

Responsibilities

- Handle requests and answer users' queries at the IT Services Desk
- Provide level 2 support to users on software, hardware, and mobile device issues.
It includes onsite and remote support
- Provide meeting event setup support (internal and external)
- Perform hardware and software installation
- Assist in projects as assigned

Requirement

- Bachelor's degree or above in IT or another related discipline
- Minimum of 2 years experience in IT support or related fields
- Strong critical and analytical thinking
- Excellent communication and interpersonal skills
- Proven time management skills and able to work under pressure

5.4.6. IT Analyst

Job Highlights

- Bachelor's degree or above in IT
- Minimum of 1 year's experience in IT
- Recognize the areas for improvement within IT infrastructures

Responsibilities

- Creating and examining the functional specifications
- Be in constant touch with the stakeholders to have a better understanding of the requirements.
- Collect information from end-users about system performance.
- Assist in projects as assigned

Requirement

- Minimum 3-5 years of strong project management and risk management experience
- Proven experience as an IT Analyst, IT Consultant or similar role
- Analytical mindset and problem-solving aptitude
- Excellent communication and interpersonal skills

STAFFING BUDGET (Monthly)

STAFFING BUDGETED
AMOUNT

\$ 500,000.00

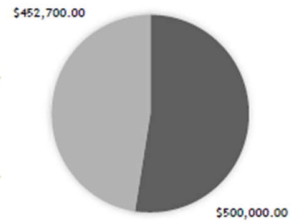
STAFFING TOTAL COSTS

\$452,700.00

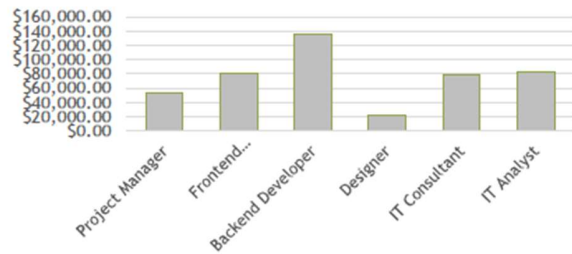
DIFFERENCE

🕒 \$47,300.00

COSTS VS BUDGET



STAFFING COSTS

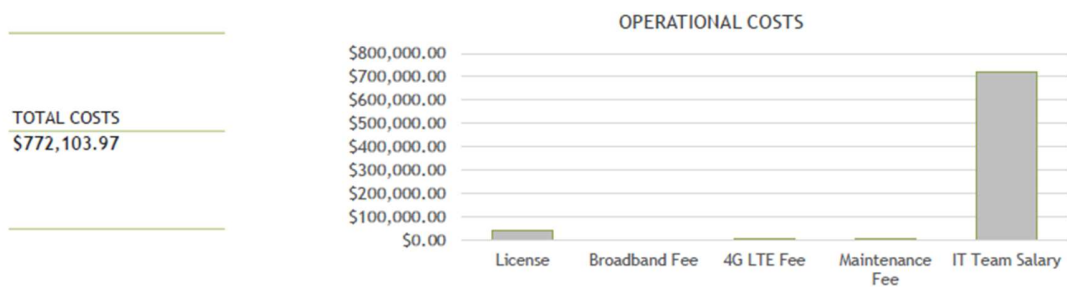


ITEM	DESCRIPTION	QUANTITY	COST	TOTAL
Project Manager	Project Leader	1	\$54,200.00	\$54,200.00
Frontend Developer	Frontend Develop	3	\$26,700.00	\$80,100.00
Backend Developer	Backend Develop	4	\$34,000.00	\$136,000.00
Designer	System Design	1	\$22,000.00	\$22,000.00
IT Consultant	IT Consulting and Supporting	2	\$39,200.00	\$78,400.00
IT Analyst	Analysis, Maintenance, and Enhancement System	2	\$41,000.00	\$82,000.00
Total Cost				\$452,700.00

5.5. Operational Costs

SQL License	\$42,387.97 / year
Broadband Fee	\$2,136.00 / year
4G LTE Fee	\$2,580.00 / year
Maintenance Fee	\$5,000 / year (approximately)
IT Team Salary(2 persons)	\$720,000.00 / year

OPERATIONAL COSTS PER YEAR



ITEM	DESCRIPTION	QUANTITY	COST	TOTAL
License	SQL License	1	\$42,387.97	\$42,387.97
Broadband Fee	Broadband Plans For Commercial	1	\$2,136.00	\$2,136.00
4G LTE Fee	Mobility Service Plan for Tablets	1	\$2,580.00	\$2,580.00
Maintenance Fee	System / Hardware Maintenance Fee(approximately)	1	\$5,000.00	\$5,000.00
IT Team Salary	IT Officer(Database and System)	2	\$360,000.00	\$720,000.00
Total Cost				\$772,103.97

5.6. Schedule

5.6.1. Agile Development Sprint Cycle

Development Methodology: Agile Development Sprint Cycle



This development methodology focuses on streamlining the Software Development Life Cycle, including face-to-face communication. It is suitable when our team has a clearly defined and well-managed product backlog for the system. The communication between the team and customers can lower the confusion and help the team make informed decisions about which items should be the priority.

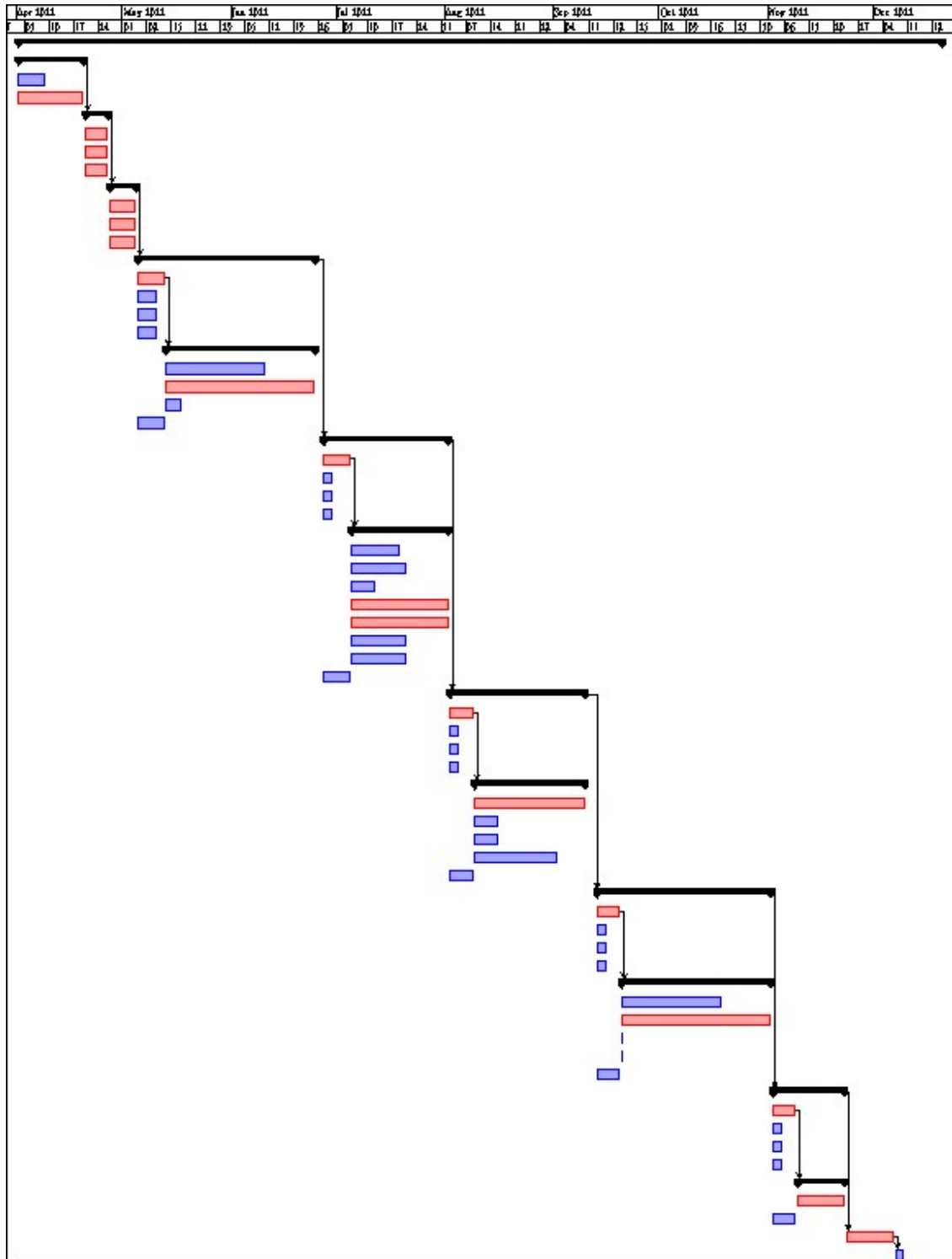
Unlike the traditional framework, customers will be involved in different processes (planning, design, and feedback), which make good communication and reduce risks as well. When the sprint is finished, the project manager will have a meeting with all team members and the customers for feedback. It will demonstrate the output of the sprint, and determine which tasks are done or are not done. Also, the main point of the meeting is to review the project forecasts.

5.6.2. Gantt Chart

The task table shows all the project tasks and their accompanying information in lists.

