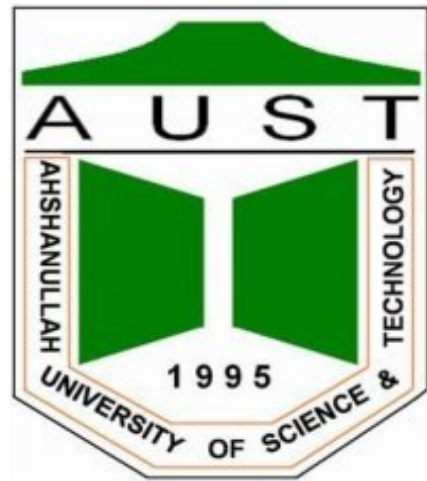


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Chapter 1

Introduction

The proposed project is to develop an "Auto parts Workshop Management System". It is a system that is designed to meet the needs of wholesalers and distributors of auto parts. Our transportation system consists mainly of vehicles as thousands depend on it and so the need of auto parts workshops and warehouses is increasing day by day. But most of them are not digitized and face many problems in keeping track of parts and other things. If we can provide an automated system where system users can manage warehouse details easily and digitally not only the company will be benefited highly but also the customers will be satisfied. So, owing to the ever growing importance we have selected this project, so that the company we are working for can be highly benefited and thus other companies will also be interested in using our application as every management details of inventory and others is automated.

1.1 Project Goal

The features for developing this Auto Parts Workshop Management System are listed below:

1. The main objective of the proposed system is to create a more sophisticated and user friendly working environment for service and part departments.
2. It will optimize the time spend in the activities performed during the sale, service of any vehicles and selling or purchasing of parts.
3. It will also provide proper management of sale data and accurate report generation for future needs.

4. The system will also provide the way to dealing with problem of employee attendance and calculating various aspects regarding salary, work hours etc.
5. The progress of the sale or service and parts departments will be fully controlled and determined by the administrator or director.

So, the main goal is to provide such kind of platform where the company can increase their growth and market strength through the optimization and man power with the help of the proposed system.

1.2 Feasibility Analysis

The project feasibility study is to carry out a full analysis of the project before the project decision-making, research, demonstration, evaluation process. After an analyst determines the reasonable objective for a project, the analyst needs to determine if it is possible for the organization and it's members to see the project through completion. Generally the process of feasibility assessment is effective in screening out projects that are inconsistent with the business objective, technically impossible or economically without merit. Although it is painstaking, studying feasibility is worthwhile because it saves businesses and systems analysis time and money. In order for an analyst to recommend further development a project must show that it is feasible in all three of the following ways: Technically, Economically and operationally.

The feasibility analysis regarding our selected project that includes study of technical, economical and operational feasibilities are given below:

1.2.1 Technical Feasibility

The analyst must find out whether it is possible to develop the new system given the current technical resources, if not the system must be upgraded. Technical feasibility includes the available software packages that can accomplish the main objective. To develop our project, we shall use:

1. **Front-end Language:**

XAMPP Server

Netbeans IDE

Language: Java

2. **Back-end Language:**

MYSQL Server

So that we can strongly say our project is technically feasible as there will be no difficulties in getting these technical resources.

1.2.2 Economical Feasibility

Economical feasibility is the second part of resource determination. This includes the time of the system analysis team, the cost of doing a full systems study (including the time of employees) the cost of the business employee time, the estimated cost of hardware/software or software development.

Developing this application is highly economically feasible. We don't need to spend much money for the development of the system. The only thing to development with an effective supervision. The costs for the software developers and servers are reasonable and the company for which the project will be developed will be highly benefited by serving customers as well as selling auto parts as every details of the servicing and selling of parts will be listed in the system. So, we can say that our project is economically feasible.

1.2.3 Operational Feasibility

The system analyst must consider the operational feasibility of the requested project even if the technical and economic resources are both judged adequate. Operational feasibility is dependent on the human resources available for the project and involves projecting whether the system will operate and be used once it is installed. If users are virtually used to the present system, see no problems with it and generally are not involved in requesting a new system, resistance to implementing the new system will be strong. Chances for it ever becoming operational are low. Alternatively, if users themselves have expressed a need for a system that is operational more of the time, in a more efficient and accessible manner, chances are better that the requested system will eventually be used.

