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An Undergraduate Internship/Project on “Store Point of Sale Solution Using Power App”

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Independent University, Bangladesh

An Undergraduate Internship/Project on

"Store Point of Sale Solution Using Power App"

By

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Autumn, 2022

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Dissertation submitted in partial fulfillment for the degree
ofBachelor of Science in Computer Science

Department of Computer Science & Engineering

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Attestation

This is to certify I am Ahmad Sayeef Khan (ID: 1520139), submitted in partial fulfilment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). It has been completed under the guidance of Sanzar Adnan Alam sir (Supervisor). I also certify that all my work is original which I have learned during my Internship. All the sources of information used in this project and report has been duly acknowledged in it.

For any information, my internship supervisor, Mahmuda Islam, at my company, Tech Trioz Solution Limited, can be contacted on mahmuda.islam@techtrioz.com.

10/01/2023

Signature Date

Ahmad Sayeef Khan

Name

Acknowledgement

I would like to thank my Almighty. I would like to express my gratitude to the Faculty of Computer Science and Engineering department to keep internship credit in the curriculum of the graduation program to having scope of tasting the flavour of industry-oriented real world tasks and the field of work with my interest. I would like to thank specially and heartily to my supervisor, Sanzar Adnan Alam sir, Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh, who encouraged and directed me with his continuous guidance, invaluable instructions, stimulating suggestions and thoughtful advice during pursuing this internship and preparation of this report. I am also thankful to my supervisor Mahmuda Islam, Managing partner at TechTrioz Solution. She helped me with her kindness, support, guidance, instructions and advice as well as motivating me to achieve more what I even expected. I am very proud and gratified that I was working under her supervision. I am also indebted to the employees of the TechTrioz Solutions and also my office seniors, who gave me immense support while working.

Letter of Transmittal

Sanzar Adnan Alam

Lecturer

Department of Computer Science and Engineering

School of Engineering and Computer Science

Subject: **Submission of Internship Report** for the completion of Graduation.

Dear Sir,

I am hereby submitting my Internship Report, which is a part of the Bachelor Program in Computer Science and Engineering curriculum. It is a great achievement to work under your active supervision. This report is based on, “Internship at TechTrioZ Solutions”. I have got the opportunity to work at TechTrioZ Solutions for three months, under the supervision of Mahmuda Islam, Managing Partner at Tech TrioZ Solutions. This internship has given me both academic and practical exposures. The internship has given me the opportunity to develop a network with the corporate environment. I tried to make this report as much informative as possible with the experience I have gained during my internship period. In order to prepare a well-organized internship report, I have followed the guidelines and described the required fields with sufficient details. I, however sincerely believe that this report will serve the purpose of my internship program. I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgement. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on the issue. Sincerely yours,

Ahmad Sayeef Khan

ID: 1520139

Department of Computer Science and Engineering

Independent University Bangladesh

Evaluation Committee

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Signature

Ms. Ajmiri Sabrina Khan

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Name

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Internal Examiner-1 / Panel Member-1

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Signature

Mr. Sarwar Shahidi

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Name

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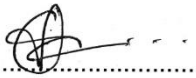
External Examiner-2 / Panel Member-2



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Signature

Mr. Sanzar Adnan Alam

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Name

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Supervisor of the intern

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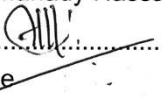
Signature

Dr. Mahady Hassan



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Name

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Head, Department of Computer Science & Engineering

Abstract

Internship is defined as obtaining practical experience from various organizations, which helps in the formation of a connection between theoretical and practical knowledge. It is very important because it is the first time for a student to acquire a keen practical knowledge from the different organizations. When I was offered an internship at TechTrioZ Solutions, I got the chance to work and learn with developer team. The project's goal was to create a Point of sale system using Power App platform which is very newly used platform in Bangladesh. This report covers the whole project that I learned about throughout my internship period. By the mercy of Allah I had prior development experience and knowledge about the Microsoft Power App, Power Automate, Share-point, Microsoft Data-verse, and Dynamic 365 thus I was able to take responsibility for the development of this application. In first chapter there is an introduction about the project, background of the project, objectives, scope of the project and about the organization where I worked. Chapter two describes the literature review where I discussed about market analysis both in local and global market, about similar products and how my undergraduate studies helps me to do this project. Chapter three describes the project management and financing of the project where I describes work breakdown structure, time distribution show in critical map diagram, gantt chart, activity wise resource allocation and about the budget. Chapter four describes about methodology where I describes about agile methodology which I used here, I also describe why use agile methodology. Chapter five describes body projects, where I describe in details about work description, six element analysis, feasibility analysis, problem, effects and constraints analysis. I also give here rich picture, erd diagram, activity diagram, use case diagram, sequence. Functional, non-functional requirements, input, output and architecture of the project also describes in this section. Chapter 6 describes about survey results and analysis. Chapter seven describes project as engineering problem analysis which includes sustainability of the project, social and environmental effects of the project, addressing ethics and ethical issues. Chapter eight describes about the future work, lesson I learned from my internship and finally the conclusion.

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Chapter 1 - Introduction

Internships means of gaining valuable real world experience. The purpose of the internship program is to help students focus on their career interests and learn more about their own potential. This allows students to connect their theoretical knowledge with practical real world implementation and also to expand their existing skills to a new height. Independent University, Bangladesh offers Internship opportunities under "Computer Science and Engineering" program for completing one's graduation. As a student of the undergraduate program myself, it's required that I complete my Internship with a reputable company and as such I have completed my 3 months internship from "Tech Trioz Solutions". In this report, I have elaborated my experience of the internship period spent at "Tech Trioz Solutions". Also a proper overview of the work I have done, what I have learned and how it has helped me to grow professionally.

1.1 Overview/Background of the Work

I started my Internship as a Junior Software Engineer at "Tech Trioz Solutions" from 21st September 2022. I was given the opportunity to work on an Application for Point of Sale for a small store. The application build up on Microsoft Power App Platform. Moreover, this is a solution or combination of two kind of application on Microsoft Platform.

Every store need a system for efficient workflow. The power platform help to make the application easier to their daily business. This solution can be used in mobile, tablet even in desktop/laptop also. User can access different type device at a time. Power app mainly used to business internal application to make their business more easily & also secured than any other platform in market.

User can make sell, track their inventory, store costing in a day, & lots of thing can do with my system.

1.1.1 Organization

An IT solutions company with the dedication and passion to provide quality IT services. Here at Techtrioz solutions, the group of ICT professionals thrive to provide Web and Mobile App development services, Data Analysis, Artificial Intelligence, Software Development services among many other fabulous things to help grow a business digitally. Techtrioz is a one stop solution for all ICT needs.

1.1.2 Company profile

TechTrioz offer clients' quality services, policies and promising tactics by assuring clients the very best service in each category. Whole team is passionate, dynamic and focused when it's time to escalate a business in the digital world. Tech Trioz holds technical expertise in the IT sectors which helps to build digital business in every aspect. They develop responsive and mobile friendly websites to strengthen the online presence of any company. As well as developing custom iPhone, Android, and Native apps to improve service delivery and drive growth for clients. Developing an ecommerce store, which delivers more revenue and works seamlessly with an entire business. Instantly improving sales process and make better decisions with CRM; Sales Integration services.

Expert advice, strategies and campaigns to rank any website on top of search queries at the sector of search engine optimization. Tech Trioz creates highly usable and intuitive designs for the B2B market improving the usability and usefulness of apps for optimal user experience for content designing. For digital advertising Bengal Software helps to reach millions of customer through on-line promotion for any business. Generally Economic value is the measurement of the benefit derived from a good or service to a company. Economic value can also be the maximum price or amount of money that someone is willing to pay for a service. Tech Trioz determines its own economic value by considering requirements of a client.

1.1.3 Products and services

Tech Trioz provides a bunch of quality products and Services. It provides Web/Mobile Based Application Development services. Software Development using interactive software for simulating a three dimensional environment. Tech Trioz extracts large amount of data from website by providing Data Scraping and Data Analysis service. It also provides Chat Assistant (Chat-bot) services for Business Pages Robotic Process Automation.

1.2 Objectives

This system went into development with specific objectives in place that needed to be executed. They are as follows,

• Must meet client's Functional and non-Functional requirements

• Development cost and deadline for the final delivery must be suitable for the client

• Digitalis the current process of sale and by doing so making it more easy and efficient

• Creating a system where client can easily taking decision from visualize reports to use this system

• Business flow can change anytime & taking action immediately into the app

• Delivering an easy to use application for the general public – Bug less system – Native and innovative UI/UX for android, IOS, windows.

1.3 Scopes

This application based real time solution for managing a store from any device. It's very effective for store cashier, store manager & also store owner to track their business performance. This application has three different types of user base and such as cashier login make sell, update inventory & create new loyal customer, Manager should able to track store inventory, should track cashier activity & also can make sell to the customer, Admin role or activity is more, admin can track & manage all users, Admin able to track & manage the inventory also the sale performance of every shift has done for a cashier. Admin can able to see visual report in Power Bi.

Chapter 2 - Literature Review

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from undergraduate courses have helped in the development of "Point of sale System" project. It would have proven more difficult if these courses were not covered before working on this project. Some of the courses are:

Object Oriented Programming, CSE213+L: This is our first object-oriented programming course. I learned here total OOP concept with customer requirement analysis class diagram & a lot.

Database Management, CSE303+L: This is the course where I learned about database in detail. In this course, I learned how to connect a server with database and how it works also I learned MySQL and Query. In our project, I need the concept of relational database.

System Analysis and Design, CSE307: In system analysis and design, I learned in detail with a system. We learned the paperwork about Business Requirement Document (BRD), System Requirement Specification (SRS), and Software Design Document (SDD). So, this course will helped me to complete this project. Without analysing a system, we can't move forward as well as without any proper design of any project what we do.

Software Engineering, CSE451: Basically, in software engineering, I learned about a systematic approach to develop a software. I also learned some methodology, how to create WBS etc. and so many. So, this is really helpful for us to complete this project within a proper guideline.

Web Application and Internet CSE 309: How the application perform in the web that was very relatable with my project.

2.2 Related works

There are a lot relatable applications in the market till date which are simile to my application but the percentage of similarities are not very high. As we have used Power App so that features can added anytime from developer side.

Service Request App:

Organizations can also use the PowerApps platform to develop an interactive application that lets users submit IT service requests. Furthermore, apps can also be built for other functions like collecting service requests for facility maintenance, purchase orders, human resources, and much more. The created apps are platform-independent and can be accessed directly through SharePoint or on the PowerApps mobile application that is available for Windows, Android, and iOS.

Expense Approval App

Expense approval is a tedious job that involves a lot of submission and process. Using PowerApps, a user can develop a mobile app for seamless expense approval. The employee can claim an expense by submitting a request with valid proofs. The manager can approve or reject the request and add comments if required. The requester is updated on the status of the request through notifications. The app can be integrated with any existing HR system. Check out Microsoft's end to end demonstration of PowerApps Sample – Expense Report. The app lets you track expense reports from submission to approval.

Chapter 3 - Project Management & Financing

3.1 Work Breakdown Structure

A Work Breakdown Structure (WBS) is a chart where the project tasks are illustrated to reflect their relations to each other and the project in general. A Work Breakdown Structure WBS proposes a graphical nature that helps project managers predict results based on various scenarios. It is often described as a result-oriented tree that covers all project procedures in an organized way. [1] However, WBS can also be displayed as a tabular list of tasks and elements in Work Breakdown structure Gantt Charts. Managers use WBS to break down their projects into easily manageable components. It's easy to do it using a Gantt Chart. These components are further decomposed until a required person from the team can be assigned.

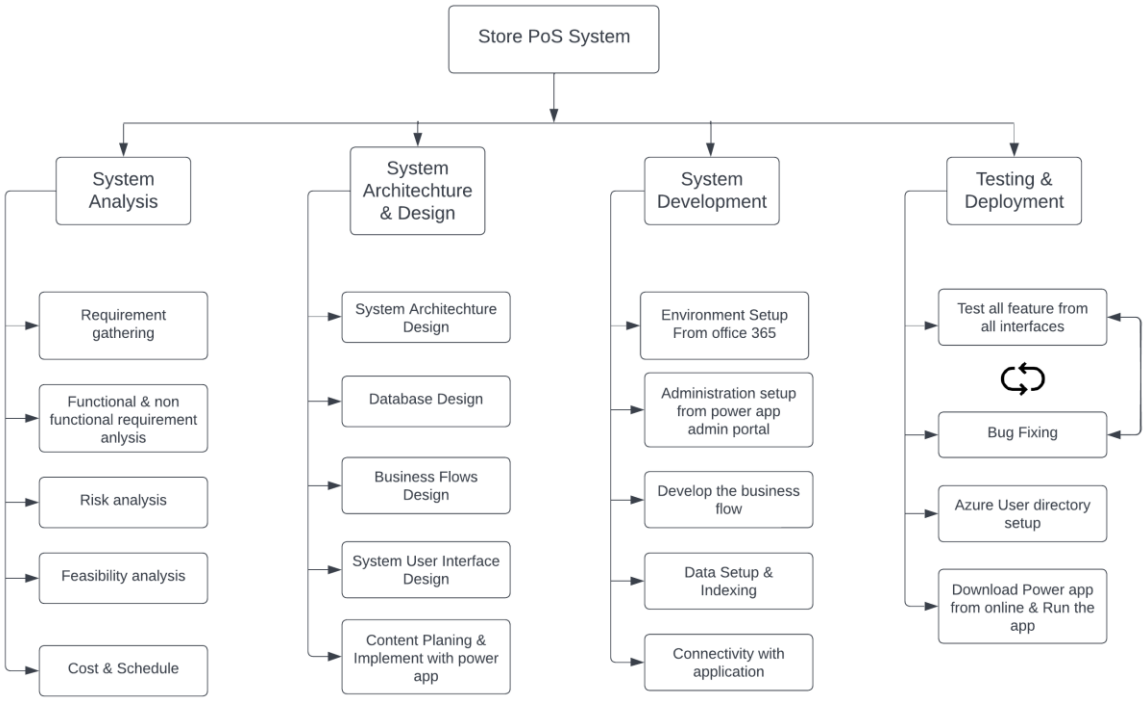

Figure 3.1 Work Breakdown Structure

3.2 Process/Activity wise Time Distribution

The time distribution determines the approximate time taken to complete the project successfully, as seen in the critical path process timeline below. The critical path in a project schedule is the longest series of tasks that must be performed on time for the project to be

completed on time. A critical path activity cannot begin until the preceding activity is completed. A project is well-defined task, which is a collection of several operations done in order to achieve a goal.

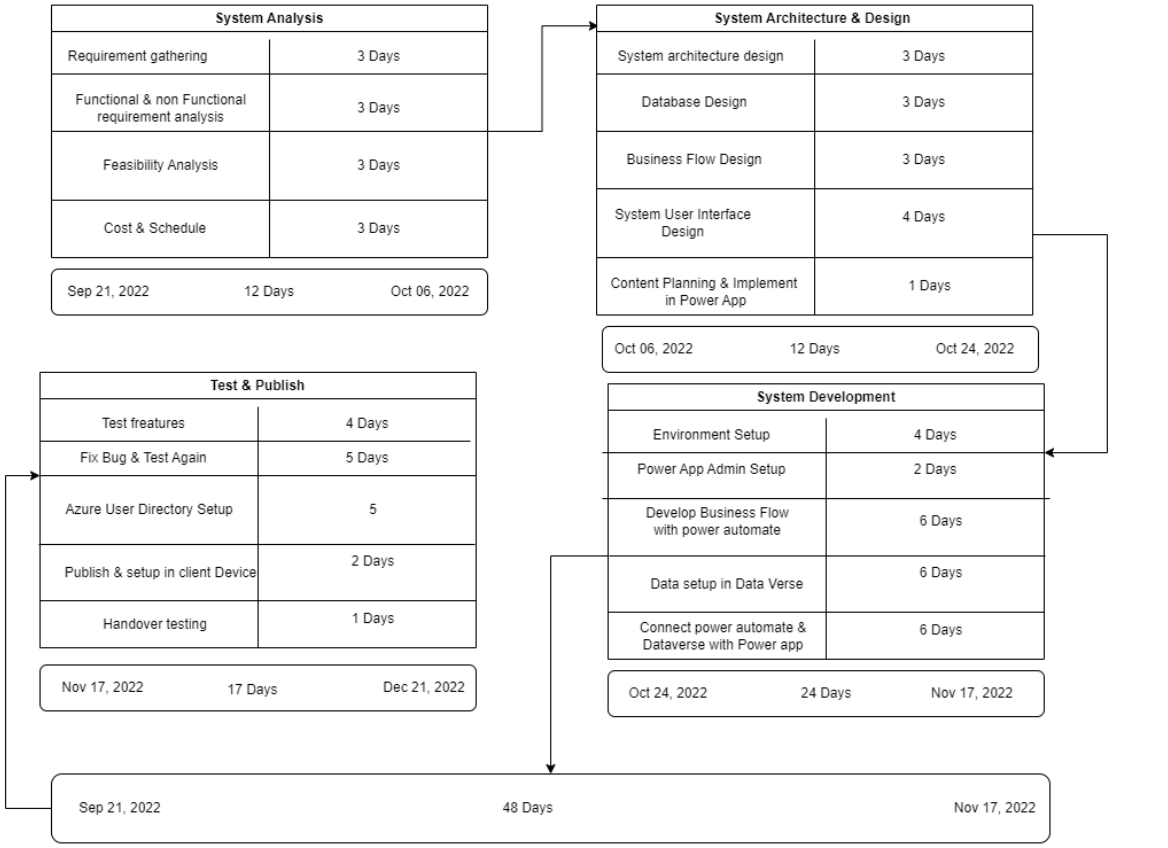

Figure 3. 1 Time Distribution

3.3 Gantt Chart

For this project, a Gantt chart was used in the planning phase of the application. Gantt charts are commonly used for tracking project schedules, and they are especially useful in project management. To put it simply, they illustrate and allow us to know what needs to be done, and when it needs to be done. Gantt charts are also able to show us additional information regarding the different tasks or sections of a project, such as how far have tasks progresses, how a group of tasks might depend or other groups of tasks, how important several tasks are, and resources are being used within a project. Simply put, a Gantt chart is a bar chart that provides a visual view of tasks scheduled over time.