	📌	Name	Duration	Start	Finish	Predecessors
1		📁 Agile Project Plan	179 days	4/1/22 8:00 AM	12/20/22 5:00 PM	
2		📁 User Stories	10 days	4/1/22 8:00 AM	4/19/22 5:00 PM	
3		Identify Key Stakeholders	5 days	4/1/22 8:00 AM	4/8/22 5:00 PM	
4		User Story	10 days	4/1/22 8:00 AM	4/19/22 5:00 PM	
5		📁 Product Backlog	5 days	4/20/22 8:00 AM	4/26/22 5:00 PM	2
6		Create Product Backlog	5 days	4/20/22 8:00 AM	4/26/22 5:00 PM	
7		Story Estimation	5 days	4/20/22 8:00 AM	4/26/22 5:00 PM	
8		Prioritize	5 days	4/20/22 8:00 AM	4/26/22 5:00 PM	
9		📁 Sprint Planning	5 days	4/27/22 8:00 AM	5/4/22 5:00 PM	5
10		Create Project Timeline	5 days	4/27/22 8:00 AM	5/4/22 5:00 PM	
11		Draft Resource Plan	5 days	4/27/22 8:00 AM	5/4/22 5:00 PM	
12		Plan Project Budget	5 days	4/27/22 8:00 AM	5/4/22 5:00 PM	
13		📁 Sprint #1	35 days	5/5/22 8:00 AM	6/24/22 5:00 PM	9
14		Sprint #1 - Planning	5 days	5/5/22 8:00 AM	5/12/22 5:00 PM	
15		Sprint #1 - Design	3 days	5/5/22 8:00 AM	5/10/22 5:00 PM	
16		Sprint #1 - Execution	3 days	5/5/22 8:00 AM	5/10/22 5:00 PM	
17		Sprint #1 - Demo	3 days	5/5/22 8:00 AM	5/10/22 5:00 PM	
18		📁 Sprint #1 - Implementation	30 days	5/13/22 8:00 AM	6/24/22 5:00 PM	14
19		Database System	20 days	5/13/22 8:00 AM	6/10/22 5:00 PM	
20		POS System	30 days	5/13/22 8:00 AM	6/24/22 5:00 PM	
21		Print Receipt Function	3 days	5/13/22 8:00 AM	5/17/22 5:00 PM	
22		Sprint #1 - Retrospective	5 days	5/5/22 8:00 AM	5/12/22 5:00 PM	
23		📁 Sprint #2	25 days	6/27/22 8:00 AM	8/1/22 5:00 PM	13
24		Sprint #2 - Planning	5 days	6/27/22 8:00 AM	7/4/22 5:00 PM	
25		Sprint #2 - Design	3 days	6/27/22 8:00 AM	6/29/22 5:00 PM	
26		Sprint #2 - Execution	3 days	6/27/22 8:00 AM	6/29/22 5:00 PM	
27		Sprint #2 - Demo	3 days	6/27/22 8:00 AM	6/29/22 5:00 PM	
28		📁 Sprint #2 - Implementation	20 days	7/5/22 8:00 AM	8/1/22 5:00 PM	24
29		Sales Delivery Note Function	10 days	7/5/22 8:00 AM	7/18/22 5:00 PM	
30		Purchasing Order Function	12 days	7/5/22 8:00 AM	7/20/22 5:00 PM	
31		Store Receipt In Database	5 days	7/5/22 8:00 AM	7/11/22 5:00 PM	
32		Re-stock Request Function	20 days	7/5/22 8:00 AM	8/1/22 5:00 PM	
33		Re-order Request Function	20 days	7/5/22 8:00 AM	8/1/22 5:00 PM	
34		Good Received Note Function	12 days	7/5/22 8:00 AM	7/20/22 5:00 PM	
35		Goods Returned Note Function	12 days	7/5/22 8:00 AM	7/20/22 5:00 PM	
36		Sprint #2 - Retrospective	5 days	6/27/22 8:00 AM	7/4/22 5:00 PM	
37		📁 Sprint #3	29 days	8/2/22 8:00 AM	9/9/22 5:00 PM	23
38		Sprint #3 - Planning	5 days	8/2/22 8:00 AM	8/8/22 5:00 PM	
39		Sprint #3 - Design	3 days	8/2/22 8:00 AM	8/4/22 5:00 PM	
40		Sprint #3 - Execution	3 days	8/2/22 8:00 AM	8/4/22 5:00 PM	
41		Sprint #3 - Demo	3 days	8/2/22 8:00 AM	8/4/22 5:00 PM	
42		📁 Sprint #3 - Implementation	24 days	8/9/22 8:00 AM	9/9/22 5:00 PM	38
43		Notification System	24 days	8/9/22 8:00 AM	9/9/22 5:00 PM	
44		Delivery Sessions Timetable	5 days	8/9/22 8:00 AM	8/15/22 5:00 PM	
45		Installation Service Arrangement	5 days	8/9/22 8:00 AM	8/15/22 5:00 PM	
46		Data Analysis System	18 days	8/9/22 8:00 AM	9/1/22 5:00 PM	
47		Sprint #3 - Retrospective	5 days	8/2/22 8:00 AM	8/8/22 5:00 PM	
48		📁 Sprint #4	35 days	9/13/22 8:00 AM	11/1/22 5:00 PM	37
49		Sprint #4 - Planning	5 days	9/13/22 8:00 AM	9/19/22 5:00 PM	
50		Sprint #4 - Design	3 days	9/13/22 8:00 AM	9/15/22 5:00 PM	
51		Sprint #4 - Execution	3 days	9/13/22 8:00 AM	9/15/22 5:00 PM	
52		Sprint #4 - Demo	3 days	9/13/22 8:00 AM	9/15/22 5:00 PM	
53		📁 Sprint #4 - Implementation	30 days	9/20/22 8:00 AM	11/1/22 5:00 PM	49
54		Checking System	20 days	9/20/22 8:00 AM	10/18/22 5:00 PM	
55		Online Store	30 days	9/20/22 8:00 AM	11/1/22 5:00 PM	
56		Login Function	1 day	9/20/22 8:00 AM	9/20/22 5:00 PM	
57		Logout Function	1 day	9/20/22 8:00 AM	9/20/22 5:00 PM	
58		Sprint #4 - Retrospective	5 days	9/13/22 8:00 AM	9/19/22 5:00 PM	
59		📁 Sprint #5	15 days	11/2/22 8:00 AM	11/22/22 5:00 PM	48
60		Sprint #5 - Planning	5 days	11/2/22 8:00 AM	11/8/22 5:00 PM	
61		Sprint #5 - Design	3 days	11/2/22 8:00 AM	11/4/22 5:00 PM	
62		Sprint #5 - Execution	3 days	11/2/22 8:00 AM	11/4/22 5:00 PM	
63		Sprint #5 - Demo	3 days	11/2/22 8:00 AM	11/4/22 5:00 PM	
64		📁 Sprint #5 - Implementation	10 days	11/9/22 8:00 AM	11/22/22 5:00 PM	60
65		Final Implementation	10 days	11/9/22 8:00 AM	11/22/22 5:00 PM	
66		Sprint #5 - Retrospective	5 days	11/2/22 8:00 AM	11/8/22 5:00 PM	
67		Final Test	10 days	11/23/22 8:00 AM	12/6/22 5:00 PM	59
68		Staff Training	3 days	12/7/22 8:00 AM	12/9/22 5:00 PM	67
69		Final Report	10 days	12/7/22 8:00 AM	12/20/22 5:00 PM	67

The following taskbars show the duration of each task. The total duration and the duration of the sprints will be shown in black; the critical tasks(dependency) will be shown in red, and the non-critical tasks will be shown in blue.



Project Start Date: 01 April 2022
 Expected Completion Date: 20 December 2022
 Total Duration: 179 Days

