An Integrated Point of Sales System with Magnetic Stripe Card Reader For Binary-based Multi-Level Marketing (MLM) Business System

Mamun Sirajul Majid
Abstract

Magnetic Stripe Card Reader for Binary-based Multi-Level Marketing (MLM) Business System

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Destiny-2000 (Pvt.) Ltd. is a Multi-Level Marketing (MLM) company operating in Bangladesh which has adopted the Binary System of MLM. Binary systems are a multilevel marketing compensation plan which allows distributors to have only two front-line distributors. Everyone else goes beneath those people. The thing that determines whether one can get a commission from a person is not what level he is on, but rather how much purchase volume is generated in the levels between one and that person. Destiny-2000 has more than 130 Net offices (so called Net office which is bigger than Branch office) / Branch offices. As of 4th October 2007, the total number of distributors/ members is 1,322,361.

To make certain level of profit to keep the sales commission and incentive amount attractive for current and prospective distributors the minimum purchase volume for joining the sales network is moderately high by Bangladesh standard.

Destiny-2000 (Pvt.) Ltd. is exploring several options to attract their prospective and current members/ distributors. To this extend, the IPOS developed in this project reduces the one-time purchase burden for prospective members and allows current members to utilize their accumulated points by conveniently purchasing products from a shopping mall.

An Integrated Point of Sales (IPOS) System with Magnetic Stripe Card Reader application has developed based on shopping mall, which will be demonstrated using screen shots.

The complete system in this project, consist of several programs using Visual Studio.Net, C#, Visual Fox Pro, an SQL Database like MS SQL Server 2000, One GUI application, a set of reports using Crystal Report and magnetic stripe card reader, Point Privilege Card (PPC), Barcode Scanner etc.

Keywords: PPC, MLM, IPOS, Software, Development, Magnetic Stripe Card Reader, Barcode Scanner, Visual Studio.Net, C#, Visual Fox Pro, Crystal Report, MS SQL Server 2000, Binary System, Database, Point Privilege Card, Destiny Point, Distributor, Member

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## Contents

1 **Introduction** 1  
  1.1 Why this project is appropriate for Binary System…………………1  
  1.2 Problems to get membership and to utilize unused points…..1  
  1.3 Methods used to solve the problem………………………………2  
  1.4 Goals…………………………………………………………………..3  
  1.5 Thesis Structure………………………………………………………4  
  1.6 Work-site………………………………………………………………4  
  1.7 Point of Sales System………………………………………………..4  
  1.8 Why IPoSS is suitable for multi level marketing…………………5  

2 **Background** 6  
  2.1 Software Development………………………………………………6  
  2.2 Terminology for Integrated Point of Sales Development………..7  

3 **Methodological Considerations** 9  
  3.1 A professional IPoSS perspective…………………………………10  
  3.2 Software and hardware to developed IPoSS ………………………10  
  3.3 System Requirements of IPoSS……………………………………12  

4 **Implementation** 13  
  4.1 Work Flow Diagram…………………………………………………14  
  4.2 Database Design……………………………………………………15  
    4.2.1 Server Database…………………………………………………15  
    4.2.2 ER-Server Database……………………………………………16  
    4.2.3 Table Description………………………………………………17  
  4.3 IPoSS software development for server API………………………21  
    4.3.1 Important features of IPoSS for server side…………………..21  
    4.3.2 Reports…………………………………………………………22  
    4.3.3 Features Description…………………………………………22  
  4.4 Shop Database……………………………………………………….27  
    4.4.1 ER diagram for Electronic Shop Database…………………..28  
    4.4.2 Table Description………………………………………………29  
  4.5 IPoSS software development for shop API……………………….32  
    4.5.1 Basic Configuration feature…………………………………..32  
    4.5.2 Item and operational Features………………………………..32  
    4.5.3 Reports………………………………………………………….33
5 Evaluation
  5.1 Results
  5.2 Questions for IPoSS Development

6 Discussion
  6.1 Requirements specification and testing
  6.2 Validity and reliability
  6.3 Conclusion

References
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The role of a compiler</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Magnetic stripe card reader with serial port function</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Work flow diagram of IPoSS</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>ER diagram of server database</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Challan module that can produced product received invoice through software</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>Products received challan module</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>Barcode label generator module</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>Print barcode label</td>
<td>26</td>
</tr>
<tr>
<td>9</td>
<td>Products delivery module</td>
<td>26</td>
</tr>
<tr>
<td>10</td>
<td>ER diagram for Electronic Shop Database</td>
<td>28</td>
</tr>
<tr>
<td>11</td>
<td>Sale module</td>
<td>33</td>
</tr>
<tr>
<td>12</td>
<td>PPC module from where PPC card's information can be view and update</td>
<td>34</td>
</tr>
</tbody>
</table>
List of Tables

| 1 | Database table for product group | 17 |
| 2 | Database table for product Name | 17 |
| 3 | Database table for product Brand | 17 |
| 4 | Database table for product description | 17 |
| 5 | Table for shopping center list | 18 |
| 6 | Global setup table for shopping center identification | 18 |
| 7 | Supplier table for details supplier’s information | 18 |
| 8 | Ichallan for product delivery information | 19 |
| 9 | Buycentral for product inventory | 19 |
| 10 | RChallan for product received information from supplier | 20 |
| 11 | Buy table is used for product inventory for electronic shopping center | 29 |
| 12 | Products sales information | 29 |
| 13 | Invoice wise products sales summary | 30 |
| 14 | Used card points | 30 |
| 15 | Table for price change | 31 |
| 16 | Table for all kinds of product return and damage | 31 |
| 17 | Table for user security | 31 |
List of Abbreviations

IPoSS  Integrated Point of Sales System
DP    Destiny Points
DIN   Distributor’s Identification Number
DOB   Date of Birth
PPC   Point Privilege Card
S/W   Software
H/W   Hardware
WFD   Work Flow Diagram
ER    Entity Relationship
DD    Database Design
IPOS  Integrated Point of Sales
1. Introduction

Multilevel marketing network is a way of selling goods or services through distributors which is also a urbane way of paying commissions to sales-people who sign up as a distributor; he will receive commissions for both his sales of the plan's goods or services and those of other people he recruit to join as distributors. Multilevel marketing plans usually assurance to pay commissions through different levels of recruits, known as the distributor's "downline."