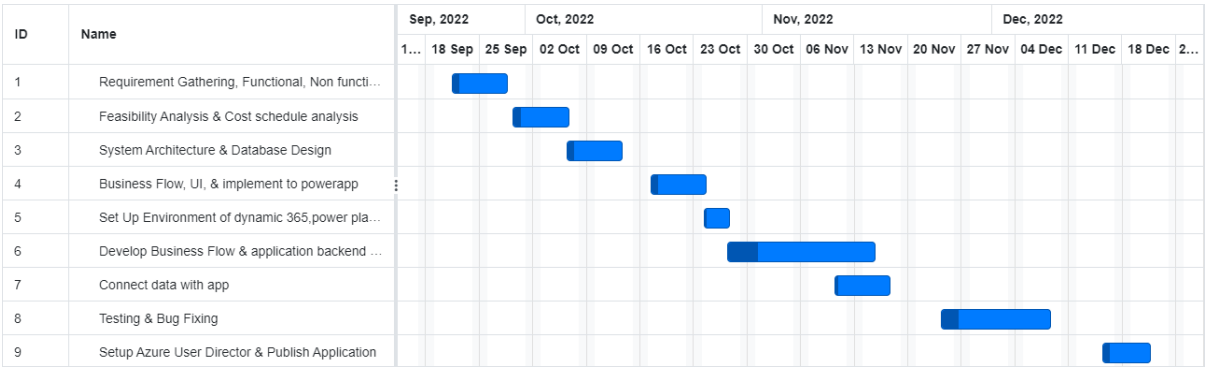

Figure 3. 2 Gantt chart

3.4 Process/Activity wise Resource Allocation

The developers are the most important resource for this project, followed by the office computers and the servers needed for the project's implementation. Any employee of the organization is seen as a resource, so each has been given a specific task with a set of deadlines, and they have all worked together to complete the job. [3] Following are the details of every step of the project

- **Initializing**: This is the first period of the project, where the idea of the project was presented by the supervisor of the company. Since this was a in-house product, no delay was made and the paperwork for the project was started.

- **Requirement Analysis**: During the first few weeks the supervisor and the developers discussed the entire requirements for the completion of the project. For example, Computer specifications, software/tech to be used to build the application, features and developers required.

- **Planning**: In this section of the development process, the developers and the supervisor engaged in hours of discussion of how this project should be built from top to bottom, the approaches to be taken, creating smaller goals and setting deadlines for them.

- **Design**: In this phase I designing the application pages of the application as well as I started working on the high level and low level diagrams for the project in order the get the bigger picture on sight.

- **Implementation**: At this stage, the designs for the pages were complete and the developers started working on writing the functional code for the backend of the application.
- **Testing**: Testing started as soon as a feature was added to the site. Hence simultaneously the testing was being carried out by me. At the end of the implementation phase unit testing for the application started.

- **Deployment**: After the testing was truly completed, I realized that it was behind schedule. For deployment.

Process/Activity wise Resource Allocation

TASK	DURATION	START DATE	END DATE	RESOURCES	%COMPLETE
System Analysis	12	Sep 21, 2022	Oct 04, 2022	Mahmuda Islam Ahmad Sayeef Khan	20%
Design	12	Oct 09, 2022	Oct 23, 2022	Mahmuda Islam Ahmad Sayeef Khan	25%
Development	24	Oct 24, 2022	Nov 24, 2022	Mahmuda Islam Ahmad Sayeef Khan	35%
Publish & Deployment	20	Nov 24, 2022	Dec 21, 2022	Mahmuda Islam Ahmad Sayeef Khan	20%
Total	68				100%

Table 3.1 Process/Activity wise Resource Allocation

3.5 Estimated Cost

The cost was calculated on the basis of the features requested by the client. As till date the first phase of the development is complete. The given costing for project completion is an estimation and not the actual costing. The estimated costs was Tk 176,000 (BDT) for the whole project. If any additional service support is required within 1 year of deployment, then some additional charges will be taken.

Task	Cost Amount in (BDT)
Power Application License cost(1Year)	108,000 tk
Development Cost	63,000 tk
Testing	5000 tk
Total	**176,000 tk**

Table 3.2 for Estimated Costing

Chapter 4 - Methodology

Methodology refers to the overarching strategy and rationale of our project. It involves studying the methods used in our field and the theories or principles behind the selection process to develop an approach that matches our objectives. The methodology is a system of methods that we use in a specific area of study or activity. The methodology is the detailed procedures used to identify, select, process, and analyse information about a subject. The application I have developed is a functional application, and it was developed using modern developing technologies.

Software Development life cycle (SDLC) is a functional model used in project management that defines the stages include in an information system development project, from an initial feasibility study to the maintenance of the completed application. There are different software development life cycle models specify and design, which are followed during the software development phase. These models are also called ”Software Development Process Models.” Each process model follows a series of phase unique to its type to ensure success in the step of software development. Here, are some important SDLC life cycle: For this project we have chosen the Agile Methodology. Sometimes it works in iterative development as well. Agile is a process by which a team can manage a project by breaking it up into several stages and involving constant collaboration with stakeholders and continuous improvement and iteration at every stage. This approach starts with customers portraying how the finished result will be utilized and what issue it will solve. It doesn’t fabricate a whole framework on the double, yet rather grows steadily.

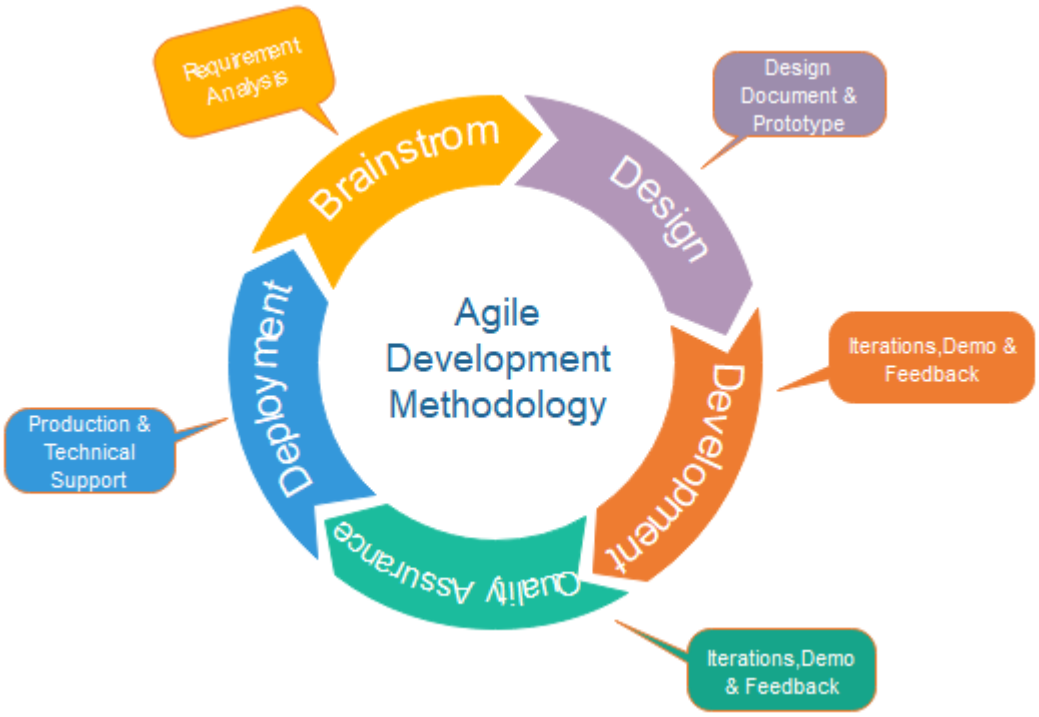

Figure 4.1 Agile Development

4.1 Why Agile for this project?

The primary benefit of agile software development is that it allows software to be released in iterations. Iterative releases improve efficiency by allowing teams to find and fix defects and align expectation early on. They also allow users to realize software benefits earlier, with frequent incremental improvements. When the development process began there were lack of information in the requirement section of the project, which eventually got added up in the future. As new features and updates on design patterns got updated the design team implemented them in a progressive manner much like what the Agile methodology suggests.

The entire plan was decided when determining the requirements during the planning phase, how the development team made sure they divide all the work according to daily basis. Every day some of the coding section of the project would be implemented and at the end of the day a meeting would be conducting between the development team and the management committee to make sure all functionalities that had been implemented throughout the day, was valid and up to the standards as well as the requirements, any changes suggested could be implemented accordingly.

Chapter 5 - Body of the Project

The body of the projects chapter contain the details about the project. Here reader will find the in depth knowledge about the project. In details documents will added in this chapter such as a brief of work description, requirement analysis of this project, System analysis, System design, Development, testing.

5.1 Work Description

The main goal of “Point Of Sale” system is making an easier system where store owner can track their business performance & operation in an easiest also digital way. Nowadays every shop owner has a POS software in their store. But Microsoft made it easier to build & very cost efficient to make a software for business owner. Like in Power app client can use their software in any device at any time & also security & privacy ensured by Microsoft. My system contain all possible functionality of POS but the speciality of the system is it was made using Power App. Database design in Microsoft data-verse & to implement the conditional flow I use Microsoft power automate. For visualization here use Microsoft power bi. There are three kinds of user in my system. For frontline user such as cashier & manager who’s are mainly in operational part, they will use canvas app & the admin or the owner will use the model driven app for management & analysis of business. Both app are separated to each other. At the end we can say the full system made by Microsoft power platform.

5.2 Requirement Analysis

5.2.1 Introduction

From the initiation of any project, it is very important to know who the client is for the application, its users, admins and the management operating the entire system. Since the application is for official client store uses and suggested by the supervisor. Keeping that in mind, I had to think of ways to make the application as user friendly as possible and also how should the application be in a responsive state. Here all the shareholders, the CEO of the company and other developers engaged in meetings and carried out several methods to achieve a complete understanding of the application that was required to build. The methods include:

- Surveys & Questionnaires
- Group Interviews
- Developing a prototype
- Document Analysis

5.2.2 Surveys & Questionnaire

Surveys are useful in describing the characteristics of a large population. No other research method can provide this broad capability, which ensures a more accurate sample to gather targeted results in which to draw conclusions and make important decisions. In this case, the survey was conducted between store employee & manager also conducted with the owner of the store to truly understand the demand, functionalities and feasibility of the application to be built. The questionnaires are attached to Appendix- A.

5.2.3 Group Interviews

As a client product, the client interviews conducted were limited to the store employee, head of the store and the development team. To get a greater sense and to get the bigger picture of the application the interview question were conducted in two different methods.

•Close ended questions: These are question types that ask respondents to choose from a distinct set of pre-defined responses, such as “yes/no” or among set multiple choice questions. In a typical scenario, closed-ended questions are used to gather quantitative data from respondents.

•Open ended questions: These are question types that allow respondents to answer in open text format so that they can answer based on their complete knowledge, feeling, and understanding. It means that the response to this question is not limited to a set of options. In a typical scenario, open-ended questions are used to gather qualitative data from respondents.

5.2.4 Prototype

Before a full application can be developed, a prototype of the application is developed. The prototype goes under rigorous testing, design tests and UI checked by the client. The data and information obtained from the surveys and interviews were used to develop the prototype. On approval from the client, using this prototypes software developers can then begin to actually work on the whole application. Since an agile methodology was being followed, any design or UI changes can be adjusted accordingly.

5.2.5 Conclusion from Research and Analysis

From the surveys and interviews conducted, it is quite clear that the demand for such cashier can make sell, can able to provide loyalty member of any customer. Also update their cash flow & stock after their shift end. Manager will count the float money & update shift of any cashier using their pin number also update the stock count after a successive day end. Admin can monitor all activity of the store also add new products to stores. Also can monitor the cash-flow after every shift has done. Admin should able to see the amount of profit/loss of every shift has done.

Admin:

- View all user data.
- Has full support and conduct any CRUD operation.
- Register a new user.
- Create New Product
- Upload a new product.
- Can monitor cash-flow & sale performance
- Can monitor the inventory update & change status

Cashier/Manager:

- Can make a new sale
- Can add a customer into membership program.
- Generate receipt
- Smooth communication with admin through system.
- Update the cash flow.
- Update the inventory system.

5.3 System Analysis

System analysis is a problem-solving method that involves looking at the wider system, breaking apart the parts, and figuring out how it works in order to achieve a particular goal. It is applied to information technology, where computer-based systems require defined analysis according to their makeup and design.

5.3.1 Six Elements Analysis

Process	**Human**	**Hardware (Computing)**	**Software**	**Database**	**Network**
Login	All	Phone/Tablet/PC	Power App	Stores data and retrieves login data	Internet
Update User	Admin	Phone/Tablet/PC	Power App	Update User details	Internet
Delete User	Admin	Phone/Tablet/PC	Power App	Delete User from database	Internet
Upload Product	Admin	Phone/Tablet/PC	Power App	Stores Product details	Internet
Update Product	Admin	Phone/Tablet/PC	Power App	Update details	Internet
Delete Product	Admin	Phone/Tablet/PC	Power App	Delete Product from database	Internet
New Sell	Cashier	Phone/Tablet/PC	Power App	New loyal cashier added to contact list	Internet
In stock & Damage Count	Cashier /Manager	Phone/Tablet/PC	Power App	Product status will updated	Internet
Create Sell & generate Receipt	Cashier/Manager	Phone/Tablet/PC	Power App	Data will updated to database	Internet

Table 5.1 Six Element Analysis

5.3.2 Feasibility Analysis

As the name implies, a feasibility analysis is used to determine the viability of an idea, such as ensuring a project is legally and technically feasible as well as economically justifiable. It tells us whether a project is worth the investment—in some cases, a project may not be doable. There can be many reasons for this, including requiring too many resources, which not only prevents those resources from performing other tasks but also may cost more than an organization would earn back by taking on a project that isn't profitable. Feasibility study is carried out based on many purposes to analysis whether software product will be right in terms of development, implantation, contribution of project to the organization etc. There are different types of feasibility studies that are conducted such as:

Technical Feasibility: In Technical Feasibility current resources both hardware, software along with required technology are analyse and assessed to develop project. Questions such 'Is the application upgradable?', 'Technical capabilities and skills of the developers?' are answered in this section. For this current applications the scalability depends on the number of users of the application, since it is a module based application any addition of a module can easily be added or removed if required. A downside of the program is that the application has become very technical, therefore non-technical users might have a harder time to understand the program completely.

Operational Feasibility: It assesses the extent to which the required software performs a series of steps to solve business problems and user requirements. This feasibility is dependent on human resources (software development team) and involves visualizing whether the software will operate after it is developed and be operative once it is installed. The major users of the application are the store employees, the application is developed completely in English.

Economic Feasibility: This feasibility study determines whether the required software is capable of generating financial gains for an organization. It involves the cost incurred on the software development team, estimated cost of hardware and software, cost of performing feasibility study, and so on. After this study is conducted it is seen that to make it a profitable business for the client business. It will be help the store to track the performance so that store owner can make effective decisions that they can make more profit that before. It will save their time & provide accurate calculations so that the cost of the product will be worth it within few months later.

5.3.3 Problem Solution Analysis

Problem analysis is the process of understanding and defining the problem to be solved. Problem solving identifies solutions that conform to the needs and constrains of the problem. Much of what is done in designing and building information systems is to solve problems, even though the objective of the system may be seen as improving existing systems or taking advantage of market opportunities.

Problem 1: Less number of defined requirements.

Definition: At the start of the project, when the requirements for the project was set, the survey and questionnaire did not involve too many people for the project. The sample size for the survey was low since I could not reach my targeted people.

Solution: More participants needed to participate in the survey that was conducted, the application has to be viewed through the eyes of any possible users.

Problem 2: No defined process for testing.

Definition: Even though the development team has great abilities with development phase, but there were no testing or SQA team, hence the testing had to be done by the development team as a result due to lack of experience no proper testing process was defined.

Solution: An experienced SQA professional was hired during the development phase of the project. His expertise led to the development of a testing process which is defined in the later chapter.

One of the biggest problem in software development is undefined or ambiguous scope & system analysis. Majority of the project delay happens for this particular reason. Then again changing requirements causes more delay and it becomes very hard to keep track of changes thus causing more delay in final delivery. For solving this kind of misshapes we used the agile model with strong research on the system, business needs and processes. More over,

1. Describe the project's scope.

2. Make no assumptions about what is required.

3. Communication between teams is essential.

4. Make a list of requirements.

5. Clients should be involved from the start.

This logic's were also followed.

5.3.4 Effect and Constrain Analysis

A constraint is a restriction on the degree of freedom a company can have in providing a solution. Constraints are effectively global requirements, such as limited development resources or a decision by senior management that restricts the way the development team develop a system. Constraints can be economic, political, technical, or environmental and pertain to project resources, schedule, target environment, or to the system itself. Some of the constraints and its effects are described below:

Budget Effect: This constraint has critical effect on how many employees for the project are hired and for how long the project can continue to be developed before reaching a conclusion to deadline.

Time Effect: Both the budget and time constraint are interrelated to each other. Time strictly depends of the budget of the company for the particular project. For this project the project was given a time of 4 months and a deadline of 25th of December was decided to be the deadline.

Scope Effect: Scope defines whether the requirements set for the project are met. During the development phase the developers needs to keep a close eye on the requirements of the project, if a deadline is too near the scope of the project can be stretched and delivered on a later date. This restricts the development team and has to undergo regular discussions, reviews and meetings to make sure the quality is up to the mark.

Effect: Due to the manual process of the store management is not fully functional and the importance is not well known by everyone involved. As this system introduces a brand new horizon to facilitate and benefit all involved party will be benefited in the process of transaction, maintenance and overall convenience. There are multiple remarkable features to help out the store more beneficial.

Constraints: The manual process has been in place for long time and to shift from a completely manually handled to the digital version of it will take some time. Also in the beginning the requirements were not completely finalize but letter on they were well established then our higher Management divided them into achievable targets within a delivery date but as every development projects new requirements and bounds where being introduced after every meeting but they didn't change enough to completely restart the work from the very beginning thus the project was done in due time.

5.4 System Design

Designing is very crucial for the software development field, because it guides you throughout the process of how the work flow will be. Systems design is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems which satisfies the specific needs and requirements of a business or organization.