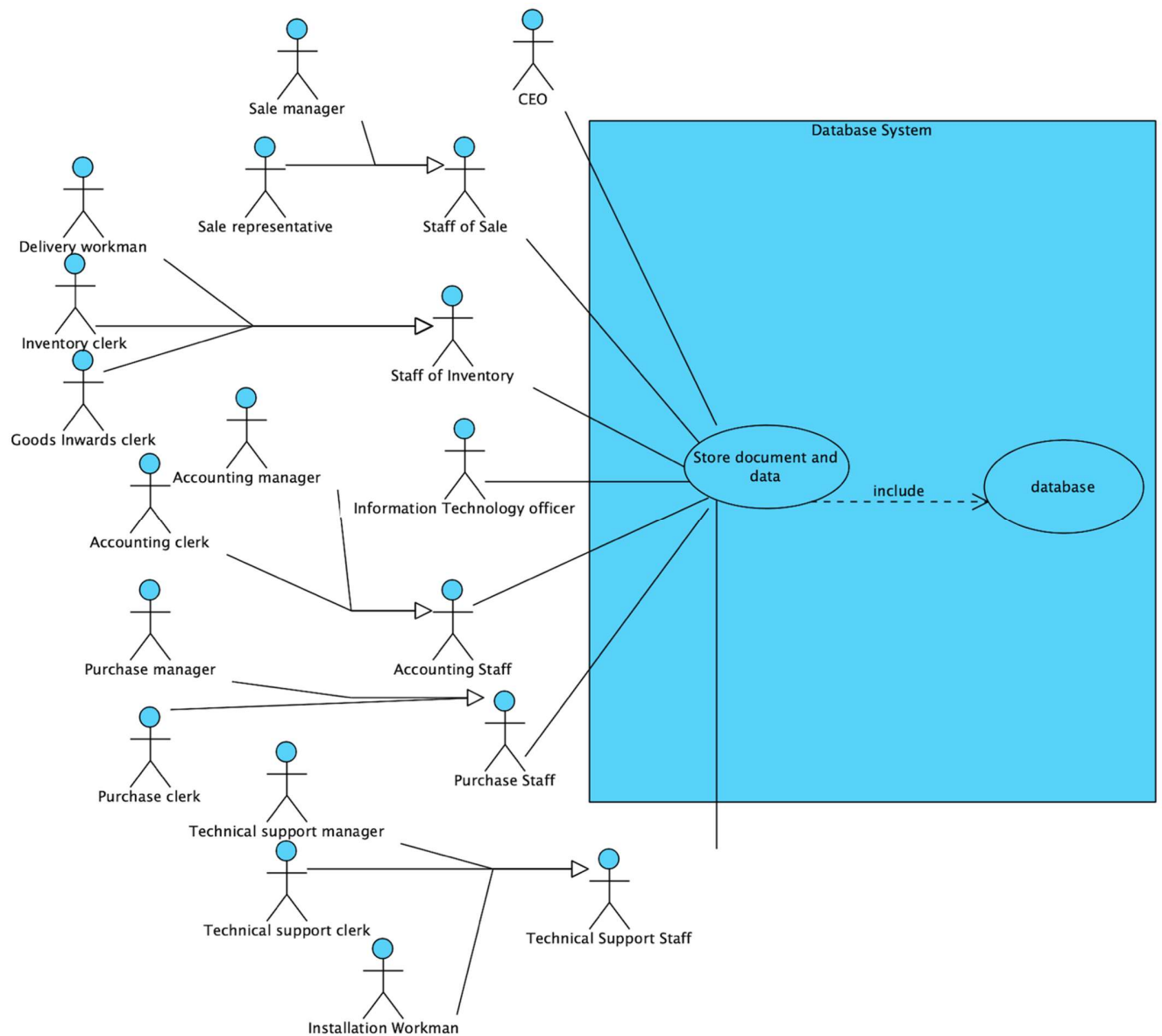
5 days working excluding holidays

Ching Ming Festival	5 April	Tuesday
Good Friday	15 April	Friday
Easter Monday	18 April	Monday
The day following Labour Day	2 May	Monday
The day following the Birthday of the Buddha	9 May	Monday
Tuen Ng Festival	3 June	Friday
Hong Kong Special Administrative Region Establishment Day	1 July	Friday
The second day following the Chinese Mid- Autumn Festival	12 September	Monday
Chung Yeung Festival	4 October	Tuesday

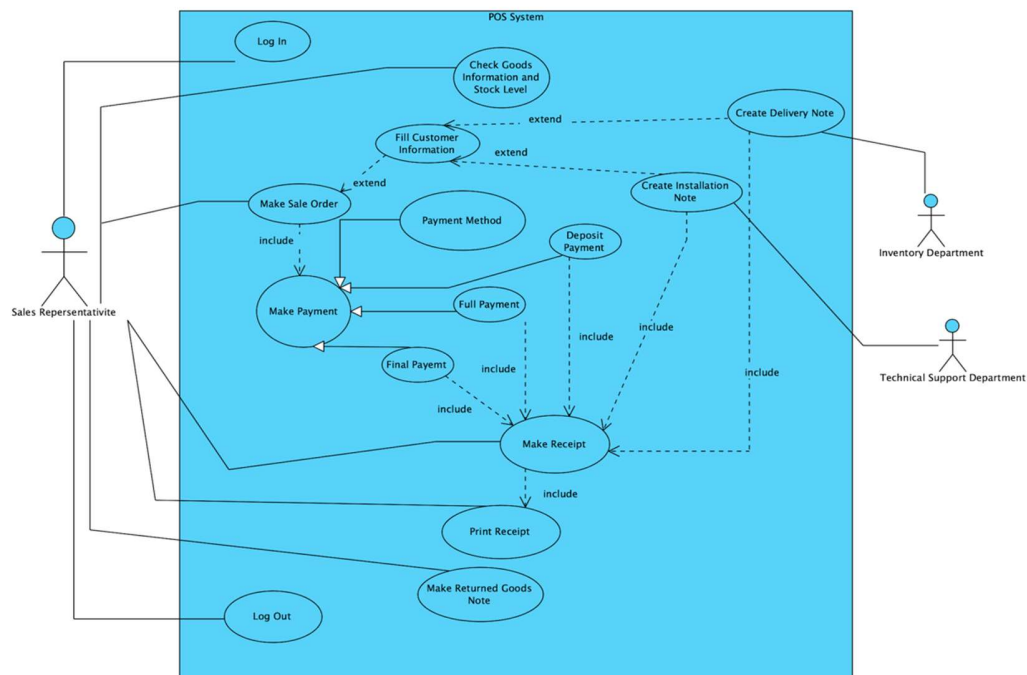
6. Current Problems & Proposed Solutions