Our efforts will always be relentless to make our project accommodating to the employees and other members of the company so that they can serve the customers properly. We shall be working constantly for further improvement of it. So that other companies will be interested to buy our project. Thus, we can say that our project is feasible operationally..

1.3 Cost/ Benefit Analysis

Benefits and costs can either be tangible i.e. measurable in dollars or intangible i.e. are not real. Both tangible and intangible costs and benefits must be taken into account when systems are considered. It includes break-even analysis, payback, cash flow analysis, break-even analysis and present value analysis.

	Cost	Benefit
Tangible	<ol style="list-style-type: none">1. Direct project cost2. Software cost3. Server cost4. Staff cost5. Cost of parts6. Maintenance cost of project/application7. Network cost8. Developer cost9. Acquisition cost	<ol style="list-style-type: none">1. Improving the production of the process.2. Lowering the inventory and production cost.3. Saving time by keeping track of every details in every department.
Intangible	<ol style="list-style-type: none">1. The lack of proper promotion2. Losing market to better performing replacement3. Project might fail to live up to expectation4. International market could go high thus lowering the sale	<ol style="list-style-type: none">1. Faster access of current data2. Improvement of life of vehicles3. Less frequent repairing4. Reduced hassle for vehicles owners5. The reputation of the company will increase

Table 1.1: Cost Benefit Analysis

1.3.1 Cash Flow Analysis

Cash flow analysis examines the direction, size and pattern of the cash flow associated with the proposed information system. The proposed system should have increased revenues along with cash outlays. Then the size of the cash flow must be analyzed, along with the pattern of cash flow associated with the purchase of the new system.

	Quarter1	Quarter2	Quarter3	Quarter4
REVENUE	6,00000	5,80,000	6,90,000	5,50,000
SERVER COST	3000	3000	3000	3000
VEHICLE EXPENSES	1,50,000	2,75,000	2,40,000	1,33,000
SOFTWARE DEVELOPMENT	10,000	5000	-----	-----
PROJECT MAINTENANCE	0	2800	2500	2750
SECURITY/ALARM	7200	7200	7200	7200
Office Supplies	12,000	15,600	18,000	20,280
TOTAL COST	1,82,200	3,08,600	2,70,700	1,66,250
CASH FLOW	4,17,800	2,71,400	4,19,300	3,83,770
CUMULATIVE CASH FLOW	4,17,800	6,89,200	11,08,500	14,92,270

Table 1.2: Cash Flow Analysis

1.3.2 Present Value Analysis

Present Value Analysis helps a system analyst to present to business decision makers the time value of the investment in the information system as well as the cash flow. It is a way to assess all the economic outlays and revenues of the information system over its economic life and to compare today's costs with future costs and today's benefits with future benefits.

Here for present value analysis we will calculate the future value after 3 years from now.

We know,

$$PV = FV / (1 + i)^n$$

We assumed that,

$$PV = \text{Present Value} = 25,00,000$$

$$i = \text{Interest rate} = 0.08$$

$$n = \text{Number of years} = 3 \text{ years}$$

$$\text{So, } FV = 25,00,000 * (1 + 0.08) = 31,49,280$$

1.4 Project Scheduling

Planning includes all the activities required to select a system analysis team, assign members of the team to appropriate projects, estimate the time required to complete each task and schedule the project so that tasks are completed in a timely fashion. Control means using feedback to monitor the project, including comparing the plan for the project with its actual evolution.

Activities	Description	Predecessors	Time(Day)
A	Task Planning and discussing about the project	None	5
B	Designing key indicators and controlling activities	A	4
C	Collect reporting data using web browser	None	5
D	Building project report	B, C	5
E	Coding	D	18
F	Testing prototype and upgrading	E	5
G	Presentation	D, E, F	2

Table 1.3: Project Scheduling

1.4.1 Gantt Chart

A Gantt chart is a tool that enables anyone to schedule tasks easily. It is a chart where bars represent tasks or activities. The length of each bar represents the relative length of the task. Here time is indicated in the horizontal dimension and the vertical dimension shows the descriptions of the activities. It is a useful technique and it lends itself to worthwhile communication with end users.