Several networks marketing reward plan exists in the world like the Matrix, the Australian plan, the Unilevel, the Binary, and the Break Away. One of the first issues was to decide type of Network Marketing reward plan is to use. Each of these reward plans has infinite variations, and none of them are same. The two most popular plans today are the Binary and the Break Away.

Destiny-2000 Ltd. has adopted Binary systems which are built on a matrix of two. The joining requirements of this network system are 500 Destiny points. Binary systems pay is based on a maximum number of purchases over the week that is specified. It pays on that amount despite the consequences of how many levels down one need to look to reach that total. So the number of levels between one and a given recruit is not especially relevant. The thing that determines whether one gets a commission from that person is not what level he is on, but how much purchase volume is generated in the levels between one and that person.

1.1 Why this project is appropriate for Binary System?

To become more attractive of this network system, Destiny-2000 Ltd has established electronic shopping malls for their prospective and current members. Current distributors will get rebate on every purchase of products (every product has destiny points) from any of its Electronic Shopping Center by using Point Privilege Card (PPC) or can save this destiny points to joining points which could be enhance their binary network system. Prospective members can also purchase products for a substantial fraction of the membership fee and fulfill their prerequisites points in the near future by purchasing products to join this binary network system. That’s why this project is appropriate for binary system.

1.2 Problems to get membership and to utilize unused points

Prospective members can get a membership with or without purchasing products. In both cases one has to have 500 DP (Destiny Points). To get membership of this company, one has to have 500 DP (Destiny Points) equivalent to 2775 BDT=39.64 USD. However if the prospective members want to get this 500 DP by purchasing product from this company only once, it will cost
lot of money - 20000 BDT or 285.71 USD. This one-time membership fee is moderately very high for Bangladeshi people, where the average income is 10000 BDT. Hence the one-time membership fee severely limits the number of potential members which the network can attract.

To make it more attractive the network has promised the new joining members to ensure the ability of purchasing products from an electronic shopping mall for a substantial fraction of the membership fee. However, currently there is no system or application to support or manage their purchases.

To run this business more efficiently, an electronics shop should be able to verify member’s Point Privilege Card (PPC) to get sales rebate. However, currently there is no database or systems or application to verify this card.

1.3 Methods used to solve the problem

Main resolutions to overcome the problems mentioned are:

1. Lowering the expenses to fulfilling the DP (Destiny Points) requirement for new distributors joining the network.
2. Maintaining the profit level intact or undisturbed to pay commission and incentive through the referral network.

To achieve both the goals the following methods are followed:

i) New distributors will have to have 500 DP (Destiny Points) at the time of joining, but this will consist of buying products which is equivalent to 50 DP only and the rest of 450 DP will be issued in favor of the joining distributor on payment of the equivalent profit amount (450*5.55=2498 BDT) and the distributor will get a Point Privilege Card (PPC) with a Magnetic stripe in which the 450 DP will be loaded.

ii) There is another option for the new distributors just to join in this process by purchasing 50 DP equivalent products which means prospective distributors can join this network by this points and fulfill their prerequisite points(500 DP) in the near future by purchasing products. This can reduce the one time expenditure for joining by more than 75% and thus enabling lot more people to join.

iii) The new distributors will get rebate on every purchase of products from any of its Electronic Shopping Center. The software application will be installed at the Point of Sales (POS) system where the distributors can purchase products adjusting points from the PPC card with preloaded DP in the magnetic stripe.
Thus the bookkeeping of DP is done by record keeping in the magnetic stripe of the PPC, which is updated by the attached magnetic card reading/editing device (at the time of transaction), which is integrated with the POS system.

1.4 Goals

The goals of this project and the questions will answer are:

What is the process of lowering the expenses for fulfilling the DP (Destiny Points) requirement for new distributors joining the network?

How the profit level could be kept uninterrupted to pay commission and incentive through the referral network?

How it is possible to implement the points with the product which is essential for current and prospective distributors?

How to implement the Point Privilege Card with the Magnetic Stripe Card Reader?

How access control system works with IPoSS?

How can the current members utilize their unused points to get some rebate from their purchase amount?

How to check joining points for current and prospective distributors to enhance or start binary network system?

How to control or monitor IPPoS from one central point?

Present future possible research topics:

The purpose of this work is to develop IPoSS integrated with magnetic stripe card reader for electronic shopping center where consumers or distributors can purchase products which will create a center of attention in multi level marketing network business. This project is specially based on prospective and current distributors where newly joining members are able to purchase products for a considerable fraction of the membership fee and current distributors will get rebate
on every purchase of products by using Point Privilege Card (PPC) or save these points to enhance binary network.

1.5 Thesis Structure

This thesis is divided into four main chapters; introduction, background, implementation and evaluation.

First we have the introduction section that presents the problems and the goals of the project.

Then we have background which describes software development process, terminology, methodology, professional IPoSS perspective, software and hardware description related with IPoSS.

Then we have two sections on design and implementation containing the details on the implementation, what design is to use for the application and how to optimize project's problems and some useful features.

Then we have an Evaluation section with the results of the experiments and suggestions for future research.

Finally we have focused on summaries and discussion.

1.6 Work-site

This project is carried out at Destiny-2000 Ltd. in Dhaka, Bangladesh. It is one of the largest Multi-level marketing companies in Bangladesh that provides shopping centers, tree plantation, Co-operative multipurpose (pre banking system), newspaper and SMS services etc.

1.7 Point of Sale System

Now-a-days information has become more important than products, so an electronic cash register can’t collect or utilize information efficiently enough. A point of Sale System is critical to gathering and applying information effectively in today’s competitive markets. The main objectives of POS are – to reduce costs, reduce inventory, respond to trends faster, improve customer service, buy and sale smarter, improve marketing, control of money etc.
1.8 Why IPoS is suitable for multi level marketing?

To make the multi-level networking business more attractive, Destiny-2000 Ltd has introduced electronic shopping centers for their current or prospective members and other consumers. IPoS has specially designed this networking business where current members will get discount on every purchase of products by using Point Privilege Card or save this purchase points as joining points to develop network business system.