5.4.1 Rich Picture

A Rich Picture is a way to explore, acknowledge and define a situation and express it through diagrams to create a preliminary mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation. In the following rich picture shows the summed up activities of the three different user groups of the system namely Admin, cashier, and Manager. All the users groups has to login and register except admin who can willingly ban or add a user from the group and has all the power to view all data. Cashier can sell any kind of goods in here. Manager will calculate money & end the shift. Admin will monitor & handle all other stuff.

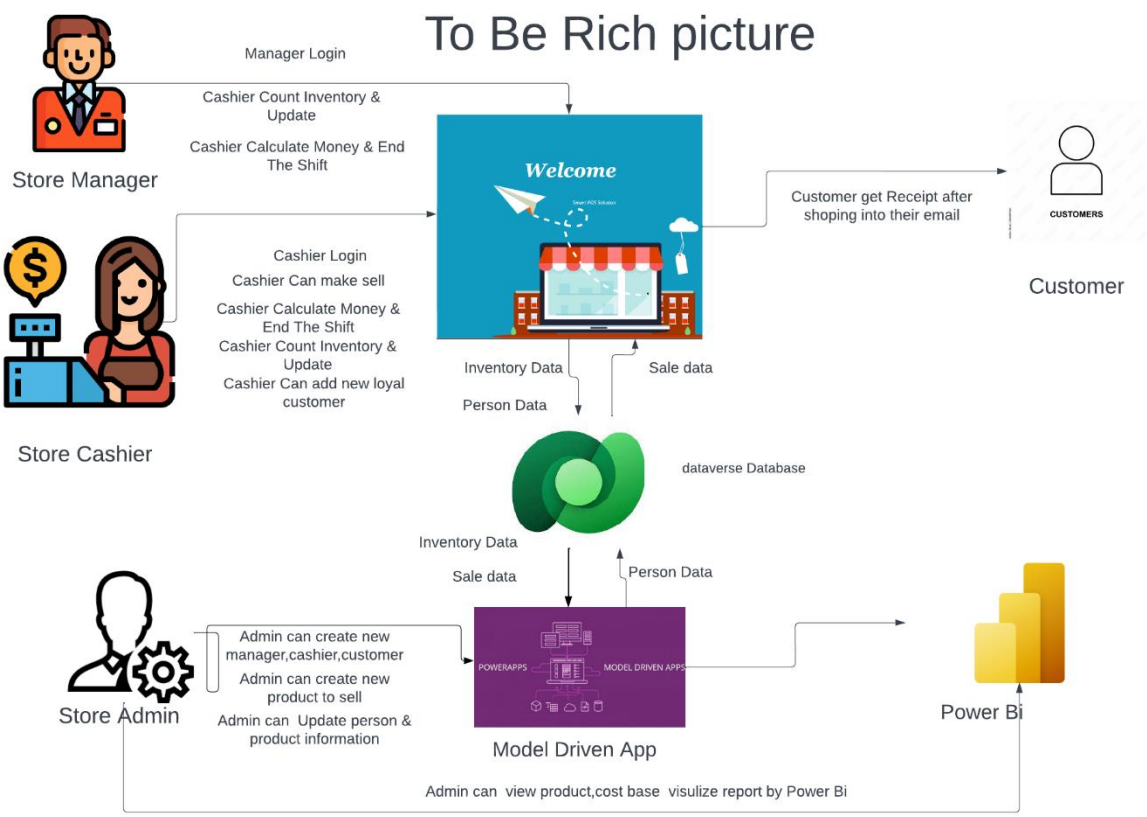

Figure5.1 Rich Picture

5.4.2 UML Diagram

A UML diagram is a diagram based on the UML with the purpose of visually representing a system along with its main actors, roles, actions, artefacts or classes, in order to better understand, alter, maintain, or document information about the system. So, UML is a way of visualizing a software program using a collection of diagrams.