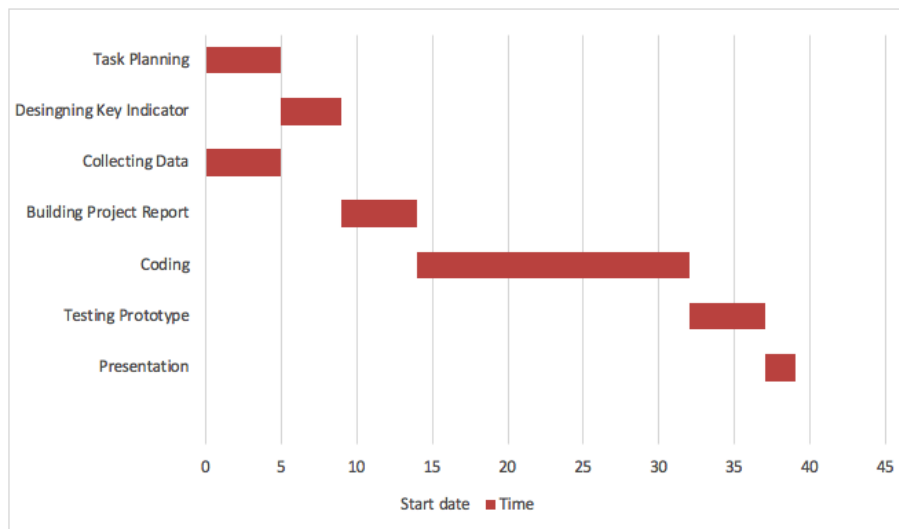


Figure 1.1: Gantt Chart

1.5 Conclusion

We have planned to implement “Auto Parts Workshop Management System” that is a user friendly application of vehicles diagnosis. Several user friendly coding will be adopted to make the system fully automated so that the system users find it easier to use it and thus the revenue of the company will increase. We shall try to carry out a full analysis (feasibility) of the project’s demonstration and evaluation process. The software planning is to provide a framework that enables the manager to make reasonable estimates within a limited time, keeping track of the auto parts and serving the customers. For achieving our goal we shall work harder according to our activity list and follow the schedule of the project properly.

Chapter 2

Information Gathering

Introduction

"Auto Parts Workshop Management System" is an important branch of our company which could lead the company to success. Our effort is to make a system for our company that can increase the company profits, productivity, and reliability. Many ways have been taken to achieve that. We started gathering required information by interviewing selected individual. Each company has its own management system that the company has developed in years. In this research, company's requirements along with the tools and methods they are using currently in their management have been studied.

This chapter includes objectives of information gathering and interview, questionnaire and interview pattern, selection of interview personnel, question answers, summary of the total information and prepare list of activities and conclusion.

2.1 Objectives of Information Gathering & Interview

Information gathering and interview is a directed conversation with a specific purpose that uses a question-and-answer format. The name of our project is "Auto parts Workshop Management System". The main objective is to construct interview questions to elicit human to gather information and structure them in a way that is meaningful to users. So, to make the project user-friendly and realistic by useful data and information, it is of high importance to interview people employed in the workshop. Thus we can understand the purpose and why they are useful in system analysis.

The interview is the primary technique for information gathering during the systems analysis phases of a development project. The interviewing skills of the analyst determine what information is gathered, and the quality and depth of

that information. As Interviewing, observation and research are the primary tools during analysis phase of a project, we have chosen this technique for our information gathering.

2.2 Questionnaire & Interview Pattern

There are three types of interview pattern, they are:

- Pyramid Structure:

By using pyramid structures, an inductive organization of interview questions can be visualized as having a pyramid shape. Using this form, the interviewer begins with very detailed, often closed, questions. The interviewer then expands the topics by allowing open-ended queries and more generalized responses.