6.1. Use Case

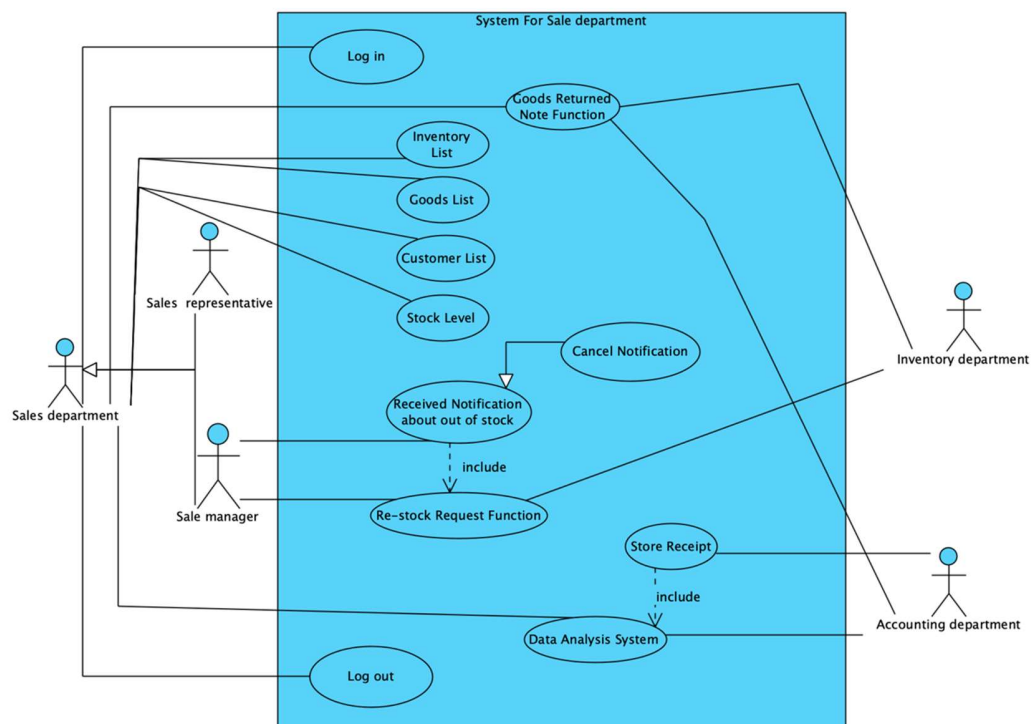
Database System



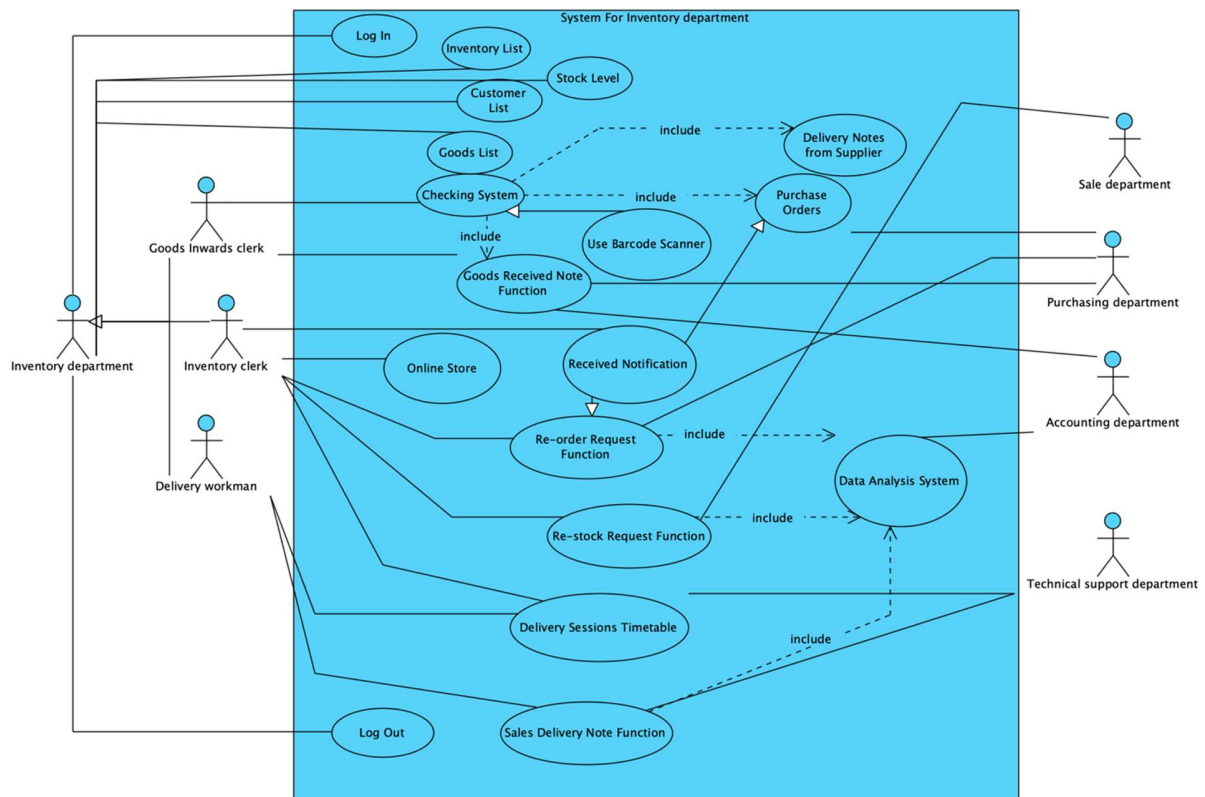
POS System



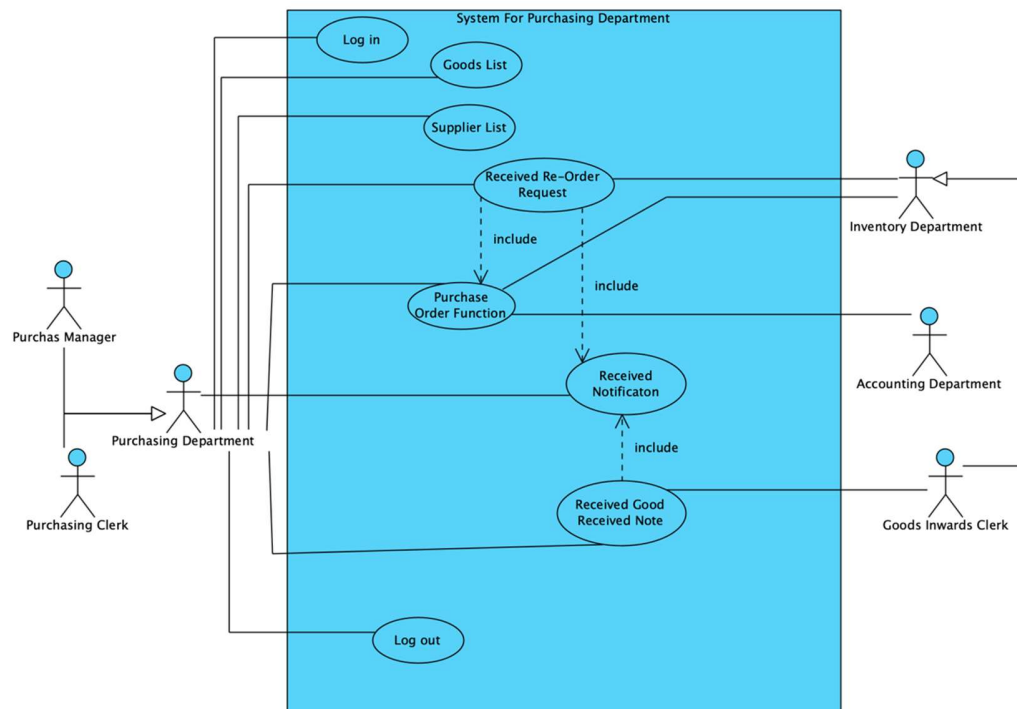
System For Sales Department



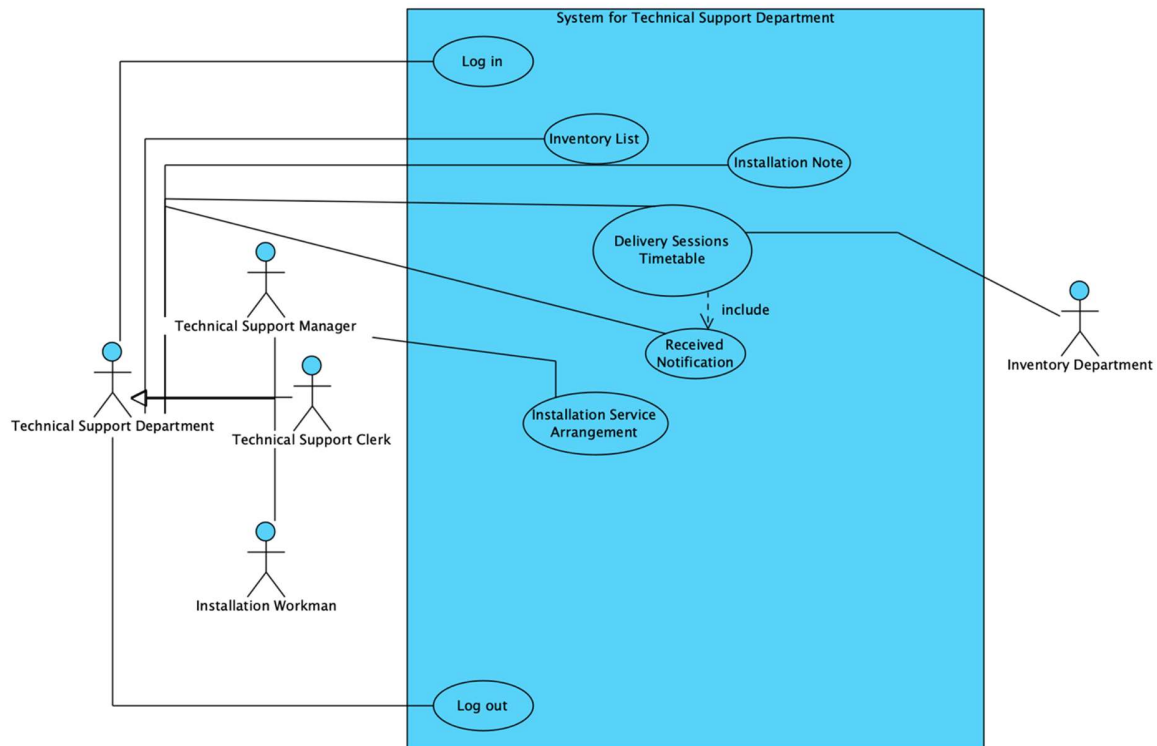
System For Inventory Department



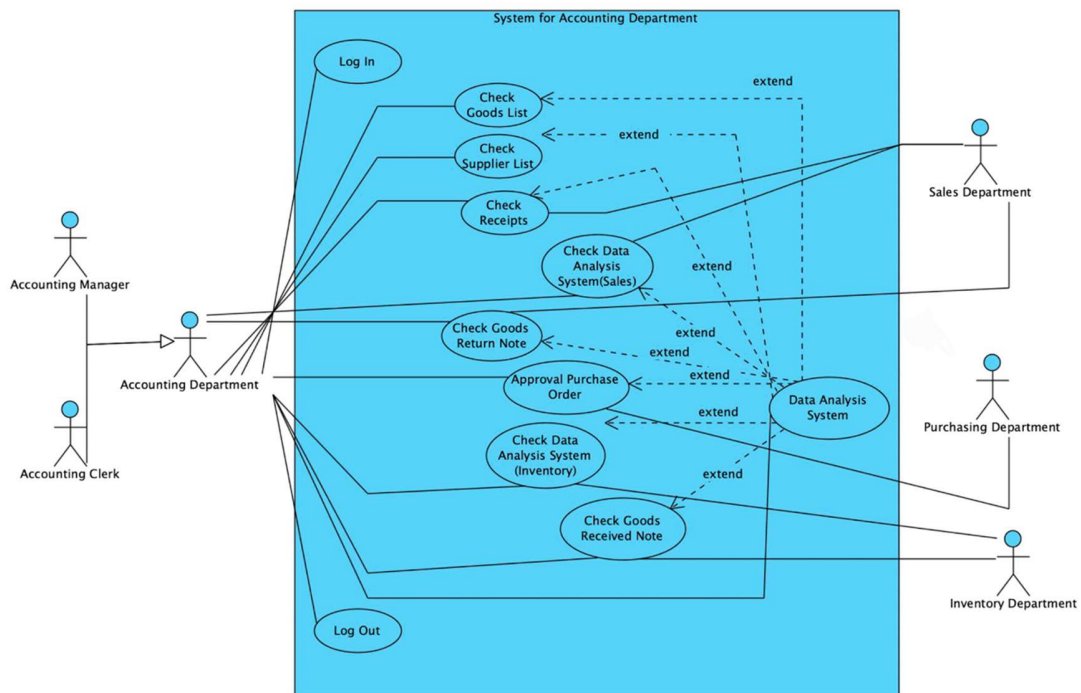
System For Purchasing Department



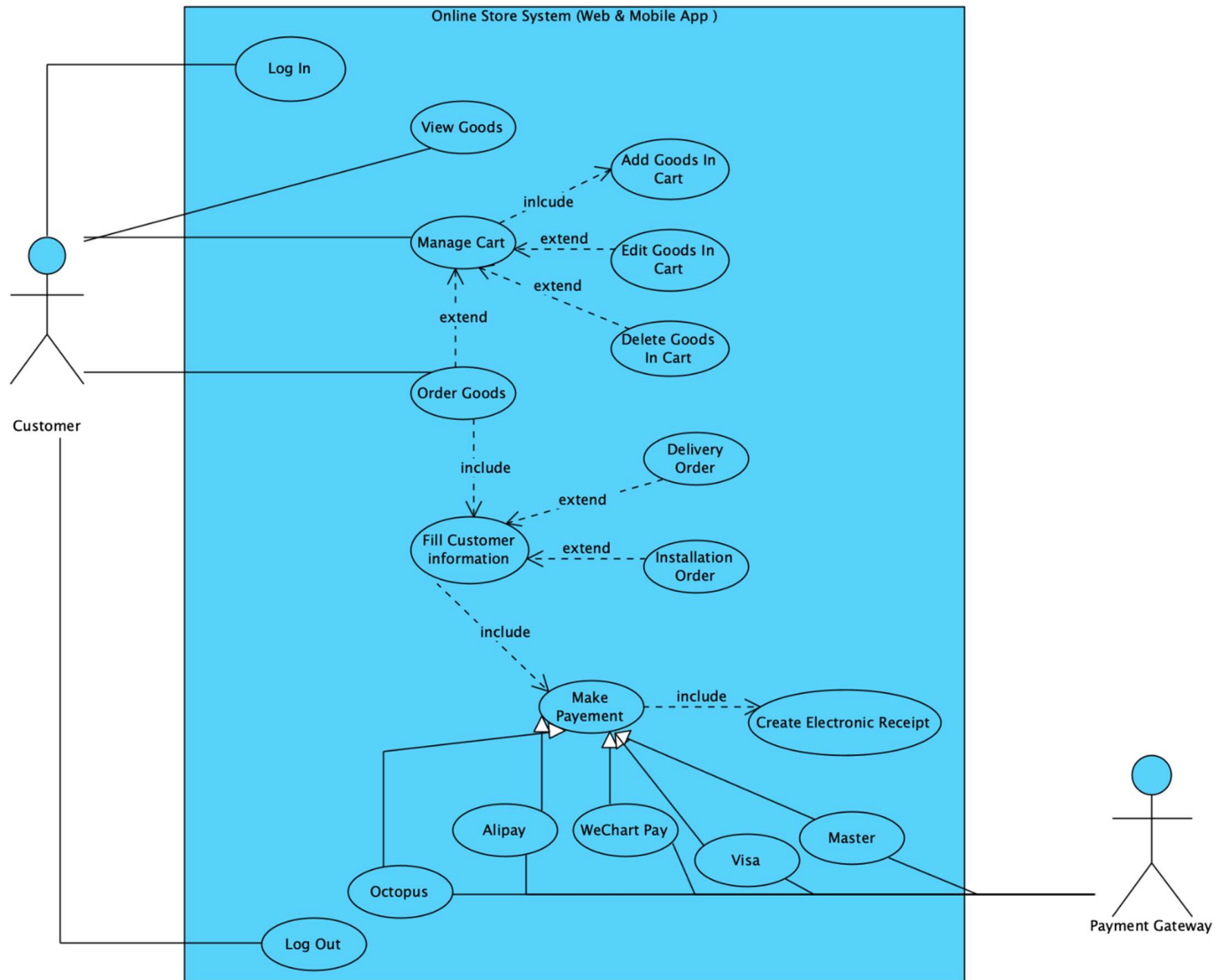
System For Technical Support Department



System For Accounting Department



Online Store (Web & Mobile App)



6.2. User Story

6.2.1. Main User Story

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a staff, I want a database, so that I can store all the information on the database.		
Acceptance Criteria: <ul style="list-style-type: none">• The database stores different data, such as sales order, receipt, goods information, stock level...etc.• Users can create, read, update, and delete data• Different users have different permission to view the data.		

Title: Notification System	Priority: 3	Estimate: 24 days
User Story: As a staff, I want a notification system, so that I will be notified when there is some important information.		
Acceptance Criteria: <ul style="list-style-type: none">• The system will pop up a notification box.• Users can send a request as a notification to other users.		

6.2.2. User Story with Problem & Solution

Sales Order

Problem	When the customer makes a deal in the retail store, the sales representative will handwrite a sales order to record the details of the goods such as name, quantity, price, and deposit if possible. It will take a lot of time to write down if the customer buys a huge number of goods, also, it will increase the chance to make errors.
Solution	<ul style="list-style-type: none">• Develop a POS system that allows sales representatives to input data to create a sales order when customers make a deal.• The system will store the data in the database and calculate the stock level when the sales order is placed.

Title: POS System	Priority: 1	Estimate: 30 days
<p>User Story:</p> <p>As a sales representative, I want to create a sales order and receipt through the POS system, so that I can save the data into the system and print a receipt.</p>		
<p>Acceptance Criteria:</p> <ul style="list-style-type: none">• The POS system allows users to input goods information to create a sales order.• Users can check the retail store stock level on the system.• The POS system will automatically generate a receipt after the sales order is placed.• The POS system will automatically generate a sales delivery note if the sales order requires delivery.		

Poor Data Management

Problem	The stock level in the retail stores and warehouse is hard to monitor and track since there is no database system to store all the goods information and stock level. The sales representative has to check whether the goods are available or not and inform sales managers to replenish the stock level of the retail store. If sales representatives forget to inform sales managers, the out of stock will occur in the retail store. It will decrease productivity and efficiency.
Solution	<ul style="list-style-type: none">• Use a database system to store goods information and stock level, which can be updated data by users at once.• Setting a stock level notify reminds sales managers automatically to replenish the stock in the retail store when it is close to out of stock.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a sales manager, I want a stock list, so that I can check stock levels.		
Acceptance Criteria: <ul style="list-style-type: none">• The retail store stock level will be stored in the sales department database.• The sales department can create, read, update, and delete the data of the sales department database.		

Title: Notification System	Priority: 3	Estimate: 24 days
<p>User Story:</p> <p>As a sales manager, I want a stock level notification (Retail Store), so that I can be reminded to replenish the stock in the retail store.</p>		
<p>Acceptance Criteria:</p> <ul style="list-style-type: none"> • Sale managers will receive restock notifications when the quantity of in-store items is close to the re-stock level. • Display the notification every day when the stock level in retail stores remains 3 or lower than 3 quantities of goods. • The notification will disappear when the retail store receives the items. 		

Title: Re-stock Request Function	Priority: 2	Estimate: 20 days
<p>User Story:</p> <p>As a sales manager, I want to send a re-stock request to inventory, so that I can replenish the goods in the retail store.</p>		
<p>Acceptance Criteria:</p> <p>The re-stock request will convert to notification and be sent to the inventory. It will show the item ID, name, and request quantity. The re-stock request function will automatically generate when the in-store item stock level is lower than 3.</p>		

Poor Inventory Control

Problem	When the goods from the retail store are close to re-order level or out of stock, the sales manager will request the inventory department to deliver the goods from the warehouse to the retail store, but the inventory clerk is also hard to monitor and track the stock level of goods in the warehouse. Therefore, the sales manager cannot get the response in real-time.