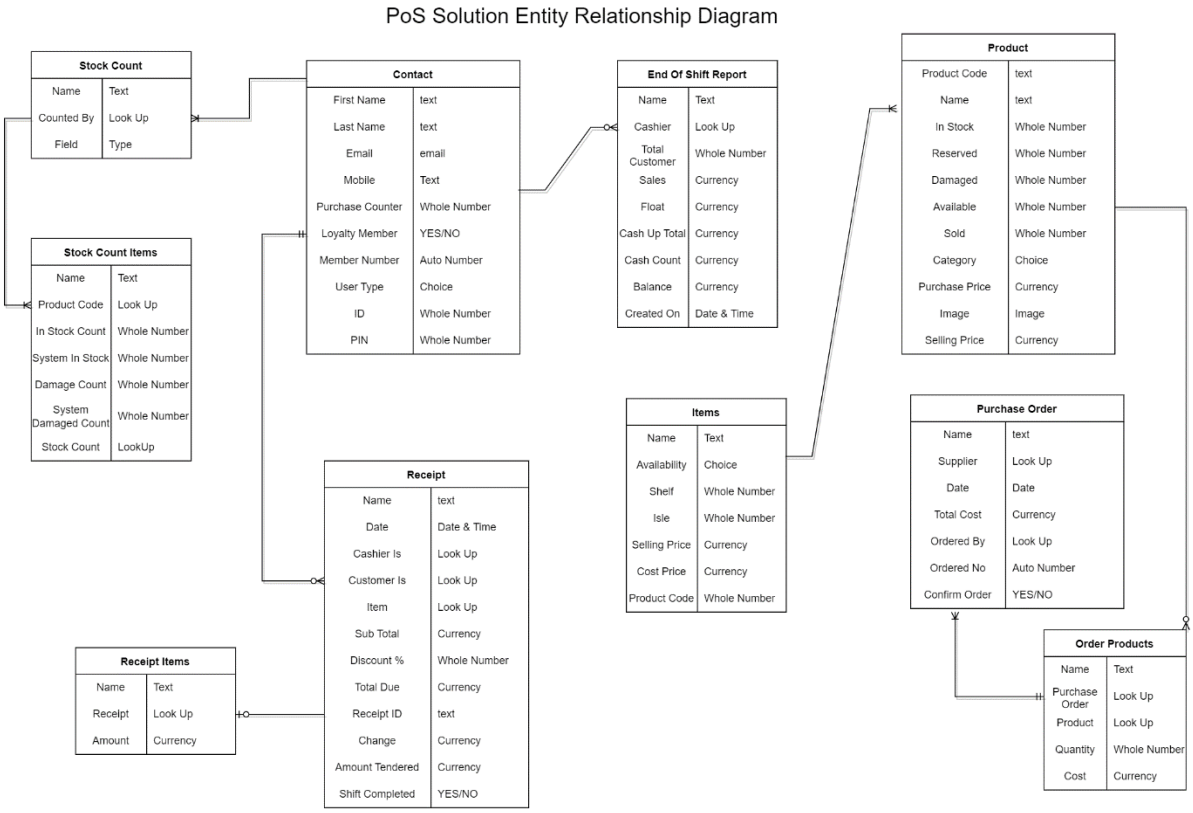

Figure5. 1 Entity Relationship Diagram

Use Case Diagrams

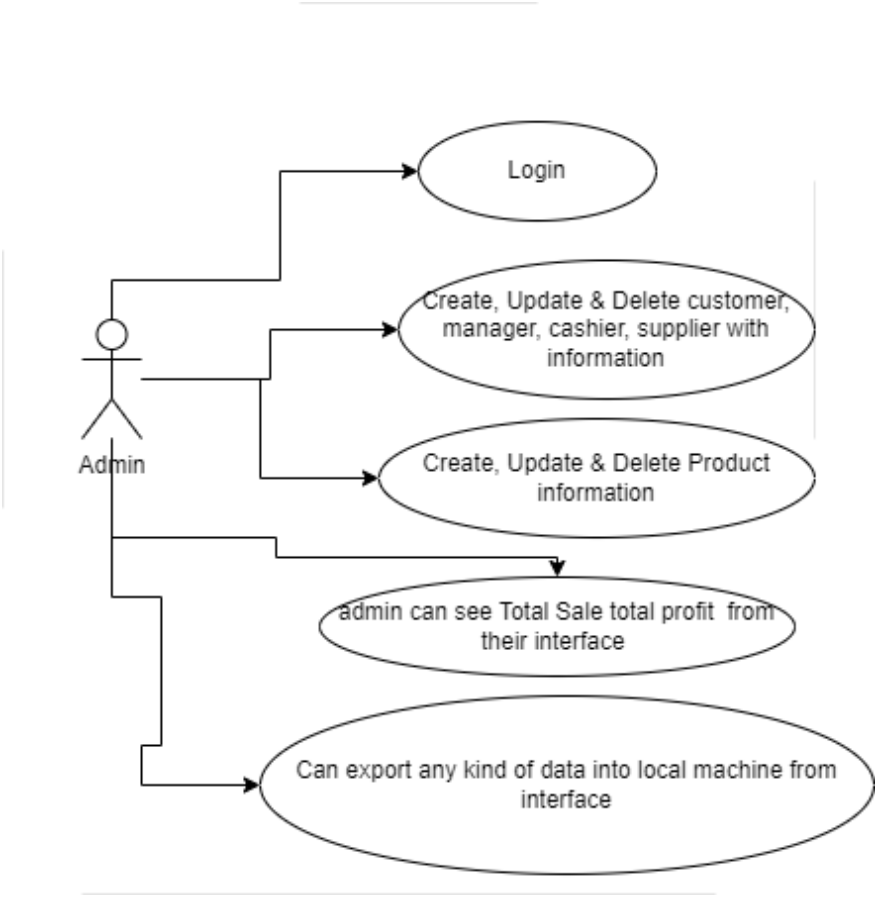

Figure5. 3 Admin Use Case Diagram

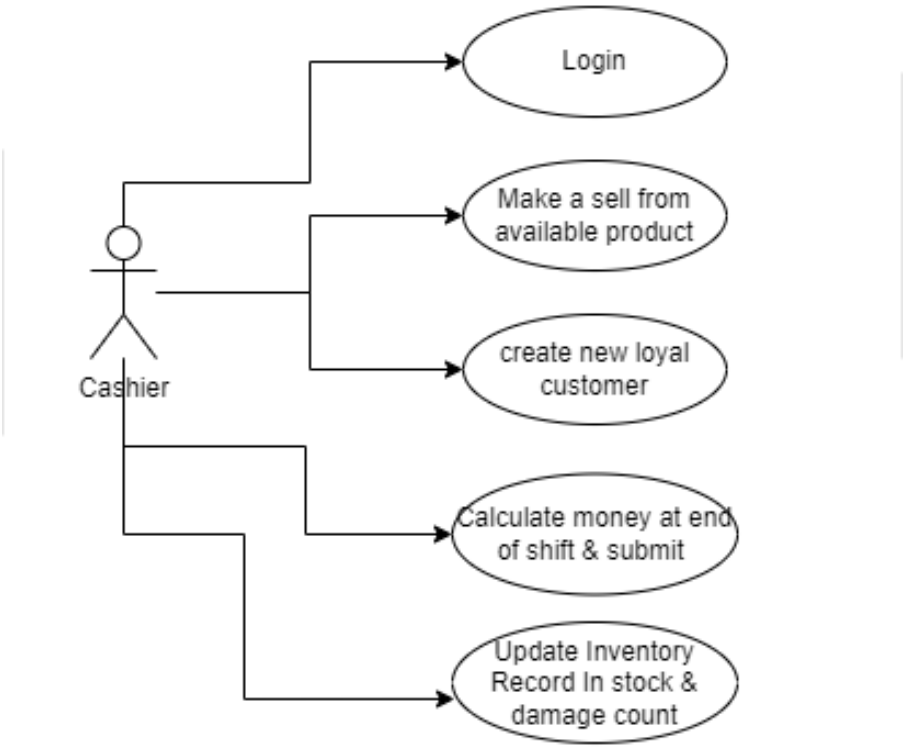

Figure5. 4 Cashier Use Case Diagram

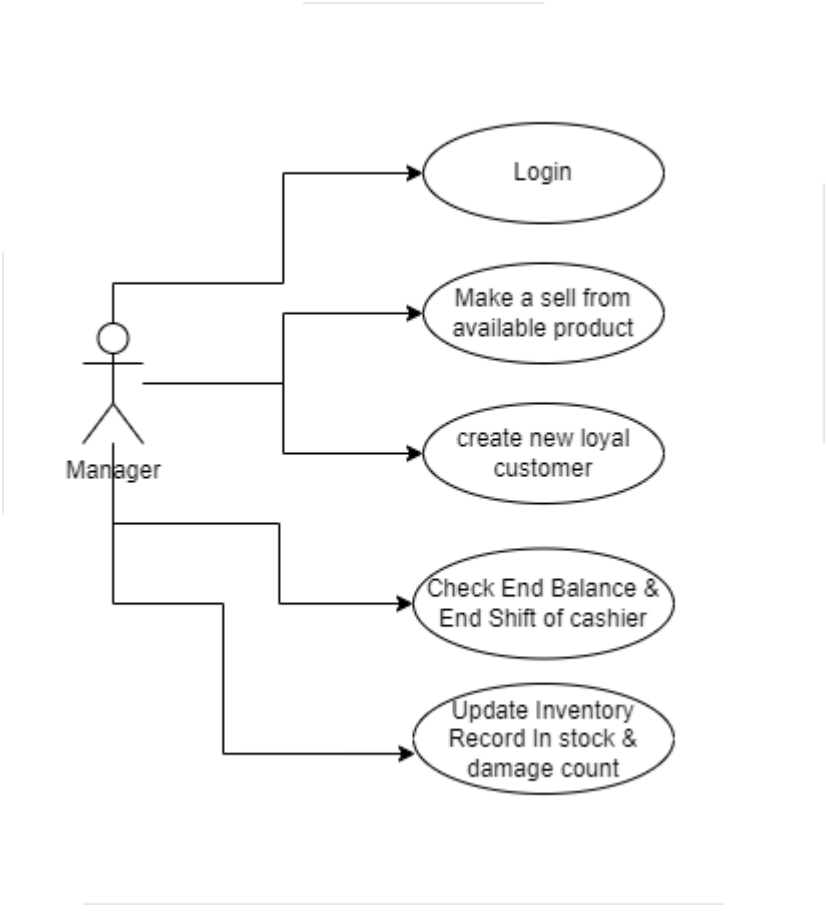

Figure5. 5 Manager Use Case Diagram

Activity Diagrams

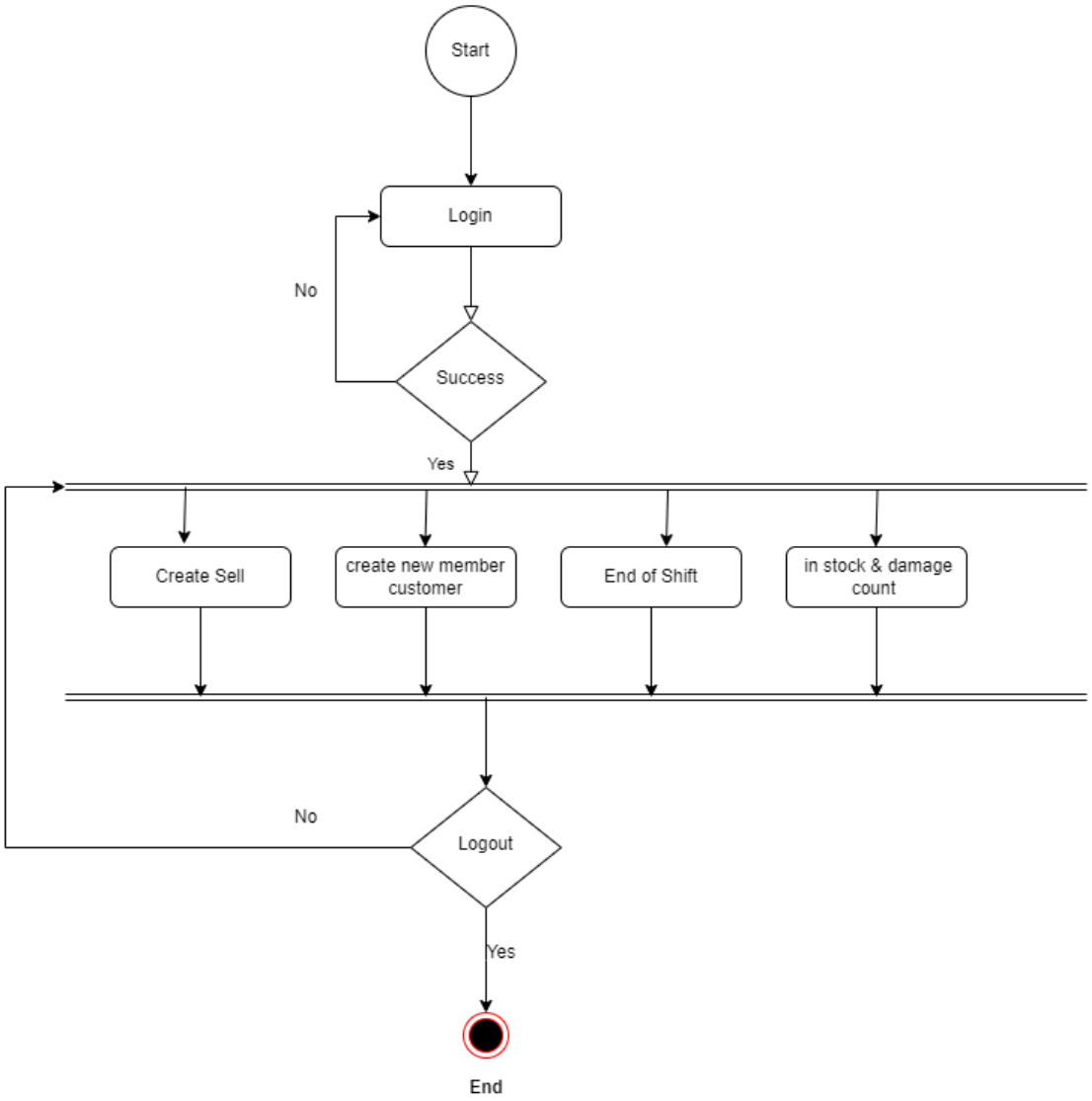

Figure5.6 Cashier Activity Diagram

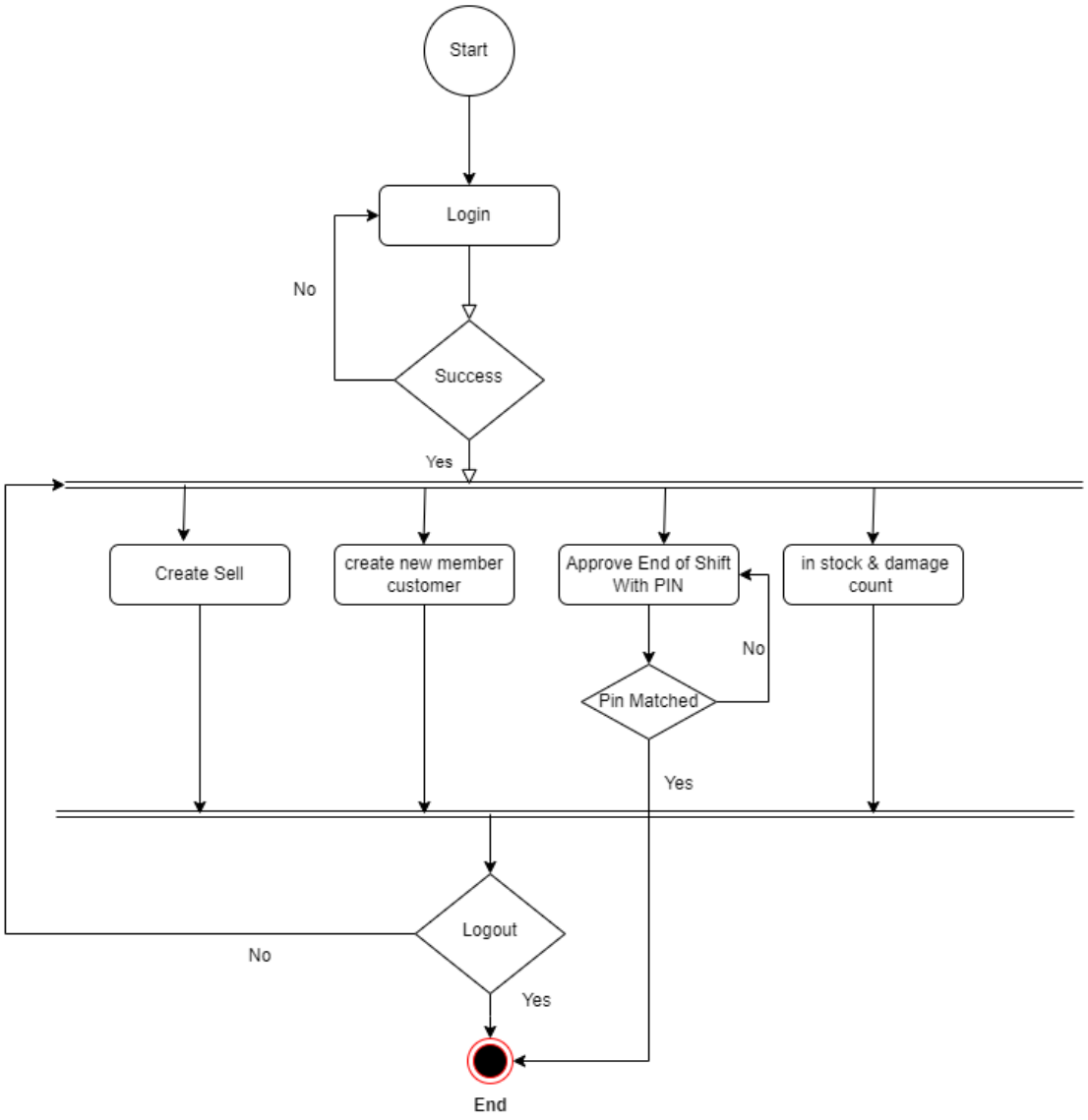

Figure5.7 Manager Activity Diagram

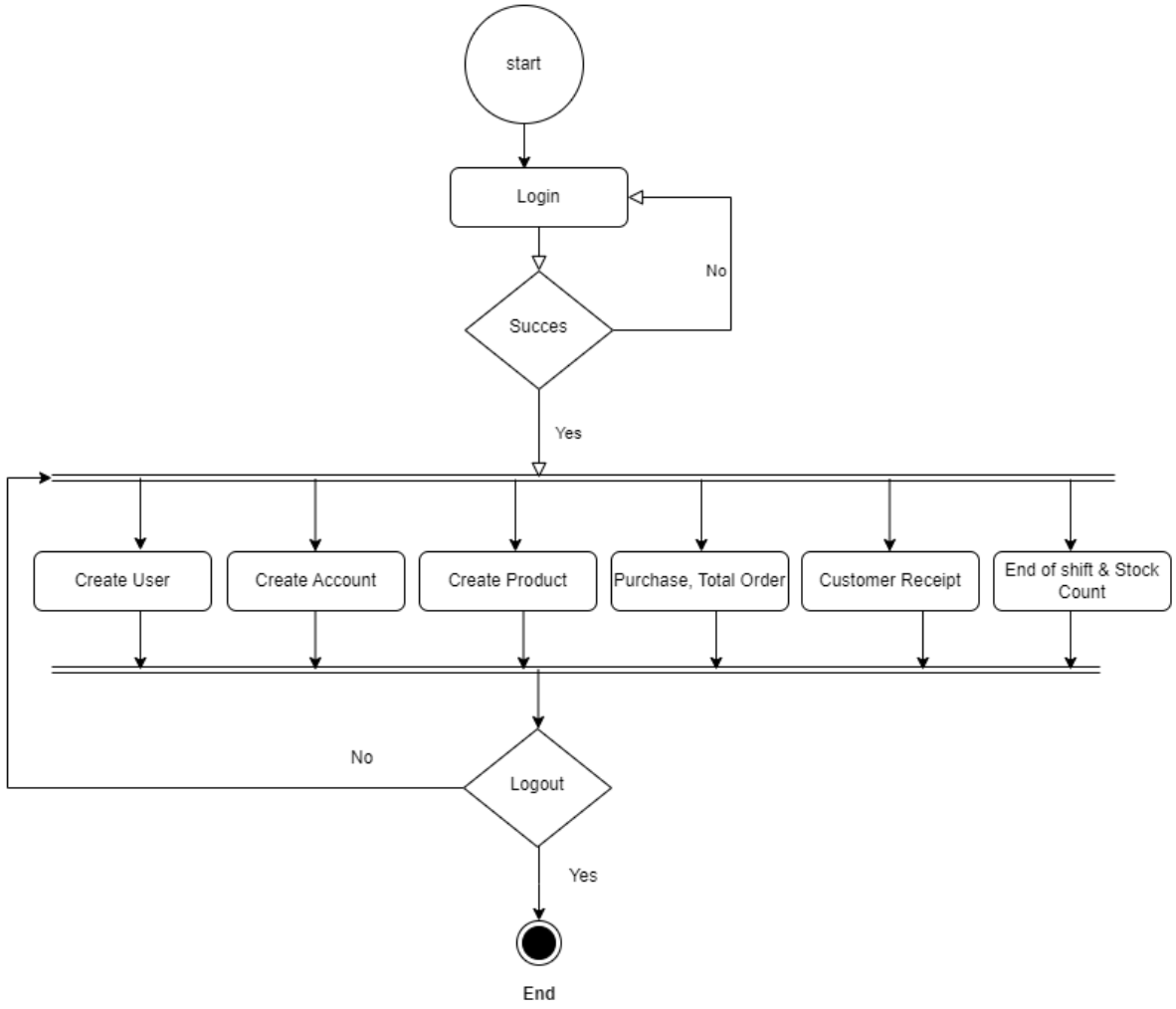

Figure5.8 Admin Activity Diagram

5.4.3 Functional and Non Functional Requirement

5.4.3.1 Functional Requirement

The functional requirement is that it essentially specifies something a system should do. The Functional Requirements are the operations and activities that a system must be able to perform.

Authentication

- Login- The user can login to the site with his/her username and password.
- Logout- The user can log out from the site.
- Login failure- If the user does not exist in the database or the user has not yet being authorized by the admin.

Process Data

- Display- User with defined roles can display the content of the database. Admin can not only see his/her personal information but also user's information.
- Edit- Admin can edit all information related to all users' & products.

Product

- Create product- The admin can able to fill in products details in the appropriate fields.
- Update approval- The admin can be able to update products viewing quantity, quality, etc.
- Product Count- User can able to count damage product/ Instock product.

5.4.3.2 Non Functional Requirement

Non-functional requirements are often called "quality attributes" of a system. A non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system. Here, according to this website Non Functional Requirements are discussed below. Simply said, a non-functional requirement is a specification that describes the system's operation capabilities and constraints that enhance its functionality. The system will be fully secured for all users. No personal information will be leaked from the database. Microsoft will provide the maximum level of security.

Performance requirements

There is a restriction on the number of the users to be added to the database. It's depends on Microsoft office licence module.

Hardware requirements

EMS should be able to work on a computer with the following minimum hardware specifications:

OS: Windows XP/Vista/7/8/10

CPU: Pentium III (700MHz) and above

Memory: 512 MB and above

Capacity: 4GB of hard drive

Others: Network interface card, mouse, keyboard, and monitor.

Software requirements

Since it's a third party software module so Microsoft power app default app need to run the application. It can be mobile/desktop application need to download from Microsoft official website for desktop & app-store/play-store for mobile application.

5.4.4 System Feature

Login: Here user will be assign by the admin. Only valid user can use this application by their valid id & password. If user input wrong password then login button will not showed.

Customer Receipt Email: When a customer purchase a product then they will get an email of their purchase history into their inbox.

Member Customer Discount: Member customer will get 10% discount from any purchase.

Order History: Admin can see the how many order place & how many sales generate in a day

Bi Visualization: Admin can view reports in Power Bi visualization tool.

Time efficiency: The normal method needs a great deal of time for third parties involvement and other schemes. The admin can generate statically reported data from the system directly in the forms of diagram.

5.4.5 System Input & Output

5.4.5.1 System Input Table

Process	**Input Fields type**
Login	Email- string ;Password- string
Sell Product	Product Code - string
Edit profile	Name - string ;ID - string; Password - string
Upload product	Name- String; Product details- string ;Quantity - string
Edit product	Name- String; Product details- string; Quantity - string
Delete product	Name- string ;Number of leave- string ;Time - string
Product Details	Name: String; Selling Price- Currency; Cost Price- Currency; Purchase Price- Currency
End Of Shit	Balance: Currency Float Amount: Currency
Stock Count	In Stock- String; Damaged- String

Table 5.2 Input table with Field

5.4.5.1 System Output Table

Process	**Output**
Login	On success- Redirect to user Interface. On failure- Not Showing login button.
Sell Product	On success- Show product. On failure- Not show the product
Edit profile	On success- Show success message “Updated data successfully” at top. On failure- Show error message “Data not updated “at top.
Create product	On success- Show success message “Product uploaded successfully” at top. On failure - Show error message “Something wrong! Check again.” at top.
Edit product	On success- Show success message “Product updated successfully” at top. On failure - Show error message “Something wrong! Try again.” at top.
Delete product	On success- Show success message “Deleted product successfully” at top. On failure - Show error message “Something wrong! Try again.” at top.
End Of Shift	On success- Show success message “Submitted successfully” at top. On failure - Show error message “Something wrong! Try again.” at top.
Stock Count	On success- Show success message “Submitted successfully” at top. On failure - Show error message “Something wrong! Try again.” at top.

Table 5.3 output table with Field

5.4.6 System Architecture

The application made by Microsoft power platform, all kind of elements comes from Microsoft.

Power App Canvas App: This is for the cashier & manager interface. Canvas app mainly made for the operations of the business. This app mainly generate the customer data, sale performance & the stock count performance of the business. In canvas app we can design as our own expertise. User can use this app into their mobile/desktop.

Power App Model Driven App: This app only for admin application. In model driven app admin can control all the operation such as add new user, create new product, monitoring the stock count & shifts. There is limited scope to design this part. It could be structural design can be modified but the visual design not supported in this part. This application only support into desktop.

Data Verse: Data verse using for designing & create database. Data verse is RDBMS (Relational Data Base Management System). Here foreign key called as Look Up. Data type can set automatically.

Power Automate: Power automate used for create automatic flow such as automated email send to the customer, store product update to the admin email, update database table etc.

Process Flow: Some process are need to take action in delay like damage product update.

Dynamic 365: To setup the separate solution I need to setup the dynamic 365 power app admin panel. From azure user directory we need to assign the active valid user.

5.5 System Testing

Test Id	Test Case	Description	Steps To Executed	Expected Result	Actual Result	Pass/ Fail
T1	Cashier Login	Cashier ID: 1234 Pin: 1111	1.put Id, pin on require field 2.Check if any float money in cash then input amount	Login button Visible	Id password is valid & login button visible. Now cashier can enter his/her interface clicking login button	Pass
T2	Manager Login	Manager ID: 4321 Pin: 4321	1.put Id, pin on require field 2.Check if any float money in cash then input amount	Login button Visible	Id password is valid & login button visible. Now Manager can enter his/her interface clicking login button	Pass
T3	Search Available Product	Product Code:1000	Put Product code into the enter product code field	Bananas Come To List	If bananas available then bananas comes to list	Pass
T4	Sell Product to Normal Customer	Customer gives $20	Enter 20 into tendered amount. Click Paid Button.	Change $5 & Total $20	Bananas Price is $15 so customer should get change $5.	Pass
T5	Customer Has a membership id	Customer id-1001	Enter member id into scan member card field & click search icon. Click Paid Button	Change $6.50 & Total $13.5	Member customer get 10% discount so total amount will be 13.50.	Pass
T6	Save & Email Receipt to customer	Check & save/cancel Icon Visible &	Enter save to save button	Successful ribbon appear & Reset every field	Save Successfully ribbon appear in the top & reset every field. the receipt & email a copy to customer	Pass
T7	Cancel Receipt	After paid cancel icon appear	Enter cancel button	Successful ribbon appear & Reset every field	The receipt cancel & a ribbon appears	Pass
T8	Create New Member Customer	Enter name email & mobile no	Fill up all field after scan member card & hit save	Save & reset all field	Customer will get a email with their member card	Pass
T9	End Of shift	Manager Pin: 4321	After cash count manager enter balance & Pin	Submit button appears	If manager pin is valid then submit button appear	Pass
T10	In stock/ Damage Count	Need to click start button	After click start button need to fill up the fields	Form appears after submit everything reset again	After fillup the form need to check ready to submit checkox then submit	Pass

Table 5.4 Manager/Cashier Testing table

Test Id	Test Case	Description	Steps To Executed	Expected Result	Actual Result	Pass/ Fail
T1	Create new user	Create user such as customer, cashier, manager	1.Click New button at top 2.Fill out the form 3. Click save & close button at top	Save user details	Appears top ribbon successfully create user	Pass
T2	Create Account	Create new supplier account	1.Click New button at top 2.Fill out the form 3. Click save & close button at top	Save account details	Appears top ribbon successfully create user	Pass
T3	Create Product	Create new Product	1.Click New button at top 2.Fill out the form 3. Click save then upload image of product then click save & close	Save Product details	Appears top ribbon successfully create user	Pass
T4	Purchase from supplier	Purchase new product to add into store	Double click supplier account click add new product fill out the form & click save button	Purchase Done	Purchase Product add to the list	Pass
T5	Receive products	Receive products from purchase table	Enter Cost of product then fill-up receive amount	Receive done	Product will be added to item table & Update in Product table	Pass
T6	Update Product Status	Available to damaged	Double click on item select status & change	Status change	Save Successfully ribbon appear in the top	Pass
T7	Delete Anything	If admin want to delete any record	Click the left side check box of the row & click delete button at the top	Successful ribbon appear	Save Successfully ribbon appear in the top	Pass

Table 5.5 Admin Testing table

Chapter 6 - Result & Analysis

While testing the program, there were several issues. This was a minor issue that we were able to resolve. After the resolving of these issues, test cases were documented. Testing methodologies have been used to justify all test cases. We did our testing on a local accounts. We'll test everything on the hosting again after it goes online. As a result, various modifications may occur at that time. There are few integration's possible. But it will be added in the future. So, all the tastings are not done. But up to the current feature available, all the testing is done, and it is running fine. But live testing with users is not done.

6.1 Graphical User Interface for Canvas App Result

The graphical user interface is a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicator such as primary notation, instead of text-based user interfaces, typed command labels or text navigation. Here I attached only my work that I have done in this project and it was successfully done.