- Funnel Structure:

By using funnel Structures, the interviewer takes a deductive approach by beginning with generalized, open-ended questions and then narrowing the possible responses by using closed questions. This interview structure can be thought of as funnel-shaped.

- Diamond Structure:

By using Diamond Structures, this structure entails beginning in a particular way, then examining general issues, and finally coming to a definite conclusion. Among them, we have chosen Diamond Structure because it's a combination of both. This structure entails beginning in a very specific way, then examining general issues, and finally coming to a particular conclusion that's why it's the best.

2.3 Selection of Interview Personnel

Among all the other employees including owners, we have chosen the manager, because he is the one with knowledge of what's happening around the workshop. He stays there as long as the workshop is open, he manages all the staffs, handles customers, takes the record of all the products. In other words, he oversees everything here, so he is the best person for the interview.

Autoparts Workshop Management System			
Authors: Mahimul Islam Md. Sarafat Ullah Fariha Nuzhat Majumdar	Date: 05-08-2018	Time: 04:00 pm	Duration: 1 Hour 30 Minutes
Participants: Sk. Shaim Ahmud Manager , Creative Workshop		Comments: By this interview we got the current condition of our project and found some problems in the system.	

Table 2.1: Interview Questionnaire Pattern of Autoparts Workshop Management System

2.4 Total Interview Procedure

Time: 18th May, 2018, 4.00 pm

Place: Tasofa Petrol Pump 63, Shahid Tajuddin
Ahmed Sharani, Rasulbagh.

Personnel: SK. Shaim Ahmed

2.4.1 Question & Answers

1. *When was the company established?*

Answer: The Company was established in 2017.

2. *How many workshops does the company have?*

Answer: The Company has only one workshop.

3. *Does the Company have the plan to open more workshops?*

Answer: Yes, the Company has the plan to open a few more in future in different places.

4. *Does the Company sell auto spares?*

Answer: Yes, the Company sells auto spares for cars only along with accessories.

5. *What type of parts/ accessories does the Company sell?*

Answer: Engine related parts like

- i. Oil filter
- ii. Spark plug
- iii. Cylinder head
- iv. Different fan belts
- v. Oil pump
- vi. Timing chain
- vii. Cooling fan
- viii. Valve

AC related parts like

- i. Expansion valve
- ii. Compressors
- iii. Condenser
- iv. AC fan
- v. AC evaporator core

6. *What types of services does the company provide?*

Answer:The Company provides three types of services:

- i. Engine related service
- ii. Gas related service
- iii. AC related service

7. *How many staffs does the Company have in the workshop?*

Answer: There are 8(eight) employees of different skills in the workshop.

8. *Does the Company use any software for workshop maintenance?*

Answer:No, the Company does not use any software for workshop maintenance.

9. *So, can you describe how the company keeps track of things and maintains daily ledger without software?*

Answer: The Company maintains manual ledgers for its sales, stock, and daily activities. The staff salary, i.e., regular wage, overtimes, dues, and advances in salary, duty roster, leave positions – all are maintained manually in ledgers. Apart from this, the inventory (stock) of spares

is also recorded/ maintained manually. The prices of different spares, dues against their sales to different buyers are kept/ recorded manually in ledgers. The import schedules are also managed by manually counting the present stock position of the spares.

10. *Can you briefly describe what the problems you face in keeping records manually?*

Answer: As described earlier, we have to keep records manually in ledgers, it consumes considerable period, and thus it is very inefficient. It requires a lot of stationary and men power as well. As records are maintained manually, it is always prone to errors. The utility bills are also recorded by manually that requires additional time and working hour causing Company to lose money.

11. *Do you want to use any software to avoid these problems?*

Answer: Yes, we want to use software to reduce the cost and increase efficiency and accuracy in services.

12. *What type of features does the company want in the software?*

Answer: The Company requires two main features in the software:

- i) Owner/ Admin section
- ii) Employee section

13. *What type of facilities does the company require in the owner section? Describe briefly.*

Answer: It will be helpful if the software is based on online. So that administrator can have total control with many conveniences on the software from anywhere. He can incorporate corrections if necessary from anywhere at any time. He can monitor all the activities of the workshop like a total number of cars registered for services in a given period, the sale of spares required by the customers, their prices, revenue status (cash or credit sale) and recovery of past dues as well. He can also monitor the involvement of every single staff in specific jobs, i.e., work hour per person – which can vary.