Solution	<ul style="list-style-type: none">• Build an electronic inventory list to store the goods information, which saves on the database.• Setting a stock level notice reminds the inventory clerk.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As an inventory clerk, I want an inventory list, so that I can store the item information and check the stock level in the inventory list.		
Acceptance Criteria: <ul style="list-style-type: none">• The inventory stock level will be stored in the inventory department database.• The inventory department can create, read, update, and delete the data of the inventory department database.		

Title: Notification System	Priority: 3	Estimate: 24 days
User Story: As an inventory clerk, I want a stock level notification(Warehouse), so that I can be reminded when the warehouse is out of stock.		
Acceptance Criteria: <ul style="list-style-type: none">• The inventory clerk will receive re-order notifications when the quantity of warehouse items is close to the re-order level.• Display the notification every day when the stock level in the warehouse remains 3 or lower than 3 quantities of goods.• The notification will disappear when the warehouse receives the items.		

Handwritten Receipt

Problem	<p>All of the payment receipts are handwritten by the sales representatives, the receipt could be incorrectly written (serial numbers and price) and lead to accounting errors. In addition, the handwritten receipt is easily lost and difficult to keep track of, especially since there is no database system to store the receipt.</p> <p>The accounting department will receive the receipt from the retail store on the first day of each month, to keep handwritten receipts involves a huge amount of file space and searching for a particular receipt could be time-consuming and difficult. On the other hand, when there is a damaged handwritten receipt or the receipt is lost, making a record of the transaction is hard, especially if there is no backup record.</p>
Solution 1	<ul style="list-style-type: none">• Create a POS system to handle customer orders.• The POS system can automatically generate a receipt for the sales order.• The user can use the system to print the receipt.

Title: POS System	Priority: 1	Estimate: 30 days
<p>User Story:</p> <p>As a sales representative, I want to create a sales order and receipt through the POS system, so that I can save the data into the system and print a receipt.</p>		
<p>Acceptance Criteria:</p> <ul style="list-style-type: none"> • The POS system allows users to input goods information to create a sales order. • Users can check the retail store stock level on the system. • The POS system will automatically generate a receipt after the sales order is placed. • The POS system will automatically generate a sales delivery note if the sales order requires delivery. 		

Title: Print Receipt Function	Priority: 1	Estimate: 3 days
<p>User Story:</p> <p>As a sales representative, I want the POS system can generate and print the receipt for the sales order, so that transactions will be sped up.</p>		
<p>Acceptance Criteria:</p> <ul style="list-style-type: none"> • The POS system will automatically generate a receipt when the sales order is placed. • The user can use the print function to print the receipt for the customer and accounting department. 		

Handwritten Sales Delivery Note

Problem	There are three handwritten copies of the Sales Delivery Note which are kept separately for the Inventory department, delivery team, and client. However, the Inventory department only keeps the no Client-sign Sales Delivery Note. If the delivery team loses the Note during delivery, the company cannot track whether goods were delivered to clients successfully.
Solution	<ul style="list-style-type: none">• Use a database system to synchronize Sales Delivery Note

Title: Sales Delivery Note Function	Priority: 2	Estimate: 10 days
User Story: As an inventory clerk and delivery workman, I want an electronic sales delivery note, so that I can avoid losing the sales delivery note.		
Acceptance Criteria: <ul style="list-style-type: none">• The sales delivery note will be stored in the database.• When there are any changes on the sales delivery note, it will update the database.		

Deposit Receipt

Problem	Due to the deposit receipt being kept in the retail store until the payment is fully completed, the sales volume in the account will be incongruent and not appropriate. When the customer forgot to pay the final payment or the payment has been completed in the next month, the accounting department is hard to record the correct sales and profit.
Solution	<ul style="list-style-type: none">• Use electronic spreadsheets to make a receipt and save all electronic receipts no matter completed or uncompleted receipt in the database.• The sales date will be sent to the database once the sales order is completed.

Title: Store Receipt In Database	Priority: 2	Estimate: 5 days
User Story: As a sales representative and accounting staff, I want a database to store all receipts, so that I can check the uncompleted payment and calculate the correct sales profit.		
Acceptance Criteria: <ul style="list-style-type: none">• All receipts will be stored in the database.• The accounting department can view the receipt in the database.		