6.1.1 Login

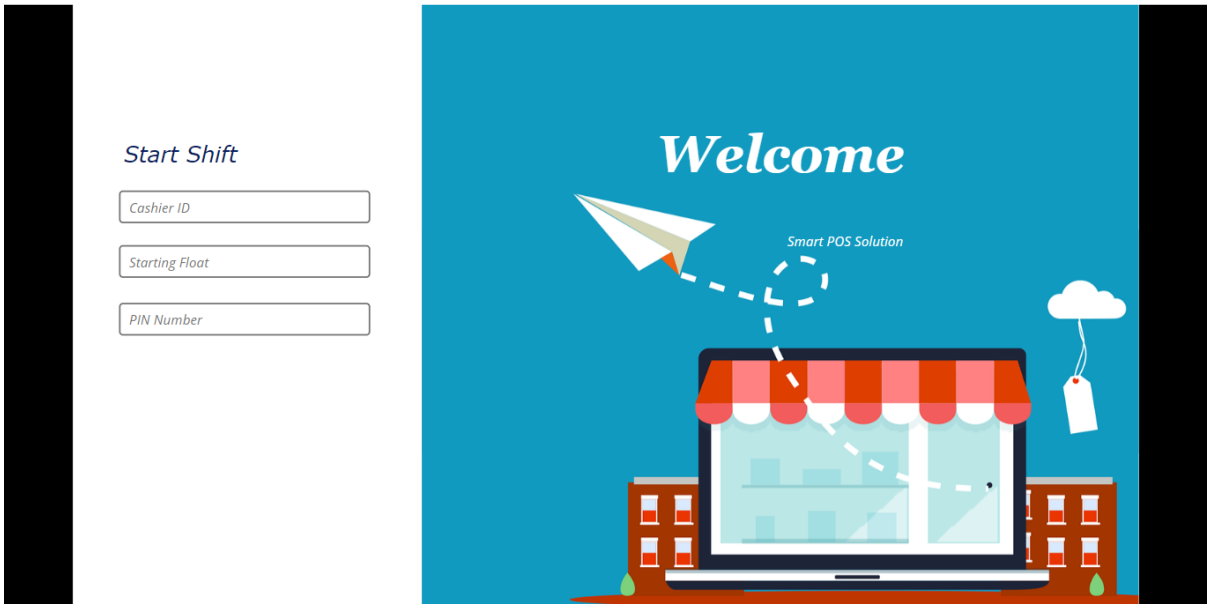

Figure 6.1 Cashier/Manager Login Interface (Blank)