IPoS system not only included general objectives of POS system but also integrated with Magnetic stripe card reader and product’s points as well as other required features. It is an integrated smart tool for an electronic shopping center which can manage their network members and other consumer’s in an elegant way. We will discuss the main features of IPoS in other section which will bear out that it is suitable system for multilevel marketing business.
2. Background

2.1 Software Development

To develop software the first thing is to write the source code; for example in VB.NET, C# (C-Sharp) in one or more files, and then compile the source code into an executable program for a specific CPU as shown in figure 1. In an electronic shopping center context, the executable program would typically be called an IPoSS application (See terminology in section 2.2 below).

![Diagram of compiler process](image)

Figure 1: The role of a compiler

The Compiler itself is known as executable Program.

The waterfall model for software development was given by Royce [1]. It is a sequential development process which is seen through the phases of Conception, Initiation, Analysis, Design (Validation), Construction, Testing and Maintenance. In practical life though, it is often an iterative process through the phases, as Royce also pointed out. Again Wiktorin [15] described a slightly condensed and simplified version of this model, with the following four phases:

- Requirements specification
- Analysis
- Construction
- Testing

A software requirements specification is a complete description of the behavior of the system that to be developed. Successful software development depends on the complete requirements specification. Finding the requirements and formulating them in an unambiguous and
understandable way is not a trivial task. This is the case for software development in general and particularly for IPoSS development.

Analysis is the process of breaking a substance into smaller parts to gain a better understanding of it. In this phase requirements specification is transferred into precise descriptions of data and its associated processing in the software system under development.

Construction phase is also known as Implementation or Coding. During this phase, the results from the analysis phase are transferred into source code written in a programming language, like e.g. VB.Net, C#.

After completing construction phase it is essential to evaluate the performance of software development. In testing phase test cases are carefully selected to evaluate the performance of the software development, in order to validate the requirements. A distinction is made between black box testing in which no information about the source code or internal structure of the software is known, and white box testing in which such information is available and can be used in the definition of test cases.

For the development of IPoSS software with the multilevel marketing business concept requirements, all these four phases will be carried out with a considerable element of professional point of sale involved.

2.2 Terminology for Integrated Point of Sales Development

The terminology within the field of IPoSS software development is inconsistent in the sense that various meaning can be given to a specific word. Examples of confusing use of terminology are given below.

**Destiny Points (DP):** DP comes from product's profits which are used in every product where each point equivalent in BDT (Bangladeshi Currency) 5.55. Destiny points normally printed in barcode label which is attached with the products.

**Point Privilege Card (PPC):** It is also known as Magnetic Stripe Card which is capable of storing data by modifying the magnetism of tiny iron based magnetic particles on a band of magnetic material on the card [10]. It is a read write magnetic card where member’s name, mother’s name, DIN, DOB and number of DP are stored. Members will get rebate on every purchase by using PPC card where only DP can be editable and number of DP will be deduct from the card.
**Challan:** After purchasing products from the supplier it is important to make computer based purchase invoice where supplier’s products information, quantity, cost & sale price, vat, and DP as per profit etc will be available. Challan is the important step to prepare barcode label and make data to store in the inventory and sales.

**Server mode:** All electronic shopping centers are under control of head office where all kinds of barcode label and sales data will be generated. IPoSS can easily manage all shopping centers from the server mode. The details of server mode will be discussed in the later section.

**Client Mode:** Electronic shopping centers can be easily managed by IPoSS system which has interactive Sale System that is integrated with barcode scanner and Magnetic Stripe Card Reader. The details of this mode will be discussed in the later section.
3. Methodological Considerations

IPoSS for multi-level marketing as an academic discipline at Uppsala University yet does not have a research tradition and is therefore in the process of forming and establishing its research area and methods. At Uppsala University the study of process and methods is defined for-

- Developing concept of binary based multi-level marketing in IPoSS system
- Processing
- Software development

These are done from both technical and multilevel marketing point of view. Methods for the evolution of IPoSS, e.g. by means of developing integrated point of Sale System for binary based multilevel marketing business, has so far been the main area of the research. It has a different center of attention and is technical in its approach, with a specific direction towards the issues in IPoSS software development. It is hoped to have been contributing to the advancement of the emerging research field of access control technology for IPoSS at Uppsala University.
3.1 A professional IPoSS perspective

From a professional IPoSS perspective, it was surveyed to summarize and integrate an overview of the state of knowledge and at the same time to observe what was still missing within the field of IPoSS development from binary based multilevel marketing business perspective.

3.2 Software and hardware to developed IPoSS

IPoSS can be developed in different programs for different operating system. Windows based applications are more familiar than other operating systems, considering our end users that’s why this project has planned to develop IPoSS by visual studio.net 2003(Visual basic.Net & C#), MS SQL Server 2000, Crystal Report, Avery Label Pro, MS Visual Fox Pro 2009 and MS Access. This application is also integrated with magnetic stripe card reader and barcode scanner. Detail descriptions of these programs and devices are given below:

**Visual Basic .NET (VB.NET)** is an object-oriented computer language that can be viewed as an evolution of Microsoft Visual Basic (VB) implemented on the Microsoft.Net framework [2]. This is the first fully object-oriented programming (OOP) version of Visual Basic, and as such, supports OOP concepts such as abstraction, inheritance, polymorphism, and aggregation [3]. This is a programming environment that created graphical applications for the IPoSS. The features of IPoSS will be discussed on the next section.

**Microsoft SQL Server** is a relational database management system (RDBMS) produced by Microsoft. Its primary query language is transact-SQL, an implementation of the ANSI/ISO standard Structured Query Language (SQL) used by both Microsoft and Sybase [4]. It is a full-featured relational database management system (RDBMS) that is for administrative tools to ease the burdens of database development, maintenance and administration [5]. IPoSS has designed a database that is used in head office or electronic shopping center. A details discussion of this database will be available on the next section.