14. *What type of facilities does the company require in the employee section? Describe briefly.*

Answer: Among the employees, only the manager will have access to the software for inputs where he will put all the relevant data regarding all workshop activities like servicing, sales, staff working hours, different daily expenses, etc. The password required to open the software will be known to the manager. The software will have provision to connect all the other workshops in future and will share some common information like price, stock level of all the workshops so that in case of necessity a particular spare can be sourced from another workshop (s) as well.

15. *Do you need any additional facilities in employee section?*

Answer: Yes, the software has to provide data at multiple levels.

i) It has to maintain a critical level of stock, which is a system alarm should be there to inform the stock of a particular spare has gone below the critical level and needs to be imported. On the other hand, it should indicate the excessively higher level of a specific stock meaning high financial involvement and needs not to be imported soon.

ii) Similar types of spare and accessories should be categorized with a specific code number for each spare.

iii) The software should automatically update the stock level of each spare after its disposal.

iv) It would show the credit level of each customer and supplier with a maximum limit in both cases.

v) The software would show the income and expenditure of any given period, e.g., day, month, year, etc.

vi) There should be different sections for different staffs as they do not perform same work and their skill level is also different so are their salaries. So the software must provide individual calculations for every staff analyzing their section of work, skill, working hours by salary. The software should also demonstrate their payment status that is the total salary for a month, dues, and advance salary in some cases. Their leave status should also be available in the software depending upon their entitled leaves and what portion of it has been consumed by them.

16. *How much time will you give us to complete the project?*

Answer: We will give you 3(three) months to complete the project.

2.5 Summary of the Total Information And Prepare The List Of Activities

We have interviewed people of a company before designing the project. We have collected the following information: how the services are provided to the customers (cars), the types of services they provide, the different categories of spare parts they sell, how the inventory for spare parts is maintained, and the information regarding the staff management, i.e., human resources. We also wanted to know the problems they are encountering for not having any automated software. We gathered the critical information from them regarding the types of features they want in the software. All these data and information would help us to design the software to be ideal and flawless.

2.6 Conclusion

We have selected the manager of the company who gave us correct data and information about the project, "AUTOPARTS WORKSHOP MANAGEMENT SYSTEM". He turned out to be the best from the workshop to be interviewed because of this helpfulness and proper knowledge about the workshop. So, we can conclude that after the interview was taken we got correct data & information about the project. It will help us to make the project as per client request.

Chapter 3

Data Flow Diagram and Use Case Diagram

Introduction Our project is "Auto Parts Workshop Management System" which will be designed for our own company. To make this project a flawless one, we are to go through some steps. In Chapter 2 we discussed about the information gathering and requirement analysis of our project. Our next step is to design the Data Flow Diagram (DFD) of "Auto Parts Workshop Management System". We will be able to create a good management system for our company by following these diagrams.

In this chapter we will discuss about the activities of our project and have a thorough idea about the DFD and its classification along with the context level, level 1 and level 2 DFDs of our project.

3.1 Activities of the project

3.1.1 Activity list of the project

1. Admin Login
2. Parts Inquiry
3. List Items
4. Add Items
5. Remove Obsolete Items
6. Manage Employee
7. Labor Payment

8. Order Product
9. Pay For Product
10. Store Product
11. Customer Order
12. Change Customer Order
13. Deliver Products And Service
14. Collect Payment

3.1.2 Database Name

Auto parts Workshop Management System

Entity Name

1. Admin
2. Customer
3. Employee
4. Parts
5. Cashier
6. Order

Process Name Main Process: **Auto parts Workshop Management System**

3.2 Sub Processes Name

1. Login
2. Process parts data
3. Process service request
4. Process work order
5. Perform Inspection
6. Perform servicing
7. Checking inventory