Delivery Service

Problem	When the sales order includes large items, the sales representative will arrange a delivery for the customer, however, the sales representative has to ask the inventory department to check the availability of the delivery workman. This will decrease the work efficiency and increase manpower.
Solution	<ul style="list-style-type: none">• Build an electronic table of delivery sessions stored on the database for inventory to check and delivery man to accept the delivery.

Title: Delivery Sessions Timetable	Priority: 3	Estimate: 5 days
User Story: As an inventory clerk, I want a delivery sessions timetable, so that I can check the available slot to arrange delivery.		
Acceptance Criteria: <ul style="list-style-type: none">• There will be a calendar and timetable for the delivery sessions, the inventory clerk will see the available time slot and delivery workman available or not.• The delivery workman can accept the delivery on the system, it will show the delivery note.		

Installation Service

Problem	<ul style="list-style-type: none">• When the item of the sales order requires an installation service, the sales representative will arrange an installation service for the customer, however, the sales representative has to ask the technical support department to check the availability of the installation workman. It will decrease the work efficiency and increase manpower.• Besides that, the items need to be delivered at least 2 hours earlier than the installation. The installation workman, who has to check whether the item is delivered or not will take time and decrease the service efficiency.
Solution	<ul style="list-style-type: none">• Use a database system to synchronize the installation and delivery information from receipt, which will automatically update to the technical support department

Title: Installation Service Arrangement	Priority: 3	Estimate: 5 days
User Story: As a sales representative, I want an installation service arrangement function, so that I can check the available slot to arrange installation.		
Acceptance Criteria: <ul style="list-style-type: none">• There will be a calendar and timetable for the installation, the sales representative will see the available time slot of the installation workman.• The installation workman can accept the installation on the system.		

Frequently Records Check

Problem	The number of goods in the retail store inventory has been checked manually by the sales representative frequently, leading to decreased work efficiency and increased manpower.
Solution	<ul style="list-style-type: none">• Use a database system to store goods information and stock level, which can be viewed by the users.

Title: Notification System	Priority: 3	Estimate: 24 days
User Story: As a sales manager, I want a stock level notification (Retail Store), so that I can be reminded to replenish the stock in the retail store.		
Acceptance Criteria: <ul style="list-style-type: none">• Sale managers will receive restock notifications when the quantity of in-store items is close to the re-stock level.• Display the notification every day when the stock level in retail stores remains 3 or lower than 3 quantities of goods.• The notification will disappear when the retail store receives the items.		

Two Retail Stores Data Unsynchronized

Problem	Since there are two retail stores, the price of goods was respectively stored in two hardcopy records. If one of the sales managers from the retail store changed the price, the goods data will be unsynchronized.
Solution	<ul style="list-style-type: none">• Build an electronic table of goods prices and synchronize the data between two retail stores.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a sales manager, I want both retail store's data in the database to be synchronized, so that the price is synchronized in both stores.		
Acceptance Criteria: <ul style="list-style-type: none">• The database will store the goods price of both retail stores.• When the price is changed by one retail store, the database will update the price and the other retail store will be notified the price is updated.		

Store Management

Problem	There are different amounts of re-order level, minimum re-order level, and price of each good. All this data might not be stored probably, the sales manager might send an incorrect request to the inventory, therefore, the chance of human error and mistake will be increased.
Solution	<ul style="list-style-type: none">• Use a database system to store goods information including re-order level, minimum re-order level, and price of goods, which can be viewed by the users.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a staff, I want a database, so that I can store all the information on the database.		
Acceptance Criteria: <ul style="list-style-type: none">• The database stores different data, such as sales order, receipt, goods information, stock level...etc.• Users can create, read, update, and delete data• Different users have different permission to view the data.		

Re-Order Request

Problem	When the non-phasing out items are out of stock, the inventory clerk will send a re-order request to the purchasing department. Due to a large number of items, the chance of human error on the request will be increased.
Solution	<ul style="list-style-type: none">Use the database to store every re-order request, so the inventory clerk can refer to previous re-order requests to make a new re-order request.

Title: Re-order Request Function	Priority: 2	Estimate: 20 days
User Story: As an inventory clerk, I want to send a re-order request to the purchasing department, so that I can replenish the goods in the warehouse.		
Acceptance Criteria: The re-order request will convert to notification and be sent to the purchasing department. It will show the item ID, name, and request quantity. The re-order request function will automatically generate when the in-order item stock level is lower than 3.		

Purchase Order

Problem	Once the request is approved, the purchase order will be generated. If any changes after the accounting department received it, they need to send it back to the purchasing department. This situation will increase manpower.
Solution	<ul style="list-style-type: none">Build a system to send the purchase order between department and department.

Title: Purchase Order Function	Priority: 2	Estimate: 12 days
User Story: As a staff of the purchasing department, I want to send a purchase order, so that I can send a purchase order.		
Acceptance Criteria: <ul style="list-style-type: none">The purchasing department staff can fill the form of the purchase order.The accounting department receives a purchase order.		

Received Goods Checking

Problem	Purchase Order & Delivery Note from Supplier <ul style="list-style-type: none">• Goods Inward Clerk follows the hardcopy of the purchase order and corresponding delivery note to check data of received goods, which is inefficient and needs huge human resources.• Checking received goods manually is lacking automation of data checking, which lifts the risk of human errors.
Solution	<ul style="list-style-type: none">• Use a database to store purchase orders and delivery notes, so Goods Inward Clerk can check data of goods received quickly.• Building a checking system, which can scan the barcode of goods by the Goods Inward Clerk, can calculate the number of goods.

Title: Database system	Priority: 1	Estimate: 20 days
User Story: As a Goods Inward Clerk, I want a database system for storing purchase orders and delivery notes from suppliers, so that the clerk can check data of goods received quickly.		
Acceptance Criteria: <ul style="list-style-type: none">• The database stores different data, such as item name, the quantity of the item, supplier name, received date.• Users can create, read, update, and delete data.• Different users have different permission to view the data.		

Title: Checking System	Priority: 4	Estimate: 20 days
User Story: As a good inward clerk, I want to scan the barcode of items, so that I can make sure that the item information is correct.		
Acceptance Criteria: <ul style="list-style-type: none">• The system has to connect with a barcode scanner.• After scanning the barcode, the item information will match the purchase orders and delivery notes.		

Goods Received Note

Problem	<ul style="list-style-type: none">• Goods Inwards Clerk may make human errors when he/she generates the goods received note. For the reason that the goods received note is referred to different suppliers purchase orders and delivery notes.• After the goods received note is generated, the inventory department has to make two copies, which will be sent to the Purchase Department and Accounting Department by post or fax. Nevertheless, it may cause data loss during the process.
Solution	<ul style="list-style-type: none">• Use electronic spreadsheets to make goods received notes and store them in the database.• Store the electronic note in the database, which is easy to update data and allows other departments to read it at the same time.

Title: Goods Received Note Function	Priority: 2	Estimate: 12 days
<p>User Story:</p> <p>As a good inwards clerk, I want goods received note, so that I can insert the data of goods in the note.</p>		
<p>Acceptance Criteria:</p> <ul style="list-style-type: none">• The good inward clerk can fill and update the form of goods received note.• The accounting department and purchase department receive the electronic goods received note after the good inwards clerk sends it.		

Goods Returned Note

Problem	The sales representative has to send two paper copies of the Goods Returned Note for the Inventory Department and Accounting Department. This method of data sharing has a high risk of data loss and is inefficient.
Solution	<ul style="list-style-type: none">• Store the electronic note in the database, which is easy to update data and allows other departments to read it at the same time.

Title: Goods Returned Note Function	Priority: 2	Estimate: 12 days
User Story: As a sales representative, I want a goods returned note, so that I can insert information about returned goods in the note.		
Acceptance Criteria: <ul style="list-style-type: none">• The sales representative can fill the form of goods returned note.• The accounting department and inventory department receive the electronic goods received note after the sales representative sends it.		

Update of Stock Book

Problem	The stock book will be updated by handwork and delayed without an instant data update system. It may influence the use of stock in the warehouse and cause data inconsistency from department to department.
Solution	<ul style="list-style-type: none">• Use a database to store data of the stock book, so users can instantly check the changes of the stock book without delay.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a staff, I want a database, so that I can store all the information on the database.		
Acceptance Criteria: <ul style="list-style-type: none">• The database store different data, such as sales order, receipt, goods information, stock level...etc.• Users can create, read, update, and delete data• Different users have different permission to view the data.		

Data Analysis

Problem	Accounting clerks use complex data from different handwritten documents to analyze sales activities and generate reports, which is inefficient and has a high risk of human errors occurring.
Solution	<ul style="list-style-type: none">• Use a database to store all electronic documents, which is convenient for accounting clerks to do data analysis.

Title: Data Analysis System	Priority: 3	Estimate: 18 days
User Story: As an accounting manager, I want a data analysis system, so that I can analyze the sales activities easier.		
Acceptance Criteria: <ul style="list-style-type: none">• The system will generate a daily, weekly, or monthly report for the accounting department.• The accounting department can check the sales and profit.• The system will show all related data for analysis.		

Data Exchange of All Department

Problem	The same paper copies of documents were put in a different department causing data consistency. It may cause misunderstanding between department and department.
Solution	<ul style="list-style-type: none">• All data will be stored on the database, some data will be shared with specific departments or positions.

Title: Database System	Priority: 1	Estimate: 20 days
User Story: As a staff, I want a database, so that I can read the data I need on the database.		
Acceptance Criteria: <ul style="list-style-type: none">• The database stores different data, such as sales order, receipt, goods information, stock level...etc.• Users can create, read, update, and delete data• Different users have different permission to view the data.		