**Visual FoxPro** is a relational database with an object-oriented programming environment from Microsoft that comes with prewritten classes [6]. Visual FoxPro, commonly abbreviated as VFP, is tightly integrated with its own relational database engine, which extends FoxPro's xBase capabilities to support SQL query and data manipulation. It is a dynamic programming language that does not require the use of an additional general-purpose programming environment. It can be used as middleware and web application [7]. Avery label pro is a software that can print barcode label from the database, which can support only visual fox pro. It is very easy to design and print barcode label by using Fox pro database.

**C#**, pronounced C sharp, a hybrid of C and C++. Microsoft designed C# as its flagship programming language for the .NET environment which is an object-oriented programming
language used with XML-based Web services on the .NET platform and designed for improving productivity in the development of Web applications. C# boasts type-safety, garbage collection, simplified type declarations, versioning and scalability support, and other features that make developing solutions faster and easier, especially for COM+ and Web services [8]. It is used to design a prototype in IPoSS system which will be integrated with Magnetic stripe card reader.

**Crystal Report** is an application that can design reports and other information from existing databases. A report can be generating by minimum code which can treat all text, graphics, and database fields as objects that a programmer can place, arrange, and format on forms. It uses an ActiveX control to establish a connection with another program. It can access data from most widely-used databases and can integrate data from multiple databases within one report using Open Database Connectivity (ODBC). It can perform mathematical calculation easily and have lots of feature that can perform and make a report attractive viewer [9]. It is used to design different kinds of report in IPoSS for better performance.

**A Barcode Reader (or Barcode Scanner)** is an electronic device for reading printed barcodes which is integrated with IPoSS for smart and rapid sale.

**The magnetic stripe, sometimes called a magstripe** is read by physical contact and swiping past a reading head [10]. PPC (Point Privilege Card) are used to store data by Magistrate Card Reader Machine where Card holder name, Mother’s Maiden name, DIN (Distributor’s Identified Number), DOB (Date of Birth), Point Status etc will be available.

![Figure 1. Wiring the Magstripe](image1.png)

![Figure 2: Magnetic stripe card reader with serial port function](image2.png)

Magnetic stripe card reader will allow changing the information on magnetic stripe cards. It will also allow writing to new cards. It will decode and encode all information on the card. It connects to computer, either personal or laptop, and runs using software. The supplied software has issued with this device that has integrated with this IPoSS.
3.3 System Requirements of IPoSS

Platform: Windows


Database: MS SQL Server 2000, MS Visual Fox Pro 9, MS Access

Hardware: Pentium III processor or higher, 256 RAM, Barcode Scanner, Magnetic Strip card reader, POS printer, PPC Card
4. Implementation

The main focus of this is to develop IPoSS integrated with magnetic stripe card reader and barcode scanner. It has designed for both central office and electronic shopping center. In this section we will be present

- Work Flow Diagram
- Database Design
- Feature of IPoSS
4.1 Work Flow Diagram

The work flow diagram of IPoSS is given below which will represent the working process of this project.

Figure 3: Work flow diagram of IPoSS
4.2 Database Design

The database of IPoSS for central office and electronic shopping center is divided into two parts; where one part is server database for central office and another part is client database for electronic shopping center. The ER diagram and description of the databases are given below:

4.2.1 Server Database

Server database can keep all kinds of information about products as well as others information for central office and electronic shopping centers. Followings are the most important features of the server database:

- Group wise item management
- Shop enlistment information
- Purchase information for both central and electronic shopping center.
- Available price change data
- All shops or shop wise delivered product information.
- Easy to find products stock, damage, supplier returns data.
- Supplier's information
- It is very easy to know shop wise sales, product return and product damage information. This information will be available after transferring data from electronic shopping center to central office.
- Supplier- wise item management
- Easy to find point’s information like current and prospective members point’s information that got rebate or save points from the purchase amount. This information will be available after transferring data from electronic shopping center to central office.
4.2.2 ER-Server Database

Figure 4: ER diagram of server database
4.2.3 Table Description

Products are divided into four categories like group, product, brand, style and size to minimize data redundancy and item management. For example Baby Care (Group) -> Baby Cream (Product) -> Johnson (Brand) -> moisturizing cream 100ml (Style and Size).

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<thead>
<tr>
<th>PGROUP</th>
<th>Data Type</th>
<th>Length</th>
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</tr>
<tr>
<td>GroupName</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>FloorID</td>
<td>char</td>
<td>10</td>
</tr>
</tbody>
</table>

**Column Description:**
GroupID= Product group ID, GroupName: Product group Name, FloorID= for group wise product store place

<table>
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<th>PRODUCT</th>
<th>Data Type</th>
<th>Length</th>
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</thead>
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</tr>
<tr>
<td>PrdName</td>
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</tr>
<tr>
<td>FloorID</td>
<td>char</td>
<td>10</td>
</tr>
</tbody>
</table>

**Column Description:**
PrdID= Product ID, PrdName= Product Name

Table 1: Database table for product group

<table>
<thead>
<tr>
<th>BRANDTYPE</th>
<th>Data Type</th>
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<td>BTID</td>
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<td>9</td>
</tr>
<tr>
<td>BTName</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>FloorID</td>
<td>char</td>
<td>10</td>
</tr>
</tbody>
</table>

**Column Description:**
BTID= Brand ID, BTName= Brand Name

Table 3: Database table for product Brand

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<tr>
<td>SSName</td>
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<td>50</td>
</tr>
<tr>
<td>FloorID</td>
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<td>10</td>
</tr>
<tr>
<td>VATPrcnt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>DiscPrcnt</td>
<td>money</td>
<td>8</td>
</tr>
</tbody>
</table>

**Column Description:**
SSID= Style and Size ID, SSName= Style and Size Name, VATPrcnt= VAT percentage, DiscPrcnt= Discount percentage

Table 4: Database table for product description
**Shop Enlistment:** All electronic shops included central office should have shop ID which is unique and fix it in the Globalsetup table for identification. All shops information will be available here

**SHOPLIST**

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
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<td>4</td>
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</tr>
</tbody>
</table>

**Column Description:**
Post=Post Office, Pstation=Police Station, Contact= Contact person, ShopID=Shop ID for central and electronic shop (without shopid no one can run any operation), District=Area (Post office->Police Station->District), ShopName=Electronic shopping center name

Table 5: Table for shopping center list

**GLOBALSETUP:** Electronic shopping centers or central office identification id with other information will be fixed here.