8. Process purchase order
9. Product report
10. Logout

3.3 Main Process

For designing any data flow diagram we have to start with our main process. Through the main process we can understand the initial scenario about our system. The main process of our website is given below:

Main Process: Auto parts Workshop Management System

3.4 Sub Processes

Any main process is formed with some sub processes. We have 8 sub processes under the Blood Donation Management Website process. The names of the sub processes are given below:

1. Login
2. Manage parts
3. Manage Workers
4. Order
5. Perform service
6. Make Payment

Now, for more clear conception of our project, we have divided the sub processes into more sub processes. The names are given below:

1.0 Login Process: We have 2 sub processes under the Login Process. They are given below:

- 1.1 Admin Login
- 1.2 Cashier Login

2.0 Manage Parts Process: We have 2 more sub processes under the Manage parts Process. They are given below:

2.1 Purchase parts

2.2 Store Parts

3.0 Manage Workers Process: We have 3 more processes under the Manage Workers Process. They are given below:

3.1 Manage Cashier

3.2 Manage Mechanic

3.3 Manage Employee

4.0 Order Process: There are more 2 sub processes under the Order Process. They are:

4.1 Parts Order:

4.2 Service Order

5.0 Service Process: We have only 4 process under the Service Process. They are:

5.1 Hand Over parts

5.2 AC service

5.3 Engine service

5.4 Gas service

6.0 Make Payment Process: The Make Payment Process has 4 more sub processes under it. They are:

6.1 Payroll

6.2 Generate Purchase report

6.3 Generate payment report

3.5 Entity Names

For any Data Flow Diagram we need to have a clear knowledge about the entities. Here we have used mainly 6 entities:

1. Admin
2. Customer
3. Employee
4. Parts
5. Cashier
6. Order

3.6 Database Names

1. Admin Record
2. Cashier Record
3. Inventory
4. Mechanic Record
5. Employee Record
6. Parts Order Info
7. Service Order Info

3.7 Data Flow Diagram Levels

Data Flow Diagram is a diagram that characterizes data processes and flows in a business system. It depicts the broadest possible overview of system inputs, processes and outputs that correspond to those of the general system. There are mainly three types of DFDs:

1. Context Level/ Level 0
2. Level 1
3. Level 2

We have prepared context level and level 1 DFDs for our system.

3.7.1 Context Level Diagram

Context level DFD is the top level. It only contains one process. It generalizes the function of the entire system in relationship to external entities. The diagram of the Context Level of our project is given below:

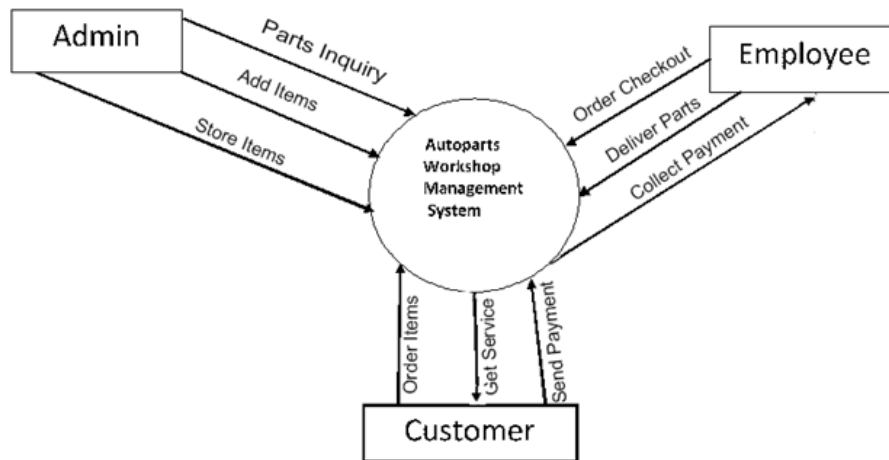


Figure 3.1: Context Level diagram of Auto Parts Management System

3.7.2 Level 1 Diagram

Level one DFD is the second level. It shows how the system is divided into sub systems, each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole.