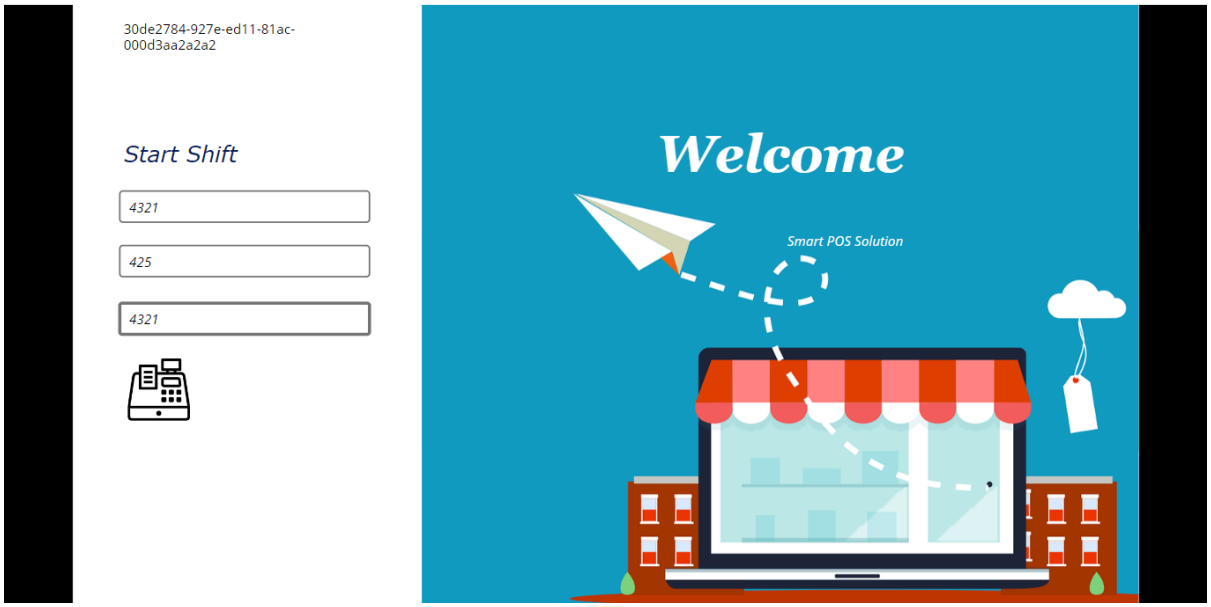

Figure 6.2 Cashier/Manager Login Interface after filled-up

6.1.2 Create Sell

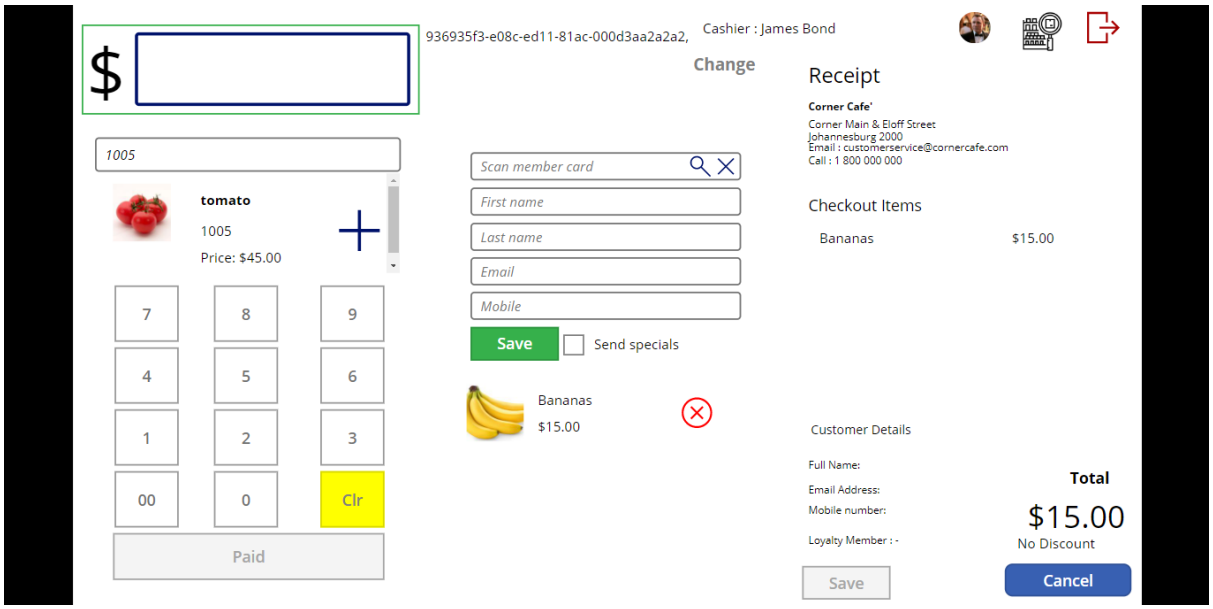

Figure 6.3 Product Search & Add to list

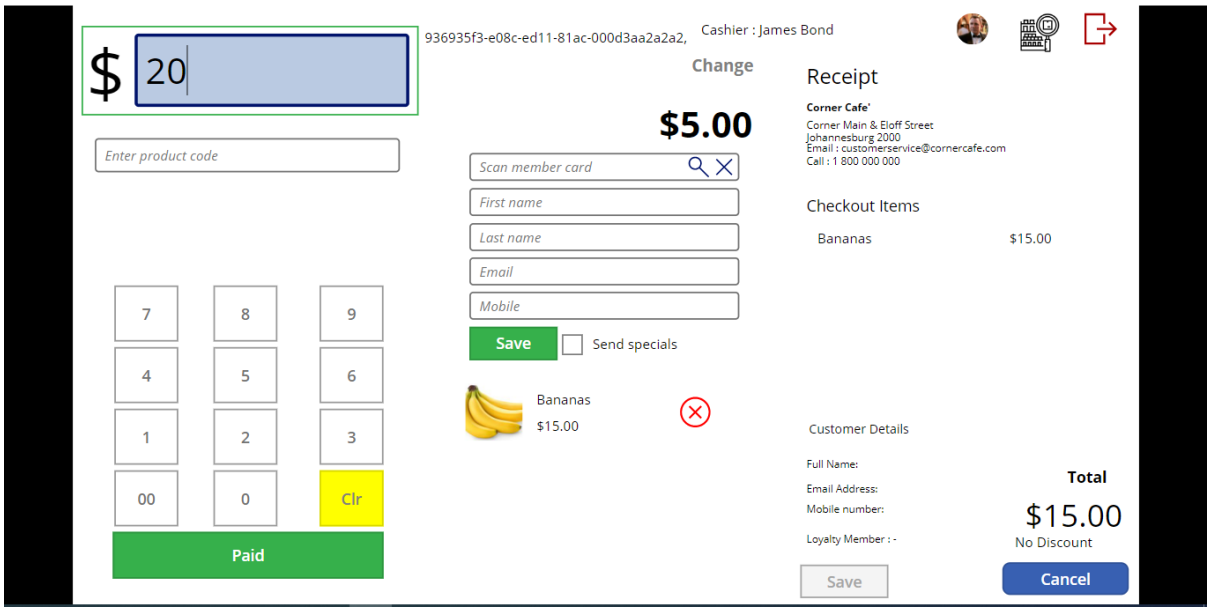

Figure 6.4 sell to default customer

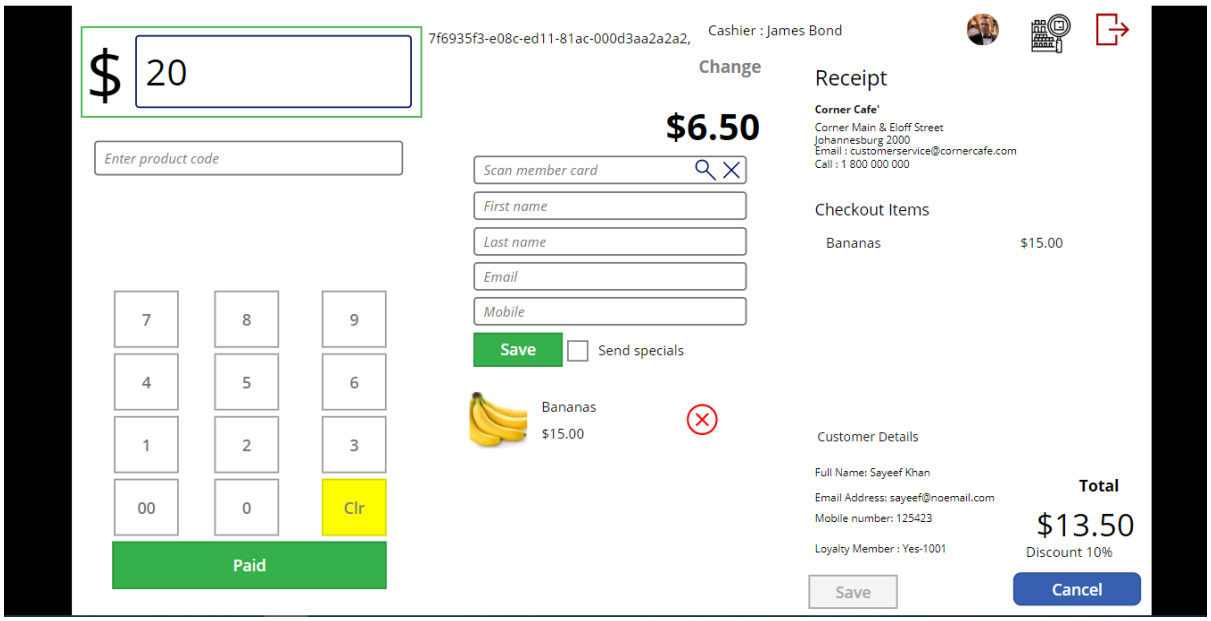

Figure 6.5 sell to member customer

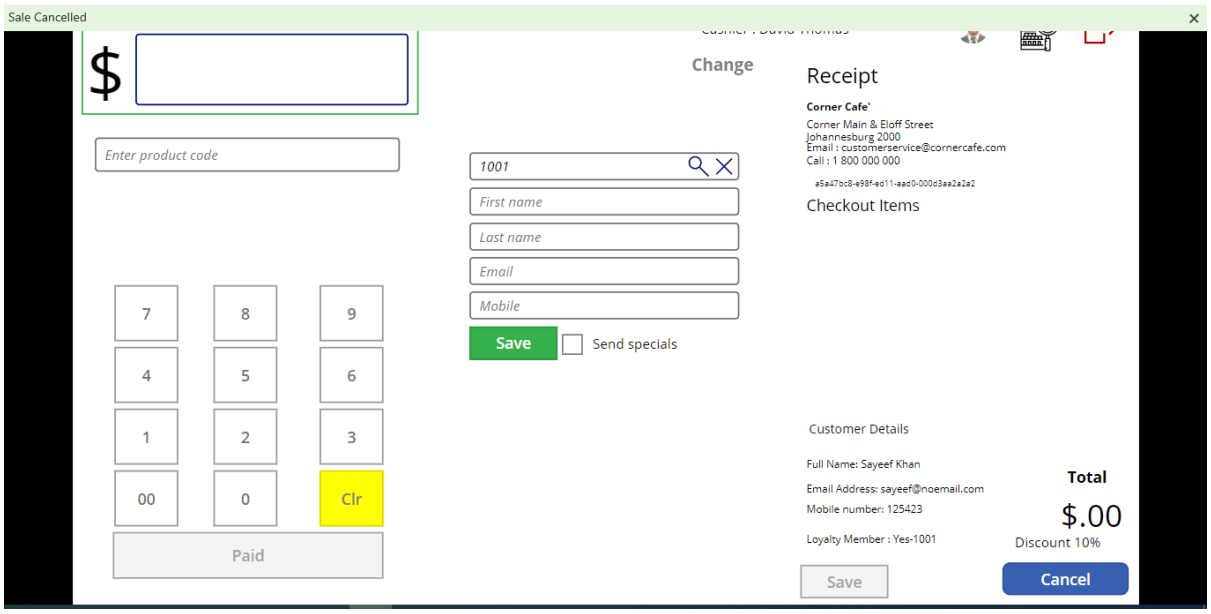

Figure 6.6 Cancel sell if needed

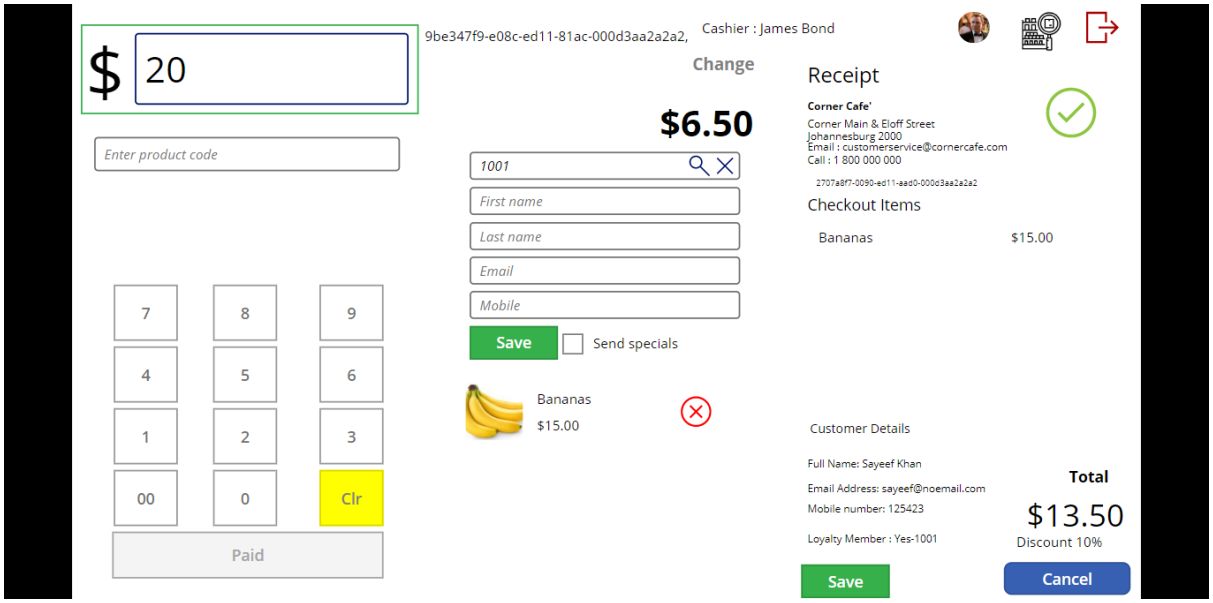

Figure 6.7 complete Sell

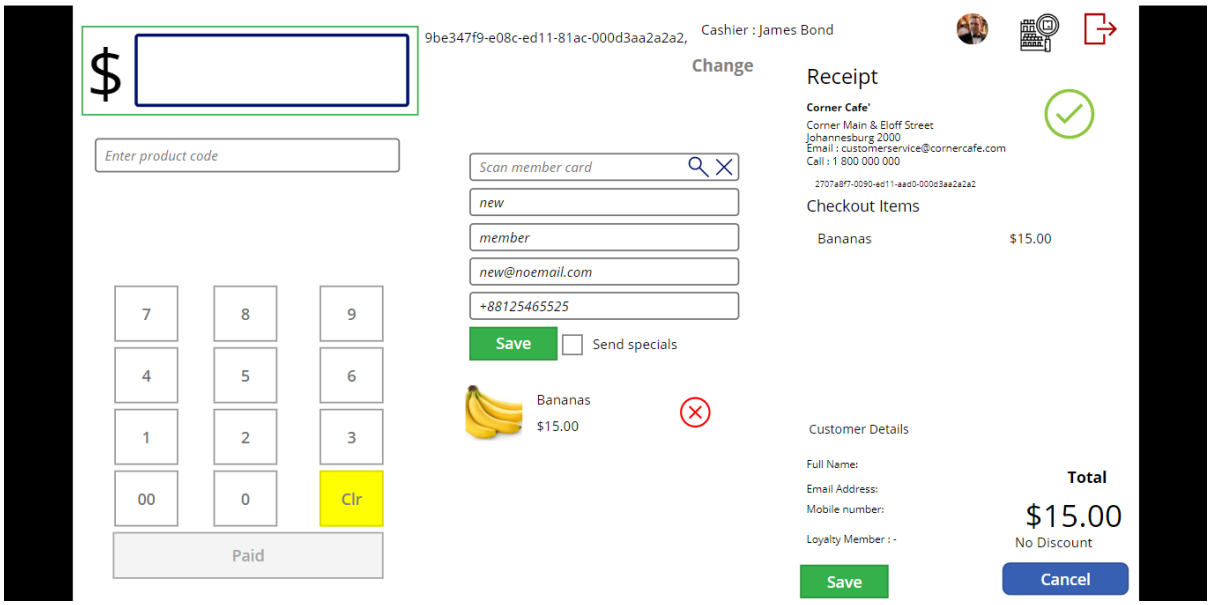

Figure 6.8 save Receipt

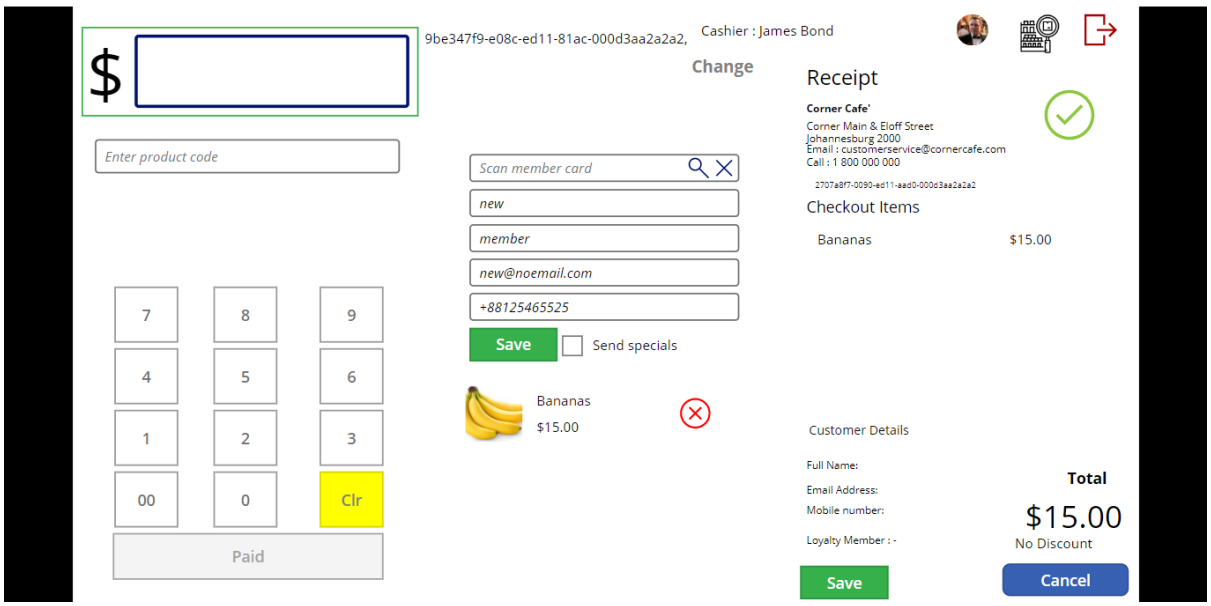

Figure 6.9 Add new loyal member

6.1.3 End of Shift

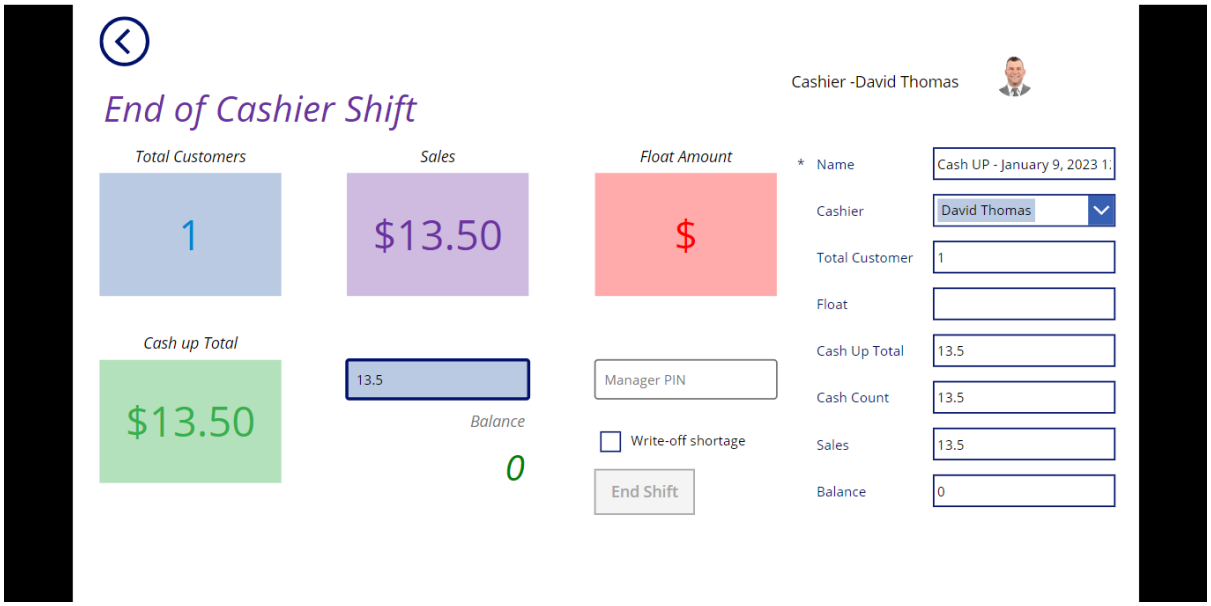

Figure 6.10 End Of Shift Interface

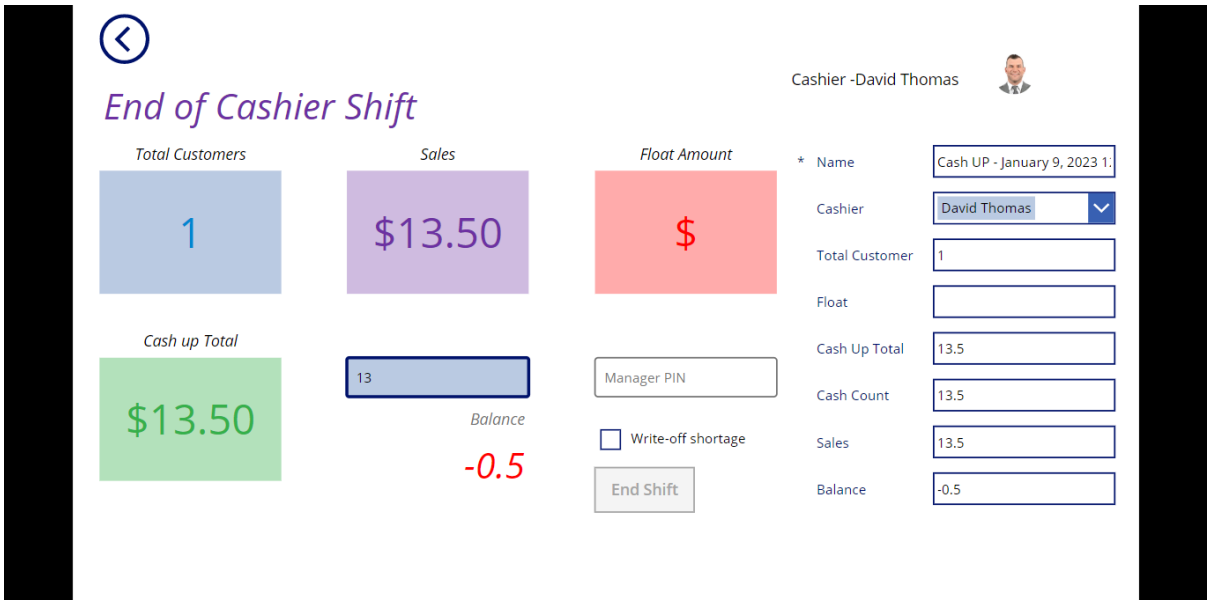

Figure 6.11 End Of Shift If balance count low than total cash up

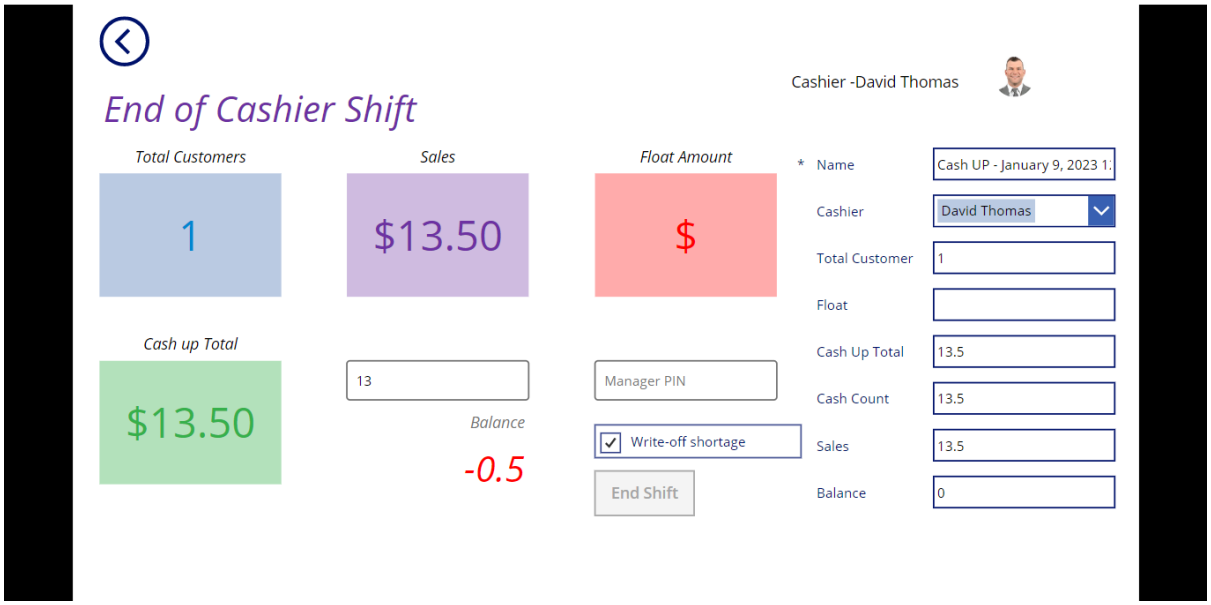

Figure 6.12 If manager write-off the shortage then balance should show 0

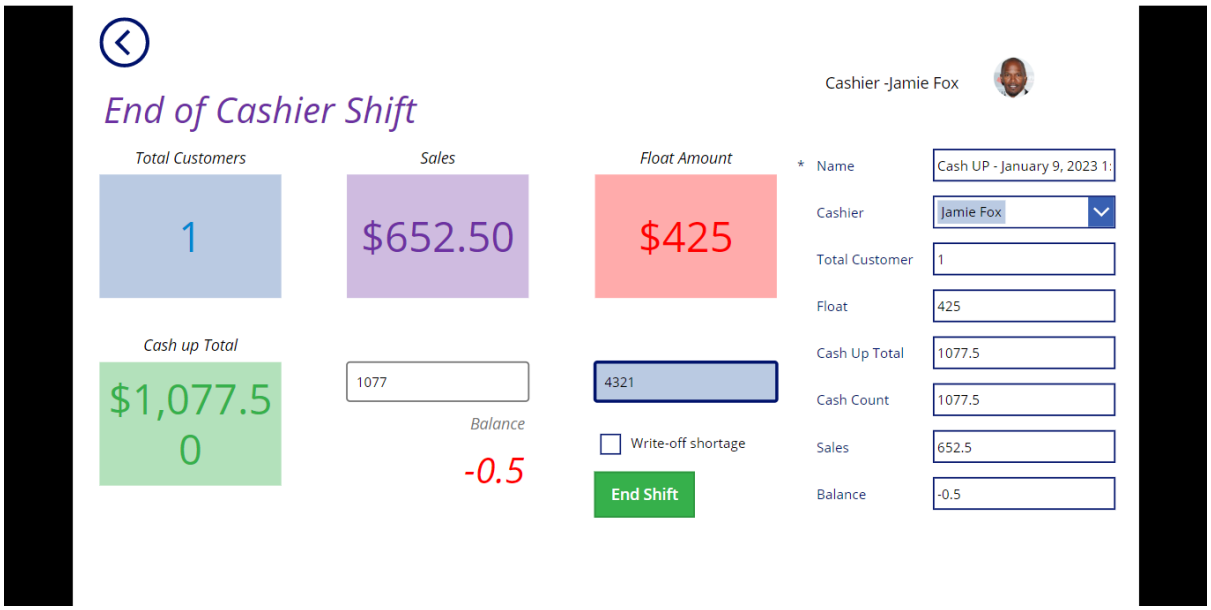

Figure 6.13 If manager pin is valid then system allow to submit.