**GLOBALSETUP**

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>MallID</td>
<td>nvarchar</td>
<td>4</td>
<td>Address</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>District</td>
<td>nvarchar</td>
<td>50</td>
<td>Country</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>Phone</td>
<td>nvarchar</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Column Description:**
MallID= Shop id for Central office or electronic shop to run business operation which is available in the shop enlistment, Address=Center’s address

Table 6: Global setup table for shopping center identification

**Supplier Information:** Suppliers are enlisted according to shop ID.

**SUPPLIER**

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SupID</td>
<td>nvarchar</td>
<td>5</td>
<td>SupName</td>
<td>nvarchar</td>
<td>100</td>
</tr>
<tr>
<td>Address</td>
<td>nvarchar</td>
<td>100</td>
<td>Phone</td>
<td>nvarchar</td>
<td>40</td>
</tr>
<tr>
<td>Fax</td>
<td>nvarchar</td>
<td>30</td>
<td>Email</td>
<td>nvarchar</td>
<td>30</td>
</tr>
<tr>
<td>Contact</td>
<td>nvarchar</td>
<td>30</td>
<td>SupType</td>
<td>nvarchar</td>
<td>12</td>
</tr>
<tr>
<td>CreditDays</td>
<td>money</td>
<td>8</td>
<td>DOE</td>
<td>smalldatetime</td>
<td>4</td>
</tr>
<tr>
<td>Rating</td>
<td>nvarchar</td>
<td>3</td>
<td>Fired</td>
<td>bit</td>
<td>1</td>
</tr>
<tr>
<td>ShopID</td>
<td>nvarchar</td>
<td>4</td>
<td>DCode</td>
<td>nvarchar</td>
<td>2</td>
</tr>
</tbody>
</table>

**Column Description:**
SUPID=Supplier ID, Supname=Supplier Name, Contact=Contact person, SupType=supplier type (payment type like cash, bill to bill, credit), DOE=Date of Entry, Rating=Performance rating, DCode=District Code, CreditDays=No. of days for credit if payment type is credit, ShopID=Relation with either central office or electronic shopping center, Fired=Supplier status

Table 7: Supplier table for details supplier’s information
**RCHALLAN:** All kinds of products purchased or received (products that are purchased by an electronic shop) information will be available here where shop wise product purchased information can be detected easily.

**BUYCENTRAL:** Inventory system can be managed by this table where products are purchased by central office.

**ICHALLAN:** Not only shop wise products delivered information will be available here but also electronic shopping center’s product purchased information can be obtainable.

| **ICHALLAN** |
| Column Name | Data Type | Length | Column Name | Data Type | Length |
| DCNO | nvarchar | 20 | Barcode | nvarchar | 50 |
| ShopID | nvarchar | 4 | DCDT | smalldatetime | 4 |
| sQty | int | 4 | UserID | nvarchar | 10 |
| CPU | money | 8 | RPU | money | 8 |
| Price | money | 8 | DiscPrcnt | money | 8 |
| VATPrcnt | money | 8 | RPP | money | 8 |
| Point | money | 8 |

**Column Description:**
DCNO= Delivery challan or invoice number, Barcode= Product Identification Number, CPU=Cost Per Unit, Price=Product sales price, VATPrcnt= Products VAT %, RPU=Price+ VAT Amount (Consider this RPU (retail price unit) for Bangladesh), DiscPrcnt= Discount Percentage, ShopID= Where to transfer, Point= individual product’s point, sQty= Transferred quantity, DCDT= Delivery Date, UserID= login user, RPP= Retail price percentage

Table 8: Ichallan for product delivery information

| **BUYCENTRAL** |
| Column Name | Data Type | Length | Column Name | Data Type | Length |
| Barcode | nvarchar | 50 | CPU | money | 8 |
| RPU | money | 8 | Price | money | 8 |
| DiscPrcnt | money | 8 | RPP | money | 8 |
| VATPrcnt | money | 8 | Qty | int | 4 |
| BalQty | int | 4 | Shop_rQty | int | 4 |
| sQty | int | 4 | Supp_rQty | int | 4 |
| Dmlqty | int | 4 | Point | money | 8 |

**Column Description:**
Barcode= Product Identification Number, CPU= Cost Per Unit, Price= Product sales price, VATPrcnt= Products VAT %, RPU= Price+ VAT Amount (Consider this RPU (retail price unit) for Bangladesh), DiscPrcnt= Discount Percentage, Qty= Product received quantity, BalQty= Balance quantity, Shop_rQty= Product return quantity from Shop, sQty= Sold or transfer quantity, Supp_rQty= Supplier return quantity, Dmlqty= Damage quantity, Point= individual product points, RPP= Retail Price Percentage

Table 9: Buy central for product inventory
<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chln</td>
<td>nvarchar</td>
<td>50</td>
<td>BarCode</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>BuyDT</td>
<td>smalldatetime</td>
<td>4</td>
<td>sBarcode</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>CPU</td>
<td>money</td>
<td>8</td>
<td>RPU</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>Price</td>
<td>money</td>
<td>8</td>
<td>DiscPrnt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>VATPrnt</td>
<td>money</td>
<td>8</td>
<td>Qty</td>
<td>int</td>
<td>4</td>
</tr>
<tr>
<td>Freeqty</td>
<td>int</td>
<td>4</td>
<td>balQty</td>
<td>int</td>
<td>4</td>
</tr>
<tr>
<td>SupID</td>
<td>nvarchar</td>
<td>5</td>
<td>SSID</td>
<td>nvarchar</td>
<td>12</td>
</tr>
<tr>
<td>EXPDT</td>
<td>smalldatetime</td>
<td>4</td>
<td>ShopID</td>
<td>nvarchar</td>
<td>4</td>
</tr>
<tr>
<td>Transfer</td>
<td>nvarchar</td>
<td>1</td>
<td>SupRef</td>
<td>nvarchar</td>
<td>20</td>
</tr>
<tr>
<td>UserID</td>
<td>nvarchar</td>
<td>10</td>
<td>Point</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>Bbarcode</td>
<td>nvarchar</td>
<td>50</td>
<td>FCAmt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>FC</td>
<td>nvarchar</td>
<td>15</td>
<td>RPP</td>
<td>money</td>
<td>8</td>
</tr>
</tbody>
</table>