6.2.3. Requirement

Title: Online Store	Priority: 4	Estimate: 30 days
User Story: As a CEO, I want an online store, so that customers can shop online.		
Acceptance Criteria: <ul style="list-style-type: none">• Connect with database• Having log in function for customer• display detail of goods• Have a shopping cart• provide digital payment		

Title: Login Function	Priority: 4	Estimate: 1 day
User Story: As a staff, I want a staff account, so that I can trace the company information and use the account function.		
Acceptance Criteria: <ul style="list-style-type: none">• Connect with database• Set up different permissions.		

Title: Logout Function	Priority: 4	Estimate: 1 day
User Story: As a staff, I want to logout or switch accounts, so that the computer can let every staff access their account.		
Acceptance Criteria: <ul style="list-style-type: none">• Connect with database• Set up different permissions.		

6.3. Function List for Scrum Sprint

Name	Priority	Estimate
Database System	1	20 days
POS System	1	30 days
Print Receipt Function	1	3 days
Sales Delivery Note Function	2	10 days
Purchase Order Function	2	12 days
Store Receipt in Database	2	5 Days
Re-stock Request Function	2	20 days
Re-order Request Function	2	20 days
Goods Received Note Function	2	12 days
Goods Returned Note Function	2	12 days
Notification System	3	24 days

Delivery Sessions Timetable	3	5 Days
Installation Service Arrangement	3	5 Days
Data Analysis System	3	18 days
Checking System	4	20 days
Online Store	4	30 days
Login Function	4	1 day
Logout Function	4	1 day

7. System Requirements

7.1. Functional Requirements

7.1.1. User Login Function

The system requires the user to login into their account to access the system, because of the user authentication, the data in this system is safe and secure. Different users have different permission to access system data, for example, the inventory clerk can read the stock level of the warehouse, but not the sales order and receipt which are placed by the retail store sales.

All the user accounts are created by the admin user, like the information technology officer in the IT department or high-level managers staff in the company.

7.1.2. POS

The POS is a point of sale system which is an assist module where retail store customers make a deal with the sales representative. The sales representative will scan the barcode of the goods or input the item details, such as the goods ID, or goods name to this system, and it will create a sales order with the full list of goods information including the quantity and price, payment, or deposit when the goods are not available at the moment. When the sales order is placed, the system will automatically generate a receipt for the company and customer.

This system will store the sales order and receipt details in the database, and share the data with another department, such as the accounting department. The sales representative can create, read, update, and delete the sales order or receipt. All these changes will update the database data as well. The system can increase productivity and decrease manpower.

7.1.3. Print Receipt Function

This function allows the user, such as the sales representative and the accounting department staff to print the receipt when the receipt is issued. When the sales order is placed, the system will generate the receipt, and the sales representative will print two copies of the receipts, one for the customer, and one for the sales department to keep a record.

Due to the current system is using the handwritten receipt, when there is a mistake written or changes, the sales representative needs more time to write a new receipt, moreover, when the handwritten receipt is lost, it will lead to a lot of problems, like data loss, and unclear payment. So, the automatically generated receipt is good for the company and it can reduce human errors and increase productivity.

7.1.4. Sales Delivery Note Function

The system will create the sales delivery note when the sales order required delivery service, the sales delivery note will be sent to the inventory department, the delivery workman will deliver the goods based on the sales delivery note and upload the note with customer's signature photo when the delivery is done. In the current system, the sales delivery note is handwritten, if the note is lost, it is hard to track whether goods were delivered to customers successfully.

7.1.5. Purchase Order Function

The system will create the purchase order when the purchasing department approved the re-order request sent from the inventory clerk, the purchase order will list the goods that need to be purchased, the quantity of the goods, and the supplier name, this order will send to the accounting department and request a payment. The purchasing department can update or delete the order when there are any changes or cancel orders.

7.1.6. Re-stock Request Function

The system will automatically send a re-stock request to the inventory department when the stock level in the retail store is too low or out of stock, the re-stock request will list the goods that need to be delivered to the retail store, the quantity of the goods and the retail store location. For example, if the sales managers set the re-stock level as 5, the system will notify the sales department when the goods stock level is nearly 5. So, the sales manager can use this function to request a delivery. Moreover, when the goods stock level is lower than 5 or out of stock, the system will automatically send a re-stock request to the inventory if the sales manager forgot to send a request for the re-stock.

7.1.7. Re-order Request Function

The system will automatically send a re-order request to the purchasing department when the stock level in the warehouse is too low or out of stock, the re-order request will list the goods that need to be purchased, the quantity of the goods, and the supplier's name. For example, if the inventory department set the re-stock level as 5, the system will notify the inventory department when the goods stock level is nearly 5. So, the inventory clerk can use this function to request a re-order. Moreover, when the goods stock level is lower than 5 or out of stock, the system will automatically send a re-order request to the purchasing department if the inventory clerk forgot to send a request for the re-order.

7.1.8. Goods Received Note Function

The system will create the goods received note when the goods inwards clerk in the inventory department received the goods delivered by the supplier. The goods inwards clerk will check the purchasing delivery note which is delivered with the inbound goods, and see if it matches with the purchase order which is requested by the inventory clerk. When all details are correct, the goods will count into the stock, and the system will create the goods received note. The system will send it to the purchasing department and the accounting department for the record.

7.1.9. Goods Returned Note Function

The system will create the goods returned note when the customer returns defective goods. The sales representative will check if the goods have a fault or do not work correctly, the goods name with return reason will be input into the system. When the goods returned note is created, it will be sent to the inventory department and accounting department for the record.

7.1.10. Notification System

The system will pop up a notification when receiving related important information or request. The sales manager will receive a notification when the retail stock level is near to the re-stock level, so, the system will automatically turn to the re-stock function interface, the sales manager can decide whether to send a re-stock request to the inventory department or not. The inventory clerk will receive a notification when the warehouse stock level is near to the re-order level, so, the system will automatically turn to the re-order function interface, the inventory clerk can decide whether to send a re-order request to the purchasing department or not.

7.1.11. Delivery Sessions Timetable

The system will create a timetable for the delivery sessions for the sales representative to arrange delivery and the delivery workman to check if there are any delivery orders. When the sales order requires delivery service, the sales representative will use this function to arrange delivery. The delivery workman can check the time sessions in the timetable to see the delivery orders.

7.1.12. Installation Service Arrangement

The technical support department follows the delivery sessions timetable to arrange the installation service, so the technical support clerk marks the installation time in the installation service arrangement for installation workmen to do the following work.

7.1.13. Data Analysis System

All documents and sales data will be stored in the database, which is convenient for accounting clerks to do data analysis, the system will generate a daily, weekly, or monthly report for the accounting department. The system will analyze the sales data from the sales order and show it on the report to identify the specific sales profit and net income.

7.1.14. Checking System

The goods inwards clerk will scan the inbound goods with a barcode scanner, the system will read the details of the goods and stored them in the database.

7.1.15. Online Store

Since there will be an online store in future, we will develop an online store to connect with this system and let customers use digital payment to shop online. The online store will connect to the database as well, it will provide a login function for the customer to log in to their account or sign up as a new member, the online store will show the goods information, and a shopping cart to let them shop online. The customer can see the availability of the goods, if the goods are unavailable, they can put the goods in the shopping cart, once it is available, the system will send an email or SMS message to the customer to notify them the goods is ready.

7.2. Non-Functional Requirements

7.2.1. Usability

The system must display a clear and user-friendly interface for users owing to storing important data and functions. Also, the company has to provide a concise online store interface for customer shopping.

The system will furnish different search functions for staff and customers respectively.

For staff, the interface will provide two search functions including item search functions and consumer search functions. In item search functions, the staff can search item information through some main attributes such as Category, Item Name, Item ID. In addition, the staff can use the consumer-order functions to search customers or transaction information through some attributes such as consumer name, order ID, phone number.

For customers, web/mobile applications will also provide two search functions including the item search function and delivery tracking search function. The customers can use the item search functions to search item information through attributes such as Category, Item Name or price. On the other hand, they can track delivery through the delivery number or phone number in the delivery tracking search function.

Heightening staff's working efficiency is the first thing for a management system. Therefore, the system arranges various permissions for different departments and positions. The staff will not read and use the information and function of another department or higher position on the interface.

7.2.2. Operational

Logging

Preventing the data breach, the system will set up a logging function for staff and customers to trace the transactions and shipments. On the other hand, it should set a log to protect staff and customer accounts. For staff, different accounts will set up permission for different positions to check the various details.

Run hours

The database server will be open 24 hours to prevent data loss. As the main user of the system is company staff, the application system does not provide 24 hours service in order to save money. It will operate on working hours from 6 am to 12 pm, excluding public holidays.

Delivery Sessions

The company will offer 3 delivery sessions from Monday to Saturday, excluding public holidays. Each delivery session only accepts a maximum of 5 appointments.

Time of Delivery Session:
<ul style="list-style-type: none">• Morning (9:00am – 12:00nn)• Afternoon (1:00pm – 5:00pm)• Evening (6:00pm – 10:00pm)

Assign Item ID

The assignment system will assign an ID for each item automatically when the item is inbounded in the warehouse.

7.2.3. Security

Access control

The customer can create an account for shopping in the company web / mobile application. However, they have a few functions to use from the account only.

The specified department managers can create, read, modify, delete staff accounts of that department.