6.1.3 in Stock/Damaged Count

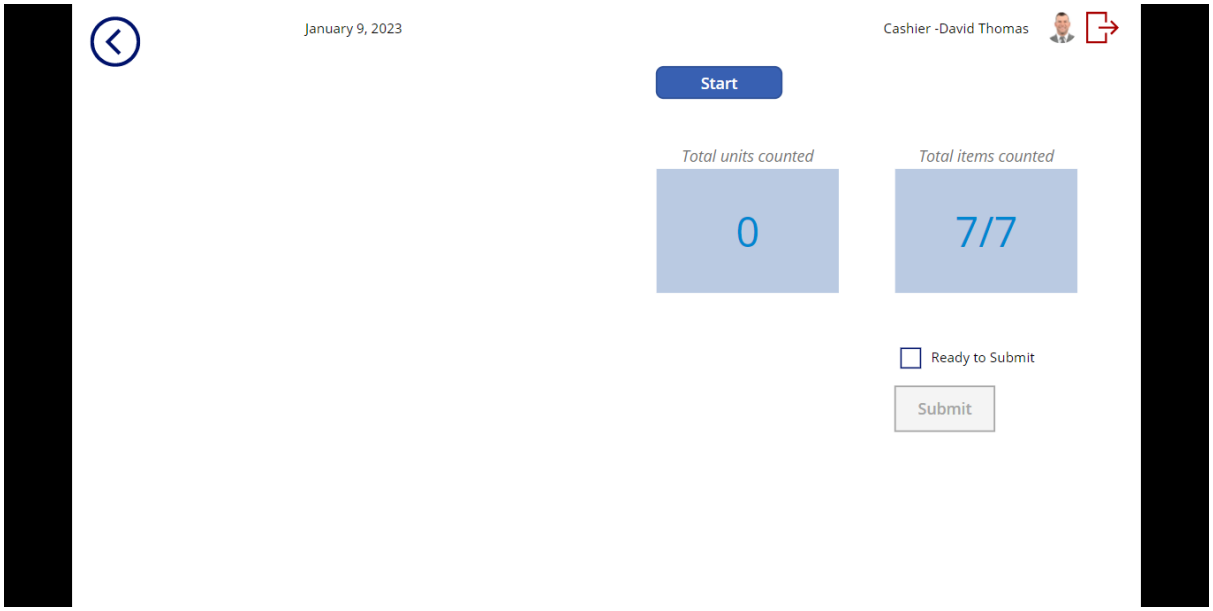

Figure 6.14 Inventory count initial interface

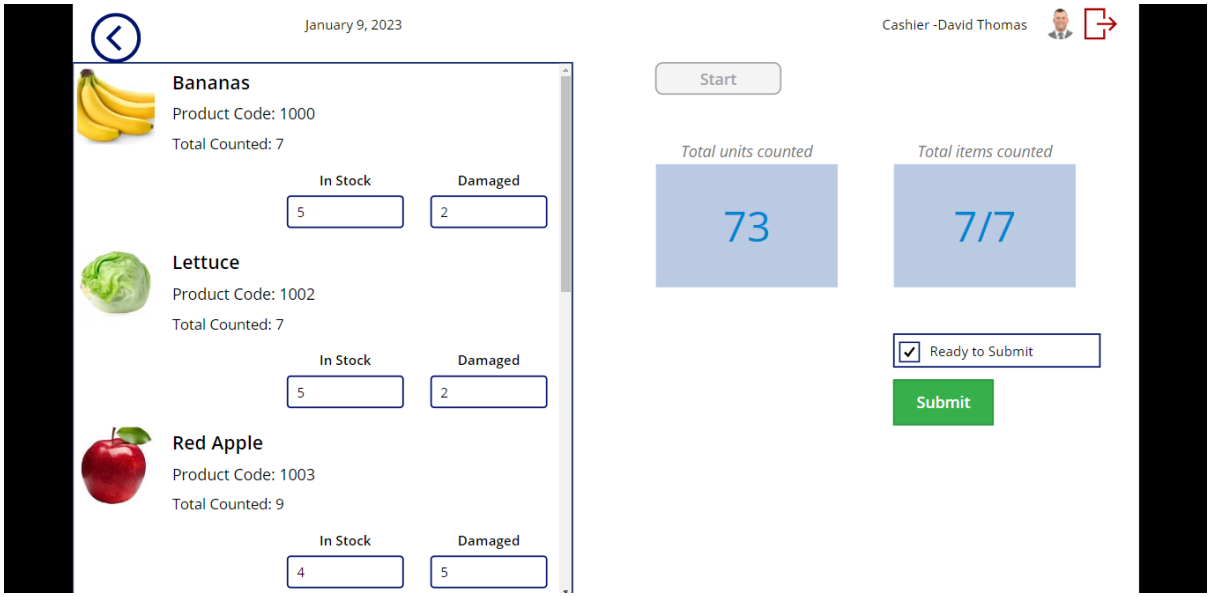

Figure 6.15 Inventory count before submit interface

6.2 Graphical User Interface for Model-Driven App Result

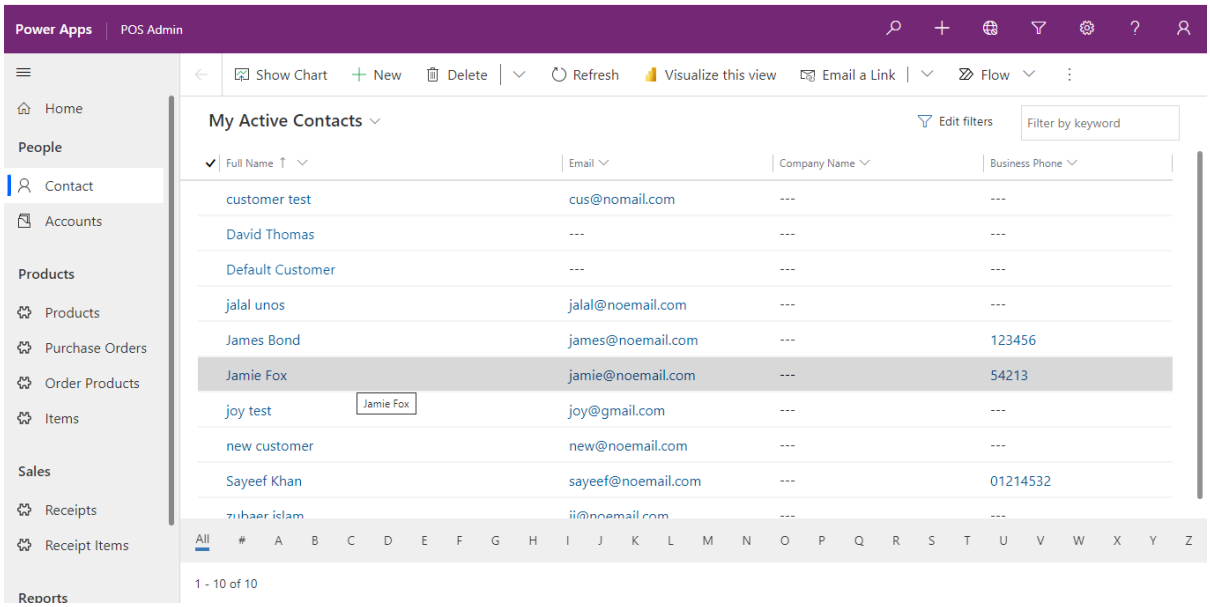

Figure 6.16 Admin user contact interface

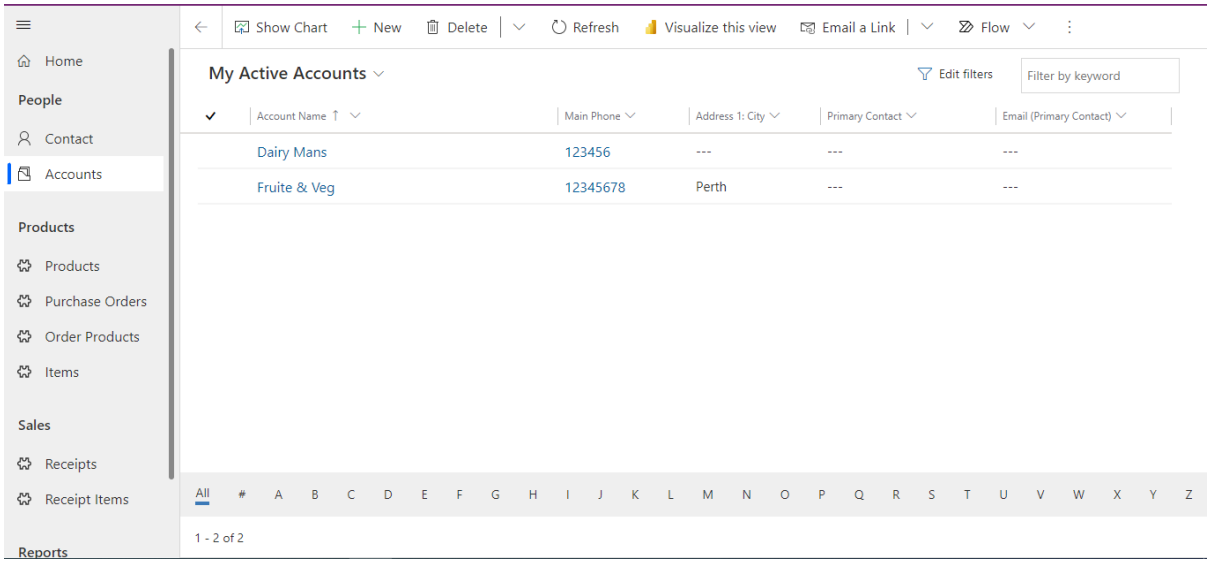

Figure 6.17 Admin Product Supplier account interface

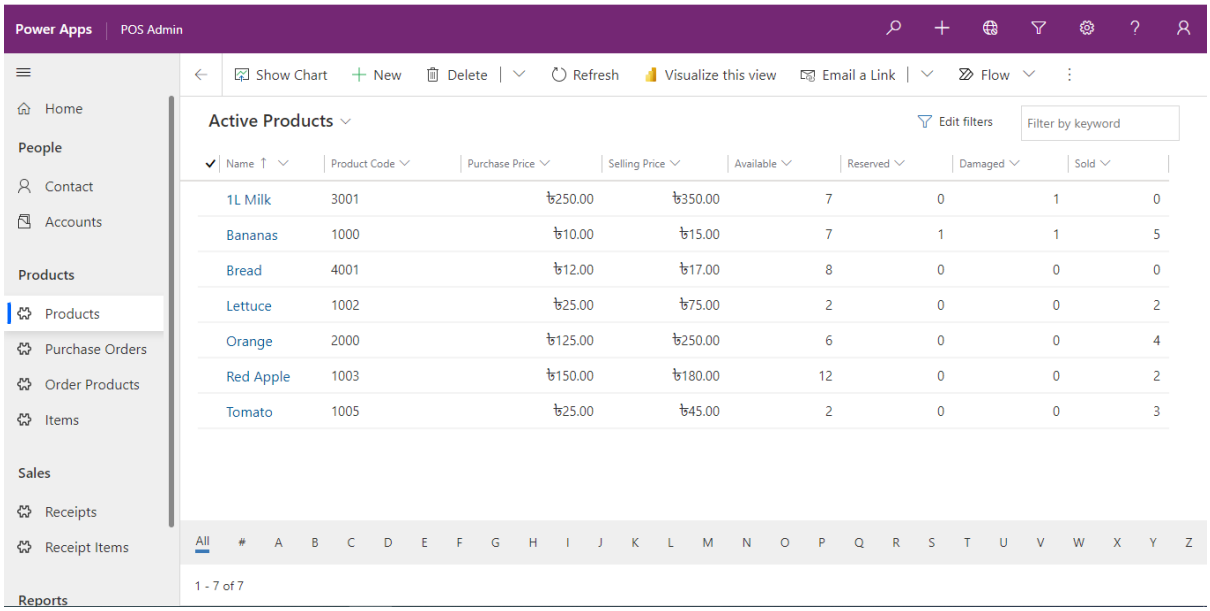

Figure 6.18 Admin Product interface

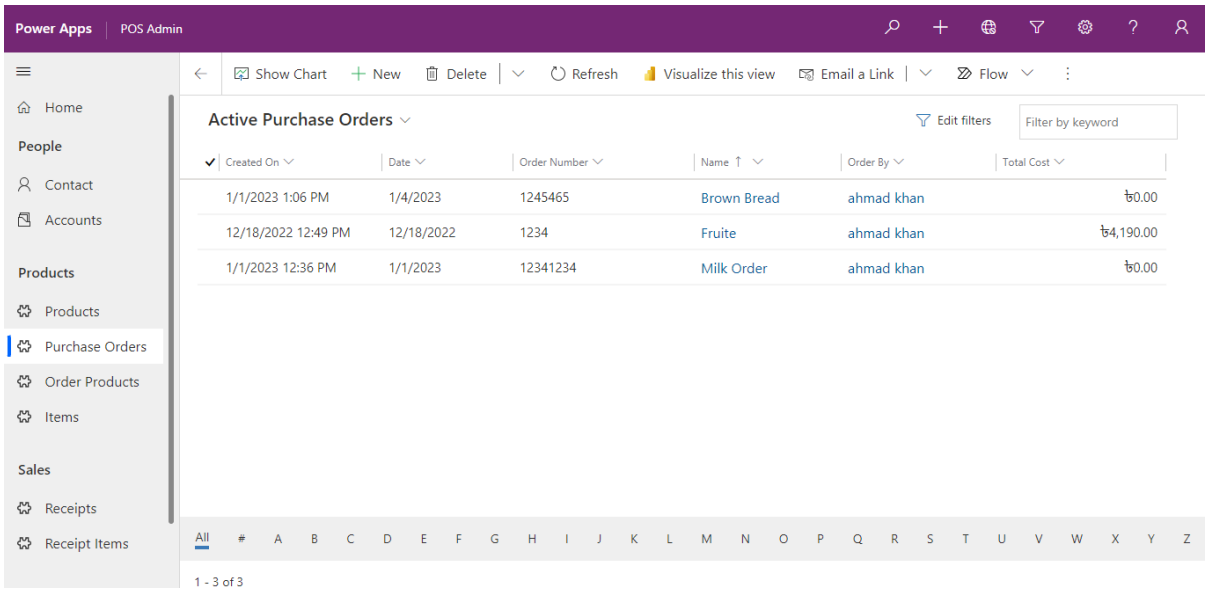

Figure 6.19 Admin Purchase Product interface

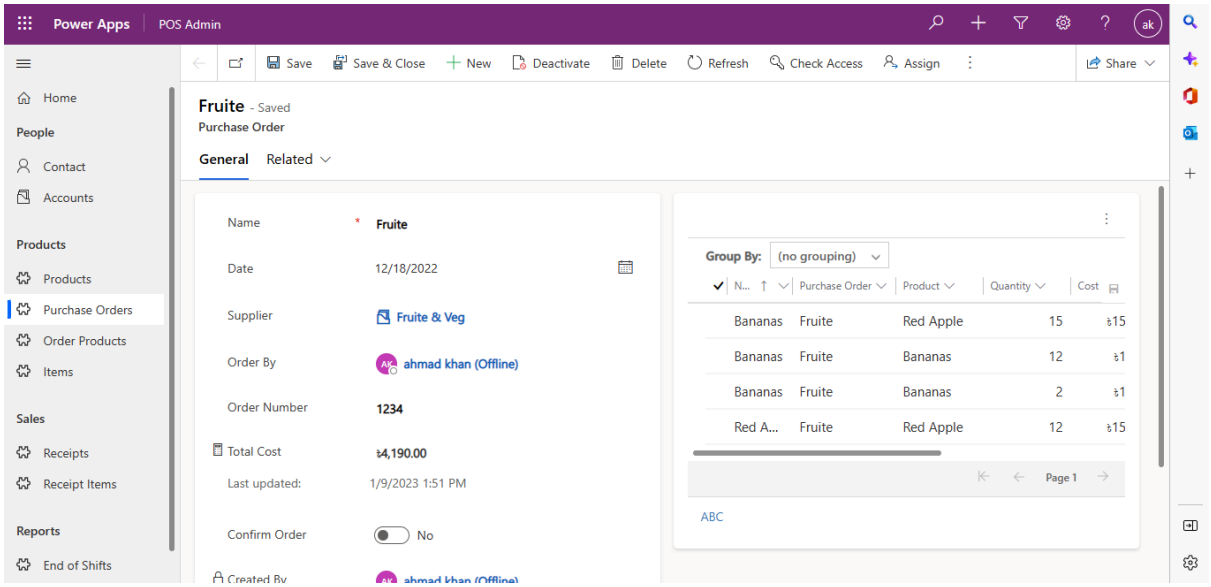

Figure 6.20 Admin Purchase Product interface in depth

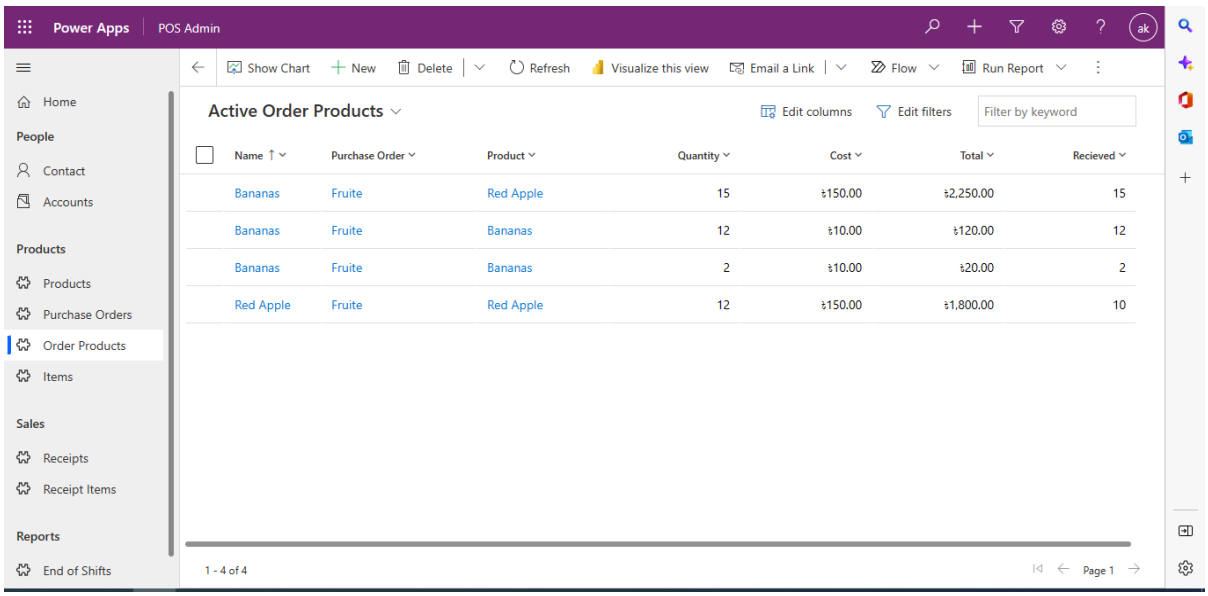

Figure 6.21 Admin Order Product History

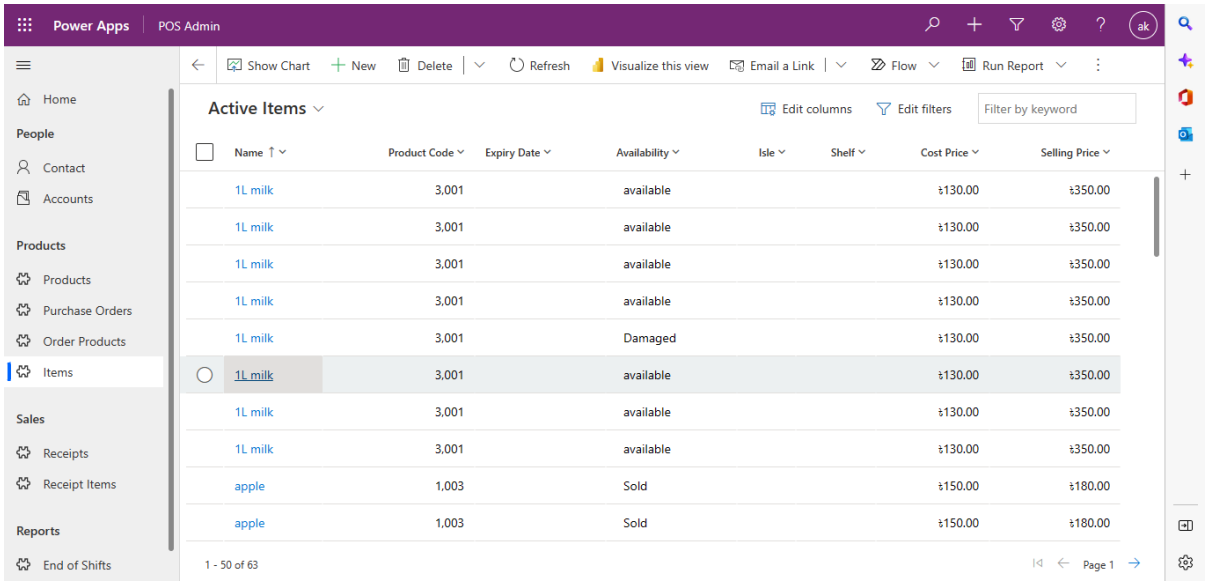

Figure 6.22 Admin Receive Item Product

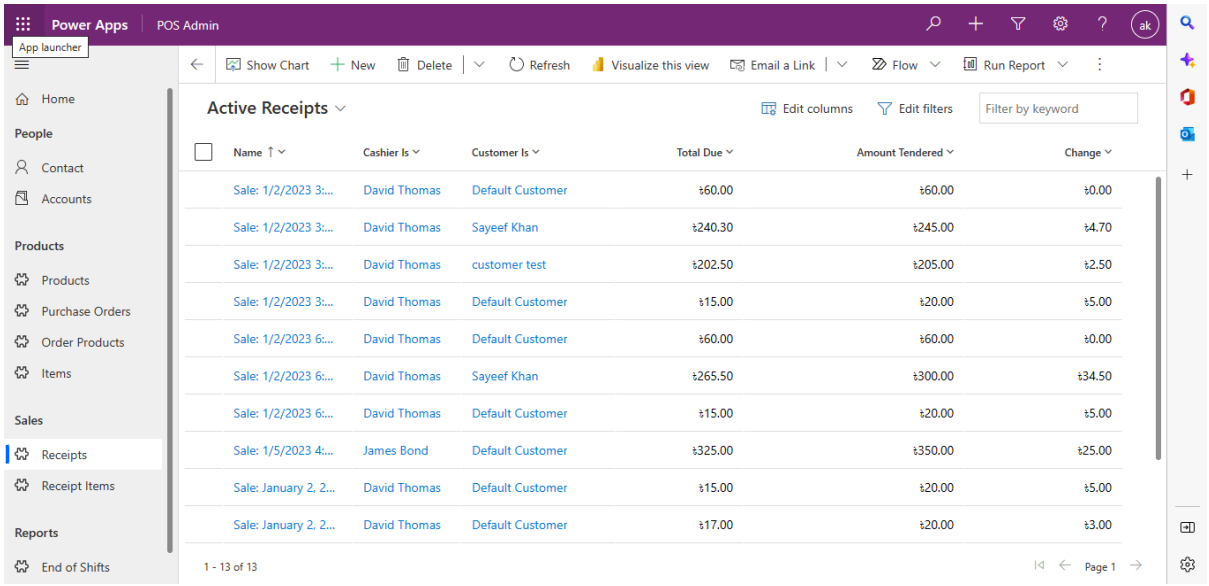

Figure 6.23 Admin Receipt history

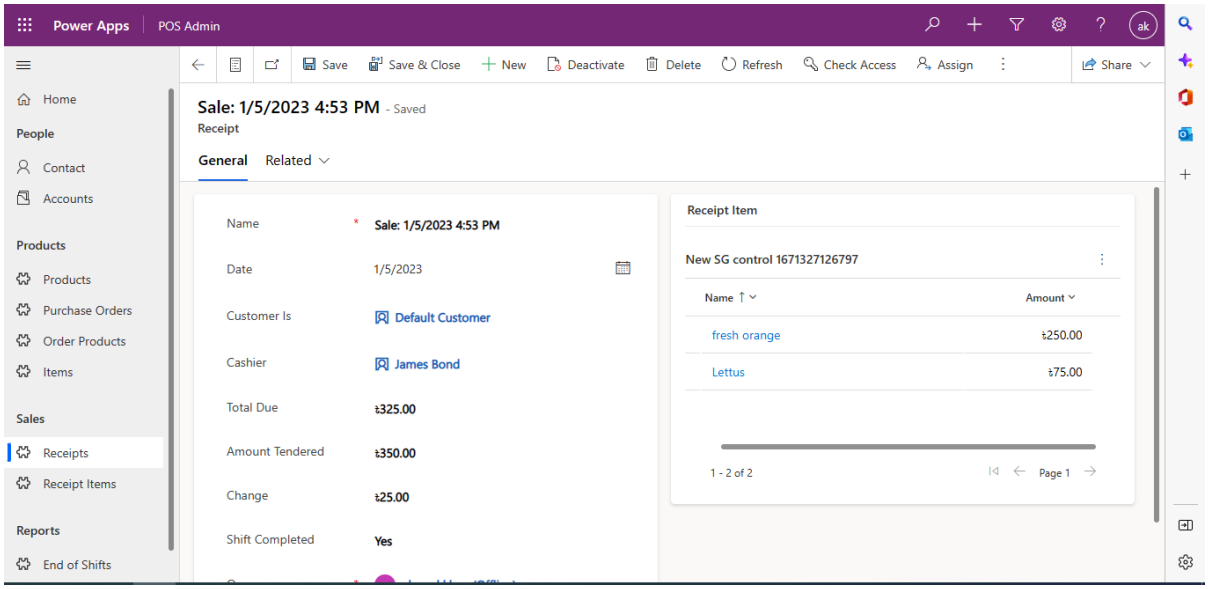

Figure 6.24 Inside Receipt item

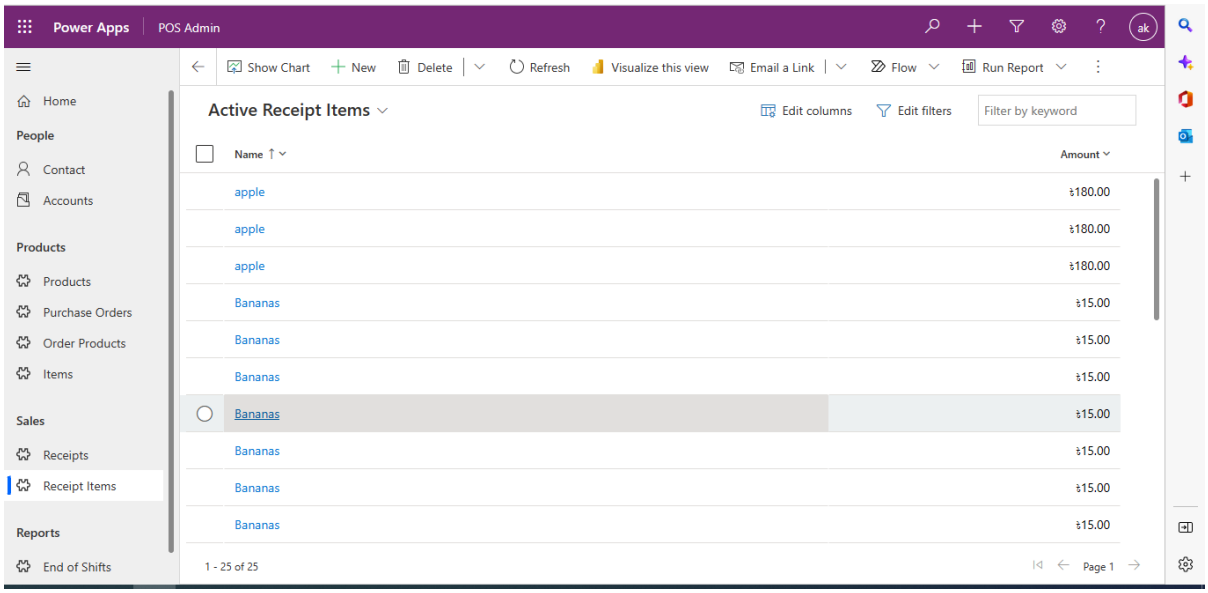

Figure 6.25 Individual Receipt item

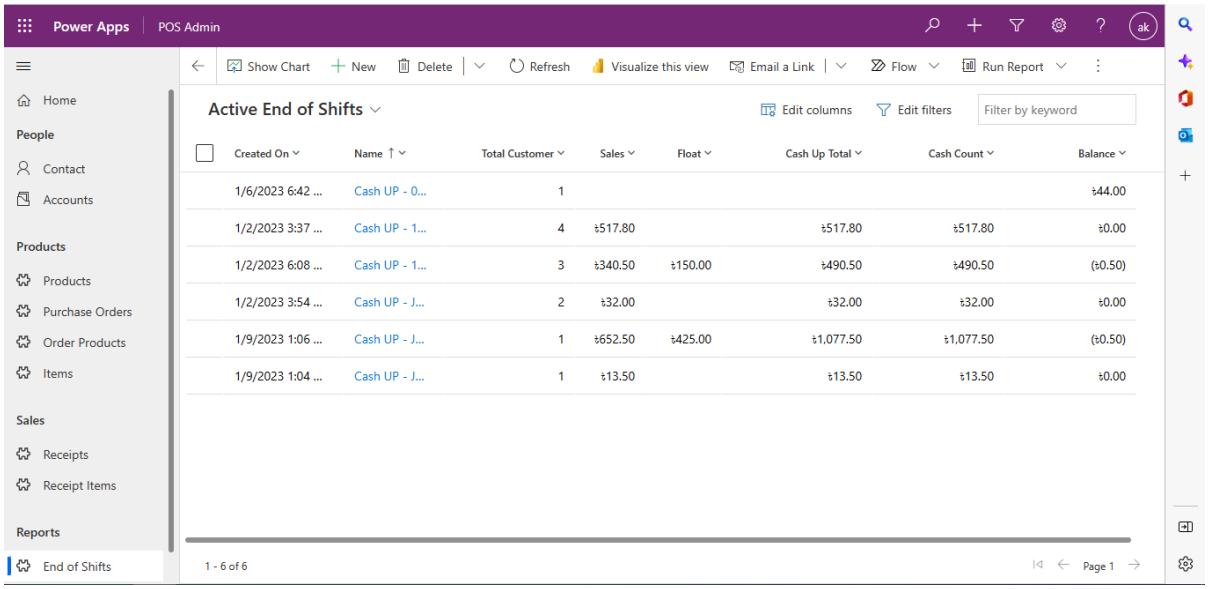

Figure 6.26 End of shift history

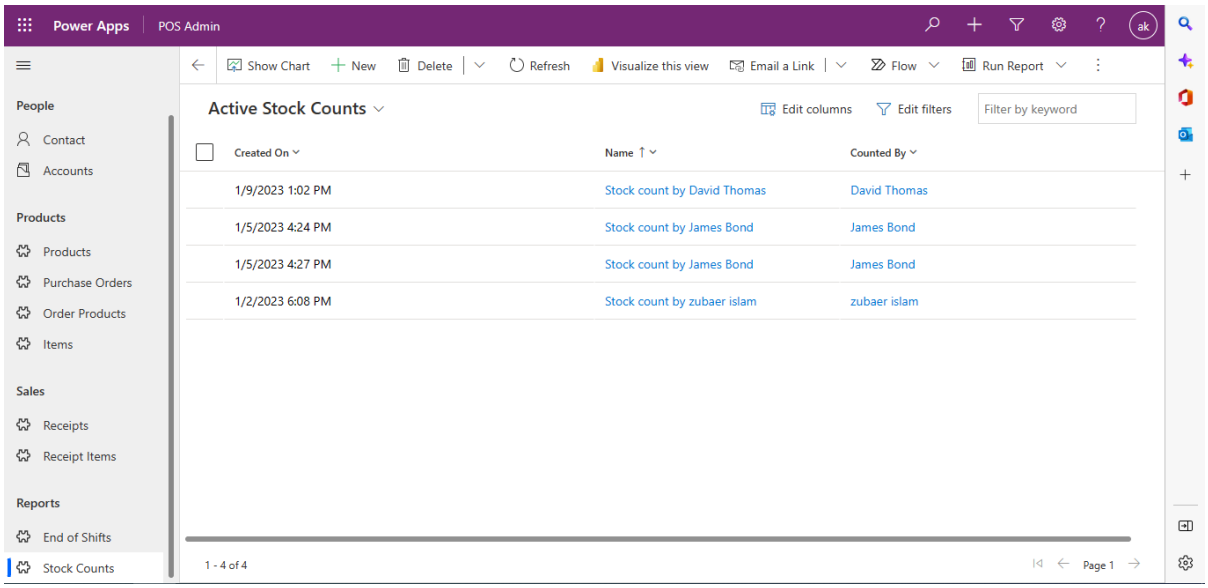

Figure 6.27 Stock Count History

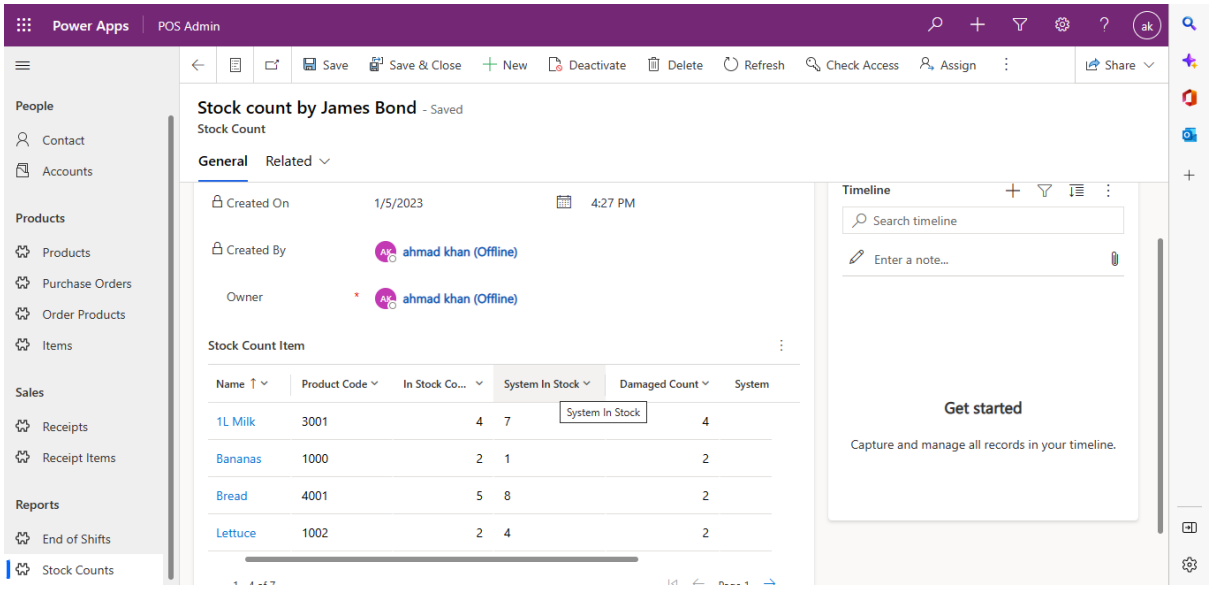

Figure 6.28 Individual Stock Count History

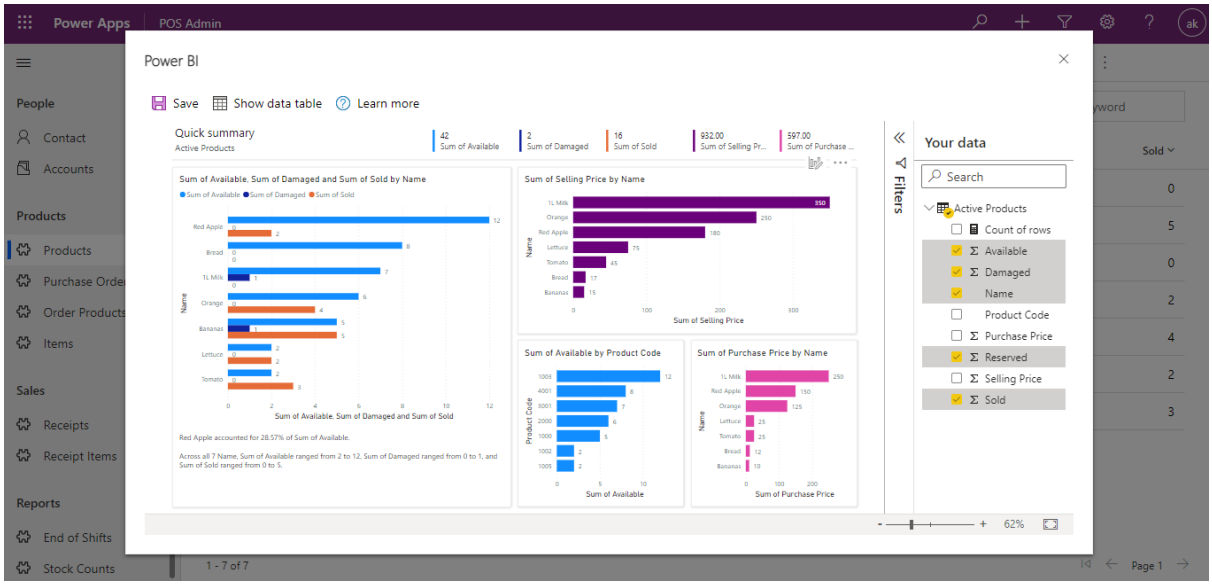

Figure 6.29 Visual Bi Report

Chapter 7 - Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

Thinking about the future, the company has made huge plans to make sure enough revenue is generated. Initially the goal is to make sure all the upcoming graduates gets involved in the software. The next plan is to target the big organizations & companies those are likely to make their private applications using power platform. This existing company now making the application to test the power platform. This app we can add more features to make it more beautiful & sell this application to multiple clients.

Now a days, In Bangladesh most of the people from all classes drastically use smartphone. Smartphone and internet make people life easier. People are now searching for an easy solution of every situation which reduce the daily life hassles. So, people get more dependent into online based solutions. A product can be sustainable in three main categories:

• **Community Sustainability**: We can expect the users to refer to other users regarding the application and thus growing the client base.

• **Financial Sustainability:** This refers to how the application's development cost will be maintained after it has been released and whether it will help to the business to grow the acceptable profit. An application's running cost includes – licence cost, database storage cost, maintenance, etc.

• **Organizational Sustainability:** It relates to how the company will continue to operate after the release of the application. After the release of an application, usually the company maintains the application via its current team, an extended team or by a fresh new team. Also, companies update their project by adding newer features to it and organization may pivot to other projects, expand the teams, create new teams, etc.

7.2 Social and Environmental Effects and Analysis

My application is very environmental friendly. We don't have any paper receipt option. When a customer complete his/her purchase they will get their receipt into their email. Only internet electricity & device need to use this software.

7.3 Addressing Ethics and Ethical Issues

The system will be fully secured for all users. No personal information will be leaked from the database. Microsoft will handle the security. To use this application user should go through two authentic ways to reach main interface. Only trustable employee can use this software.

Fraud and Identity Theft: The application does not allow any other third-party software to the database. Data are from what user provides no other information are stored. This system does not have a payment gate-way, so users will not be required to give any bank account or card information.

Data Security: Only the head developer will have access to the server and the database system. Database is secured with user name and password, without this logging information no one else can have access to the data collection.

Chapter 8 - Lesson Learned

I completed my internship as a Programmer at TechTrioZ Solutions. When I was offered an internship at TechTrioZ Solutions, I got the chance to work as a developer and I learn a lot from them. Our project's goal was to create a system for TechTrioZ Solutions. My project name is "Store Point Of Sale ". As a developer I have to develop the system using Microsoft Power App. It was completely new experience for me to work with and organizational team.