**Column Description:**

Chln= Supplier wise product receive challan or invoice no, BuyDt=Purchase date, sBarcode=another product identification number, Qty=Purchase quantity, Freeqty=get free quantity during purchase, balQty=Qty + Freeqty, EXPDT=Product expiry date, ShopID=Purchase for, SupRef=Invoice number from purchase invoice, Bbarcode=products body barcode, FCAmt=Foreign currency amount, FC=Foreign currency type

Table 10: RCHALLAN for product received information from supplier

SALE: After transferring sales data from all electronic shopping centers to central office; it is very easy to find shop wise, product wise, supplier wise sales data (see table 12)

SSUMMARY: Invoice wise sales summary data can be available at central office after transferring data from shopping centers (See table 13).
4.3 **IPoSS software development for server API**

IPoSS offers more features than any other POS software which distinguishes the characteristics for IPoSS software development and general POS software development.

IPoSS has lot of features to improve business operation and save time spent on inventory, purchasing etc. It is supported by automation access included barcode scanner, magnetic stripe card reader, POS printer etc. The reasons for deploying an IPoSS system are apparent:

- To reduce costs
- Respond to trends faster
- Improve customer service
- Buy smarter
- Improve marketing
- Control the money

**4.3.1 Important features of IPoSS for server side:**

- Product management
- Shop Enlistment
- Purchase, purchase return for both central and electronic shopping center
- Customizable product price
- Shop wise item delivery utility
- Inventory management system
- Supplier wise item management utility
- Data import and export utility
- Easy to manage products movement and sales data
- Point’s are available for both current and prospective members that has got rebate or save points on purchase amount.
- Stock adjustment utility and user security etc
User Security

4.3.2 Reports

- Purchase Report
- Stock report
- Delivery Report
- Sales report etc. will be available

4.3.3 Features Description

Some of the important features are described below for server application:

**Challan:** For both central and electronic shopping center, it is essential to make computer challans according to Supplier invoice. Features of challans are described below (Fig 5):

- Easy to find product information
- Easy to find supplier for central office or electronic shopping center
- Challan number produces automatically
- Can be fix product price and purchase currency.
- Available product’s previous price list
- Can be fix free quantity amount
- Automatic point’s calculation from profits amount
- Automatically produces barcode number
- Body barcode can be fixed easily
Figure 5: Challan module that can produced product received invoice through software
**Product Received Challan:** The important features of products received challans are (See fig 6):

- Easy to find computer challans
- Easy to convert computer generated barcode number to short barcode number if necessary
- Easy to delete computer made challans
- Easy to fix supplier discount for products purchased
- Easy to print computer challans
- Easy to adjust product for inventory system for central purchase
- Easy to transfer data to specified shop which are purchased by that shop
- Easy to print Barcode label

![Figure 6: Products received challan module](image)
**Barcode Label:** Barcode can be print in a various ways which are (Fig 7 and Fig 8):

- Received Challans number wise
- Delivery Challans number wise
- Previous challans number wise for both delivery and received challans
- Barcode number wise

![Barcode label generator module](image-url)

**Figure 7:** Barcode label generator module
**Delivery Challan:** IPoSS has easy module to transfer data; products can be delivered to different electronic shops from central office in a very easiest way (Fig 9).
4.4 Shop Database

IPoSS has another database for electronic shopping centers to control business operation properly. Important features of shop database are given below:

- Group wise Item management
- Product received information
- Price change information
- Stock, damage, supplier returns information.
- Suppliers information
- Sales information are available
- Invoice wise point’s information like current and prospective members point’s information that has got rebate or save points on every purchased amount.
- User security
4.4.1 ER diagram for Electronic Shop Database

Figure 10: ER diagram for Electronic Shop Database
4.4.2 Table Description

**RCHALLAN:** All kinds of products purchased or received information will be available here. See table 10

**BUY:** Buy table is a table from where manager can get clear picture of his products so that inventory system can be managed very easily.

<table>
<thead>
<tr>
<th>BUY</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcode</td>
<td>nvarchar</td>
<td>50</td>
<td>CPU</td>
<td>money</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>RPU</td>
<td>money</td>
<td>8</td>
<td>Price</td>
<td>money</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>DiscPrcnt</td>
<td>money</td>
<td>8</td>
<td>RPP</td>
<td>money</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>VATPrcnt</td>
<td>money</td>
<td>8</td>
<td>Qty</td>
<td>int</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>balQty</td>
<td>int</td>
<td>4</td>
<td>SuppID</td>
<td>nvarchar5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sQty</td>
<td>int</td>
<td>4</td>
<td>Supp_rQty</td>
<td>int</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>DmlQty</td>
<td>int</td>
<td>4</td>
<td>Point</td>
<td>money</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>SSID</td>
<td>nvarchar</td>
<td>12</td>
<td>BBarcode</td>
<td>nvarchar50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ShopID</td>
<td>char</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Column Description:**

Qty=Received quantity, ShopID= Shop Identification ID, Barcode= Product Identification Number, CPU=Cost Per Unit, Price=Product sales price, VATprcnt= Products VAT %, RPU=Price+ VAT Amount (Consider this RPU (retail price unit) for Bangladesh), DiscPrcnt= Discount Percentage, Qty=Product received quantity, BalQty= Balance quantity, sQty=Sold quantity, Supp_rQty=Supplier return quantity, DmlQty=Damage quantity, Point=individual product points, RPP=Retail Price Percentage, SupID= Supplier ID