A login function has different permission of operation in the system for users to utilize. The system allows the following permission:

The Access of Sales Manager				Function / Data
CREATE	READ	UPDATE	DELETE	
	✓	✓		Stock Level (Specify Stores)
✓	✓	✓	✓	Re-stock Request Function
	✓		✓	Notification Function (Out of Stock)
	✓			Inventory List
✓	✓	✓	✓	Goods List
✓	✓	✓	✓	Customer List
✓	✓	✓	✓	Data Analysis System (Sales)

The Access of Sales Representatives				Function / Data
CREATE	READ	UPDATE	DELETE	
✓	✓		✓	Sale Order (specify stores)
✓	✓		✓	Payment Receipt (specify stores)
	✓			Stock Level (Specify Stores)
✓	✓	✓	✓	Delivery Note
✓	✓	✓	✓	Installation Note
	✓			Inventory List
✓	✓	✓	✓	Goods Return Note Function
	✓			Goods List
✓	✓	✓		Customer List

The Access of Inventory Clerk				Function / Data
CREATE	READ	UPDATE	DELETE	
	✓			Re-stock Request Function
	✓		✓	Notification Function (Out of Stock)
	✓	✓		Inventory List
✓	✓	✓	✓	Re-order Request Function
	✓			Good Return Note Function
✓	✓	✓	✓	Delivery Sessions Timetable
	✓			Goods Received Note Function
	✓			Goods List
	✓			Supplier List
✓	✓	✓	✓	Data Analysis System (Inventory)
	✓			Online Store

The Access of Goods Inwards Clerk				Function
CREATE	READ	UPDATE	DELETE	
	✓			Purchase Order
✓	✓	✓	✓	Goods Received Note Function
	✓	✓		Inventory List
	✓			Goods List
	✓			Supplier List

The Access of Purchase Manager				Function
CREATE	READ	UPDATE	DELETE	
	✓			Inventory List
✓	✓	✓	✓	Goods List

The Access of Purchase Clerk				Function
CREATE	READ	UPDATE	DELETE	
	✓			Re-order Request Function
✓	✓	✓	✓	Purchase Order
	✓			Goods Received Note Function
	✓			Goods List
✓	✓	✓	✓	Supplier List

The Access of Delivery Workman				Function / Data
CREATE	READ	UPDATE	DELETE	
	✓	✓		Re-stock Request Function
	✓	✓		Sale Delivery Note Function
	✓			Delivery Sessions Timetable

The Access of Technical Support Manager				Function / Data
CREATE	READ	UPDATE	DELETE	
✓	✓	✓	✓	Installation Service Arrangement
	✓			Installation Note
	✓			Inventory List
	✓			Delivery Sessions Timetable

The Access of Technical Support Clerk				Function Data
CREATE	READ	UPDATE	DELETE	
	✓			Installation Note
	✓			Inventory List

The Access of Installation Workman				Function /Data
CREATE	READ	UPDATE	DELETE	
	✓			Installation Service Arrangement
	✓	✓		Installation Note
	✓			Inventory List

The Access of Accounting Manager				Function / Data
CREATE	READ	UPDATE	DELETE	
	✓			Payment Receipts
	✓			Good Return Note Function
	✓	✓		Purchase Order
	✓			Goods Received Note Function
	✓			Goods List
	✓			Supplier List
	✓			Data Analysis System (Sales)
	✓			Data Analysis System (Inventory)
✓	✓	✓	✓	Data Analysis System

The Access of Accounting Clerk				Function
CREATE	READ	UPDATE	DELETE	
	✓			Payment Receipts
	✓			Purchase Order
	✓			Goods Received Note
	✓			Goods Return Note
	✓			Item List
	✓			Supplier

Data Storing

Company data will be stored on a database server, which uses SQL to prevent the problem of data inconsistency

All data from different departments will be centralized on a database server (in a third-party database server) providing SQL service to avoid data inconsistency as the same documents were put in a different department in pursuit of data integrity. Also, users will not worry about data loss since the third-party is going to be responsible for the data protection.

To avoid data loss, all data from the company databases will be backed up by the NAS server per week. Backing up the data per week will balance between the possibility of data loss caused by backing up once a month and the huge operational cost caused by backing up once a day.

7.2.4. Compatibility

The system should be compatible with the geographic operation system. The application server will be provided with three languages such as English, Simplified Chinese, and Traditional Chinese to meet different district user's needs. In addition, various regional users can apply an electronic spreadsheet that is a unified format and digital payment method to cater the Chinese customer. The system will narrow the gap of stores between Hong Kong and the Pearl River Delta Region and speed up the operation.

7.2.5. Performance

The system is required to display a concise interface for users to search for information and deal with consumer requests. Thus, performance should be tidy and reloaded quickly. For instance, the loading time on inserting information and getting information should be reduced. When the user fills the electronic spreadsheet, the performance should provide many options for the user to choose from.

7.2.6. Reliability

Saving plenty of consumers and transaction information, the system must be reliable. It must use a stable and fast server and test perfectly to avoid exceptions before launching. Also, maintenance services play a vital role to ensure that the system and servers work smoothly.

To solve the problem of data inconsistency, the system will provide multi-threading. Only one user can update information in a section at a time lest other users repeat to update.

8. Existing System

In the past few years, Better Limited's main systems were a paper-based system and standalone PCs, which used to use plenty of manual work and hard writing work. The Accounting Department, Technical Support Department, and Information Technology Department were set up in the head office and the Inventory Department was set up in the warehouse. These departments were used to storing data on no inter-connected computers and hardcopy. In addition, the Sales Department was used to handwriting the payment receipts for customers. All departments sent company documents to each department using email and letters. Without a consistent management system, they may send repeated documents to each other and cannot update details of documents at once.

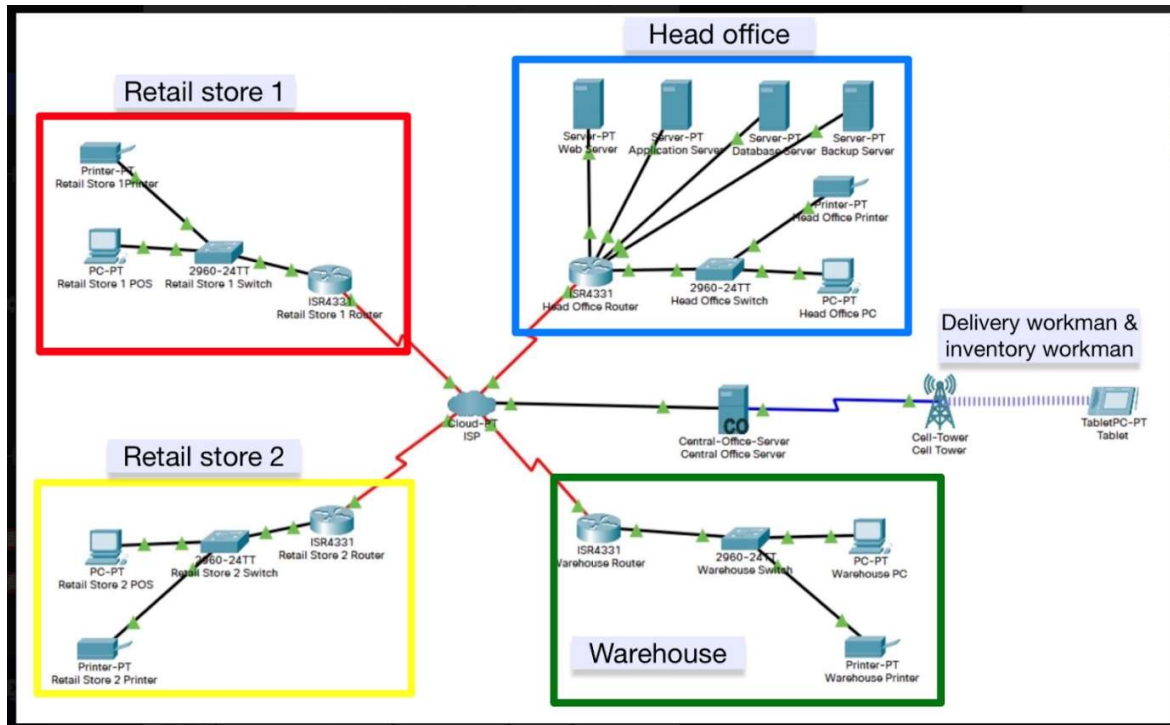
For the payment system, retail stores only accept cash payments for buying goods, which is not convenient for customers who aren't used to bringing cash.

9. Proposed System

Since the company is using paper records to manage the sales order, receipt, and documents, we will develop a computerized system, which is connected with a database to store all of these details including goods information. First, the staff should be login to access the system, different positions will have different permission to create, read, update, and delete data or use specific functions. Using the computerized system can increase productivity and decrease manpower. Besides that, the system can also allow the user to view the retail store stock level or warehouse stock level depending on the user's position. Therefore, the sales manager and the inventory clerk can easily control the stock level when there is a low stock level or out of stock.

The system can create a sales order when the customer makes a deal on the retail store, it allows the sales representative to input goods ID or scans a barcode to read the details of the goods. When the order is placed, the system will generate a receipt and print it for the customer by the printer. However, when the goods are not available, the customer needs to pay a deposit and the system will determine a deposit receipt, and it will show the deposit amount and the amount that should be paid when the goods are available. The system also allows user to send a request to another department, for example, when the goods in the warehouse are nearly out of stock, the inventory clerk will send a re-order request to the purchasing department through the system, later on, the system will generate the purchase order and send it to the accounting department to purchase the out of stock goods from the supplier.

Due to the data sharing from one department to another department, the computerized data can avoid human mistakes and decrease the time to update the paperwork. Moreover, there will be a schedule select option for the delivery and installation. When the sales order requires delivery or installation, the sales representative can see all the available time slots and the workman's availability in the schedule and make a possible time to do the delivery and installation.



The above photo shows two retail stores, head office, and warehouse network planning. Each retail store has computers for the POS system and a printer to print receipts for customers, also a barcode scanner will connect to the computer system as well. Four servers will be set up in the head office and connected to the network, also there will be computers for the system and a printer for document printing. The warehouse also has computers for the system, a printer to print documents, and barcode scanners for inventory goods management. The delivery and installation workman uses an Android tablet to process delivery and installation, customer's signature will be uploaded to the system using 4G LTE internet from the tablet.