During this period, I didn't face many problems but got the chance to learn a lot. Here I mentioned some key point I learned during my internship

1. New/improved skills

One of the most important things I want to mention as an intern is my new found knowledge, which includes knowing how to fulfilling tasks relevant to my desired career path. Not only that, but I should have also spent time sharpening and honing the skills I already possessed.

2. Communicate Professionally

For the first-time as intern, working in a professional environment is very overwhelming and difficult to adjust to. Learning to communicate professionally, whether it be in-person, over the phone, or through email, is a great skill to work on during my time as an intern. Talking with my supervisor, boss, or client is a lot different than the casual conversations I have with friends and family.

3. Network

Internships provide me with great networking opportunities. This is a great way to make friends in the office and also create lasting professional relationships with my co-workers. These relationships might be very helpful in my job search after my graduate.

4. Set Goals

It was important to set goals for myself toward the beginning of my internship. I started by asking my supervisor what their expectations are for me to get a better sense of what some of these goals. I also set goals about what I hope to learn during the internship and plan ways to reach these goals. These goals can relate to the actual work I am doing as well as personal goals that I hope to reach during my time as an intern.

5. Manage my Time Efficiently

Learned how to manage my time effectively, it can be difficult if i have never held an internship or worked in a professional environment, but i can make sure to stay organized by making lists and deciding which tasks are the most important and complete those first.

6. Enthusiasm is invaluable

As an intern, I discovered it's essential to be enthusiastic and open to learning new skills, asking for more work and being curious to learn and ask questions.

8.1 Problems Faced During this Period

Coping up with the new environment from the very beginning I wasn't that much difficult as I had my seniors from my own University there to guide and support me and moreover the management structure of the Institution is phenomenal everyone is there to support and help everyone out and they worked as a perfectly sync team to complete the task.

8.2 Solution of those Problems

Still as a new developer I had to learn a lot for coping up with my seniors. How to handle complex stuff and to keep my clients happy & the management of the office up to date about my work progress.

Chapter 9 - Future Works & Conclusions

8.1 Future Works

This software will undergo a radical change in the future. So, The work doesn't stop here. For the future we will add more feature in this application . Some of them are listed here-

- **Supplier Interface**

  This system there's no user called supplier who's supply product to the store.

- **Product Code Scanning**

  In existing system there's no option to allocate product code automatically or search by bar/QR code. In future we will developed that system very recently.

- **Sell person interface**

  Sell person is one of the most important for bigger store though we will sell this application to big store so then we will add these feature.

8.2 Conclusion

I worked on an application which has a goal to improve existing situation of the store owner during my internship at Techtrioz Solutions. This helps me to gain knowledge on how Microsoft Power platform Works . This system is designed for saving money, time and a lot of wastage of product. If we can further improve the system we think this can be a great software for client.

It has been a great opportunity for me to work in Tech Trioz Solutions as Power App Developer. The internship program here was 3 months but the last one month was involved other applications too. My experience here was full of knowledge about the development process and also the job market. I have learned how to handle different requirement for the software and the best approach to developing it. This program gave me a clear idea about professional life as a web developer, what I must face and how to handle those situations. During internship, I tried to cover my weakness about problem solver & becoming a good problem solver & ready to face any challenge.

Biography

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An Undergraduate Internship/Project on "POS system using Microsoft PowerApp"

By

AHMAD SAYEEF KHAN

Student ID: **1520139**

Autumn, 2022

Consent from Supervisor

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during and/or before final viva, and the department can use this version for archiving as well as the OBE course material for CSE499.

(Signature of the Supervisor)

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