Table 11: Buy table is used for product inventory for electronic shopping center

**SALE:** According to customer invoice number, products sales or sales return information will be available here.

<table>
<thead>
<tr>
<th>SALE</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SaleDT</td>
<td>smalldatetime</td>
<td>4</td>
<td>Barcode</td>
<td>nvarchar</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Invoice</td>
<td>nvarchar</td>
<td>30</td>
<td>ShopID</td>
<td>char</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>money</td>
<td>8</td>
<td>RPU</td>
<td>money</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>money</td>
<td>8</td>
<td>SaleQty</td>
<td>int</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PrdsNo</td>
<td>int</td>
<td>4</td>
<td>RSaleQty</td>
<td>int</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ReturnedType</td>
<td>nvarchar4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Column Description:**

SaleDT= Sale Date, Invoice= Sales invoice number, Barcode= Sale product, ShopID= Sale from, SaleQty=Sale quantity, RSaleQty= Sale return quantity

Table 12: Products sales information
**SSUMMARY:** Customer invoice number wise products summary information included vat, discount amount, points, sales return can be obtained here.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SaleDT</td>
<td>smalldatetime</td>
<td>4</td>
<td>Invoice</td>
<td>nvarchar</td>
<td>30</td>
</tr>
<tr>
<td>ShopID</td>
<td>char</td>
<td>4</td>
<td>TotalCost</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>DiscPrnt</td>
<td>money</td>
<td>8</td>
<td>DiscAmt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>TotalAmt</td>
<td>money</td>
<td>8</td>
<td>VatAmt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>VATPrcnt</td>
<td>money</td>
<td>8</td>
<td>NetAmt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>CshAmt</td>
<td>money</td>
<td>8</td>
<td>CrdAmt</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>rAmt</td>
<td>money</td>
<td>8</td>
<td>PayType</td>
<td>nvarchar</td>
<td>50</td>
</tr>
<tr>
<td>Salesman</td>
<td>nvarchar</td>
<td>30</td>
<td>CardName</td>
<td>nvarchar</td>
<td>20</td>
</tr>
<tr>
<td>CounterID</td>
<td>nvarchar</td>
<td>2</td>
<td>CusName</td>
<td>nvarchar</td>
<td>62</td>
</tr>
<tr>
<td>ReturnedAmt</td>
<td>money</td>
<td>8</td>
<td>rTotalCost</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>ReturnedType</td>
<td>nvarchar</td>
<td>4</td>
<td>Point</td>
<td>money</td>
<td>8</td>
</tr>
</tbody>
</table>

**Column Description:**
SaleDT=Sale Date Invoice =Customer invoice, TotalCost=Total summarized products cost, DiscPrnt=Discount Percentage, DiscAmt=Discount Amount, TotalAmt=Total Product Price, VatAmt=Vat amount, NetAmt= Total Amount after discount, CashAmt= Customer paid to counter, CrdAmt= if customer use Bank Card, rAmt=Cash return to customer after sale or after customer paid, PayType= Customer pay type, CusName= Customer Name sometimes need, ReturnedAmt=Return amount if customer return any product, rTotalCost=return products total cost , Point=Total Point of products

Table 13: Invoice wise products sales summary

**CARDPOINTS:** Members can get rebate on every purchase amount by using PPC card where rebate amount comes from products points; used points information can be found using invoice number or DIN number etc.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invoice</td>
<td>nvarchar50</td>
<td></td>
<td>ShopID</td>
<td>char</td>
<td>4</td>
</tr>
<tr>
<td>DIN</td>
<td>nvarchar50</td>
<td></td>
<td>Point</td>
<td>money</td>
<td>8</td>
</tr>
</tbody>
</table>

**Column Description:**
Invoice= Sales invoice number, ShopID= Shopping Center ID, DIN= Customer identification number if customer use any PPC card, Point=Used points

Table 14: Used card points
**CHANGEPRICE:** Price change information is also available.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDate</td>
<td>smalldatetime</td>
<td>4</td>
<td>Barcode</td>
<td>nvarchar50</td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>money</td>
<td>8</td>
<td>RPU</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>Userid</td>
<td>nvarchar50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Column Description:**

TDate=Price change date, Barcode=Product identification number, Userid=Login ID

Table 15: Table for price change

**ALLRETURNS:** Supplier returns products or damage products information are available here.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chln</td>
<td>nvarchar50</td>
<td></td>
<td>BarCode</td>
<td>nvarchar40</td>
<td></td>
</tr>
<tr>
<td>vDate</td>
<td>smalldatetime</td>
<td>4</td>
<td>Qty</td>
<td>int</td>
<td>9</td>
</tr>
<tr>
<td>ReturnTo</td>
<td>nvarchar50</td>
<td></td>
<td>Userid</td>
<td>nvarchar50</td>
<td></td>
</tr>
</tbody>
</table>

**Column Description**

Chln= Return challan or invoice number according to ShopID, vDate= Return Date, Qty= Return quantity, ReturnTo= Where return to

Table 16: Table for all kinds of product return and damage

**USERS:** Provided user restriction information are available here

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
<th>Column Name</th>
<th>Data Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>userid</td>
<td>nvarchar 50</td>
<td>50</td>
<td>username</td>
<td>nvarchar 30</td>
<td>30</td>
</tr>
<tr>
<td>Address</td>
<td>nvarchar 50</td>
<td>50</td>
<td>Salary</td>
<td>money</td>
<td>8</td>
</tr>
<tr>
<td>Phone</td>
<td>nvarchar 50</td>
<td>50</td>
<td>StartDate</td>
<td>smalldatetime</td>
<td>4</td>
</tr>
<tr>
<td>EndDate</td>
<td>smalldatetime</td>
<td>4</td>
<td>Designation</td>
<td>nvarchar</td>
<td>25</td>
</tr>
<tr>
<td>password</td>
<td>nvarchar 50</td>
<td>50</td>
<td>up01</td>
<td>bit</td>
<td>1</td>
</tr>
<tr>
<td>up02</td>
<td>bit</td>
<td>1</td>
<td>up03 to up29</td>
<td>bit</td>
<td>1</td>
</tr>
</tbody>
</table>

**Column Description**

UserID=Login ID, StartDate and EndDate= Login expiry date, password=Login password, Up01 to Up29 = Different module depend on these field to user access

Table 17: Table for user security
4.5 IPoSS software development for shop API

IPoSS is the prosperous as well as featured packed and easy to use. Following are the few most important features of IPoSS

4.5.1 Basic Configuration feature:

- Login panel
- User friendly interface
- Excellent Multi-user environment
- Compatible with receipt printer
- Able to Customize discount and tax calculation
- IPoSS Center wise printer selection
- Privileges management for all level users
- Center wise invoice Numbering
- Barcode scanner and magnetic stripe card reader are integrated at the sales terminal to speed entry and greatly reduce human error.

4.5.2 Item and operational Features

- Group wise item management
- Supplier wise item management
- Default rate selection for Item
- Shop wise Items exchange utility
- Sales, sales return, complimentary sales
- Item wise discount system
- Preceding sales invoice check system
- Product can be deleted during sales time
- Easy rebate system
- Easy to view and update PPC information
- Stock adjustment utility
- Purchase, purchase return
- User security
4.5.3 Reports:

- Products received report
- Products sales report
- Products stock report
- Revenue report

4.5.4 Features Description

Some of the important features are described below:

**Sale Module:** IPoSS has integrated sale module from where it is easy to sale products. Features of sale module are given below:

- Multiple sale windows for user
- Easy to discount
- Easy to use PPC card
- User wise sale
- Easy to sales return
**PPC Module:** Magnetic stripe card reader has integrated in this module so that members can use their PPC card which is easy to manage.

![PPC Module](image)

**Figure 12:** PPC module from where PPC card’s information can be view and update.
5 Evaluation

5.1 Results

The project reviews on an integrated point of sale system with magnetic stripe card reader software development from the perspective of binary-based multi-level marketing (MLM) business system. It is conducted in this essay in order to identify the questions of higher priority. Based on the reviews of previous chapters, the resulting questions are presented below.

5.2 Questions for IPoSS Development

*What is the process of lowering the expenses for fulfilling the DP (Destiny Points) requirement for new distributors joining the network?*

To allow more people to join in this network, it is necessary to lower down the expenses for fulfilling DP requirement for new distributors. Prospective distributors can join this network by purchasing 50 DP equivalent products and fulfill their prerequisite points (500 DP) in the near future by purchasing products from the electronic shop. To lower down the expenses for fulfilling the DP, IPoSS can generate points on every product from the profit amount as per company rules. So that members can purchase product in the near future as their requirements to reduce the one time expenditure of joining.

*How the profit level could be kept uninterrupted to pay commission and incentive through the referral network?*

The distributor will get a point privilege card in which the 450 DP will be loaded after successfully fulfilling DP requirements by purchasing products. These points are issued in favor of the new distributors on payment of the equivalent profit amount so that distributors will get rebate on every purchase of products from any of its Electronic Shopping Center and another way up liner distributors will get commission automatically after successfully fulfilling DP(500 DP) requirements.

*How it is possible to implement the points with the product which is essential for current and prospective distributors?*

Points are generated from product's profit amount where 1 point is equivalent to 5.55 BDT (Bangladeshi currency)
**How to implement the Point Privilege Card with the Magnetic Stripe Card Reader?**

Manufacturer of magnetic strip card reader has provided SDK to integrate with IPoSS software. For which IPoSS has developed new module which is integrated with IPoSS software and database that is easy to use.

**How access control system works with IPoSS?**

Easy Easy!!! Just plug and play

**How can the current members utilize their unused points to get some rebate from their purchase amount?**

Current members will get rebate on every purchase of products from any of its Electronic Shopping Center by using PPC card.

**How to check joining points for current and prospective distributors to enhance or start binary network system?**

It is must to keep all purchase invoices after fulfilling DP requirements by purchasing products. Forthcoming or current distributors will submit their purchase invoices to specified office for further process to enhance their binary network system.

**How to control or monitor IPoSS from one central point?**

IPoSS can monitor products movement very easily; all electronic shopping center have to send their product information to the central office. This makes it is very easy to maintain the inventory system as well as points query from the central office.

**Future possible research topics**

An obvious improvement and direction of further work is to perform experimental work with software prototypes in order to get the depth, refine complement of some projects like insurance, Co-operative multipurpose society (Small loan) or tree plantation where binary system can work very fine.

A significant example of further work could be the development of a software tool to automate and clearly illuminate the binary system.
6. Discussion

6.1 Requirements specification and testing

As mentioned in section 2.1, a good requirements specification is of fundamental magnitude for a successful software development project. A considerable element of professional IPoSS knowledge should be involved in all phases of the IPoSS software development process. A conclusion of this is that, the requirements specification phase for integrated software development must include the access to control the resulting IPoSS software through the magnetic strip card reader and barcode scanner, as to deterministically predict integrated POS quality for binary based multilevel marketing business system. A proficient test case is used for IPoSS system to evaluate that the application reaches the predetermined requirements.

6.2 Validity and reliability

Discussing validity and reliability in the context of the study conducted in this thesis is very clear, that the IPoSS software development from a POS quality perspective is a new area to study contained by the subject of binary level system for multilevel marketing at Uppsala University. Therefore a summarized and interesting research review was needed to make an inventory for the state of the art, as a starting point for other studies in this field.
6.3 Conclusion

An integrated point of Sale System with magnetic stripe card reader for binary-based Multi-Level Marketing (MLM) Business System could be quite complex, and it is not easy to explicitly illuminate. Many issues related to software must be carefully considered in an IPoSS quality perspective when developing POS applications through access control. The field is not well documented in the literature.

Why should Company put in a more complex and expensive IPoSS system? The reason behind this information is found in the following description [11].

Information has become as important as or even more important than products. Businesses that don't understand this are at a loss to explain why, when their prices are lower when their products are as good, and their advertising spending is higher - their competitor is eating their lunch.

Don't believe us? Listen to someone with whom we almost never agree:

"If the 1980's were about quality, and the 1990's were about reengineering, then the 2000's will be about velocity. About how quickly the nature of business will change. About how quickly business itself will be transacted. About how quickly information access will alter the lifestyle of consumers and their expectations of business. Quality improvements and business process improvements will occur far faster . . . A manufacturer or retailer that responds to changes in sales in hours instead of weeks is no longer at heart a product company, but a service company that has a product offering"

- Bill Gates, Business@the Speed of Thought - Warner Books, 2000.
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