The diagram of Level 1 is given below:

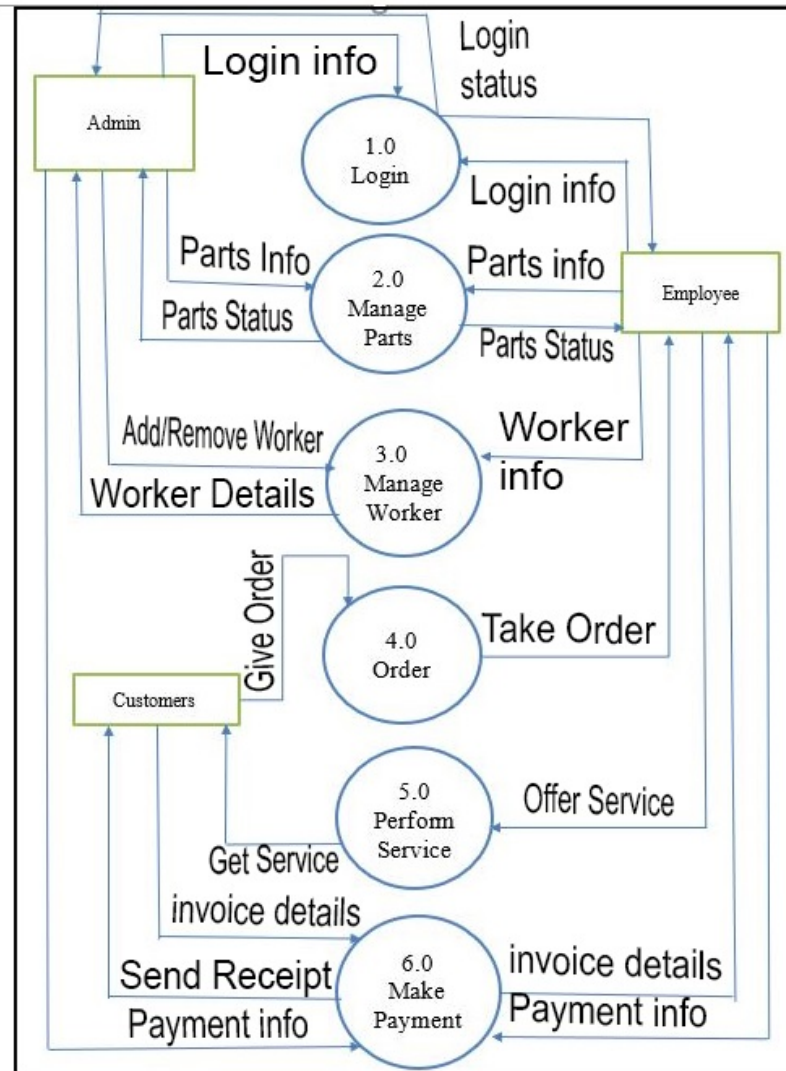


Figure 3.2: Level 1 diagram of Auto Parts Management System

3.7.3 Level 2 Diagram

A DFD that represents a decomposed level 1 DFD is called a level 2 DFD. Level 2 is the more detailed version of Level 1. In this level, all the processes which are included in Level 1 are divided into more sub processes. Level 2 gives us more accurate explanation about our project.

1.0 Login Process:

We have 2 sub processes under the Login Process. They are given below:

1.1 Admin Login

1.2 Cashier Login

The diagram is given below:

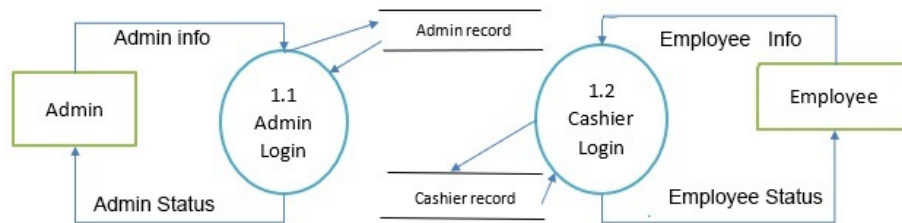


Figure 3.3: Login Process of Auto Parts Management System

2.0 Manage Parts Process:

1. Purchase Parts
2. Store Parts

The diagram is given below:

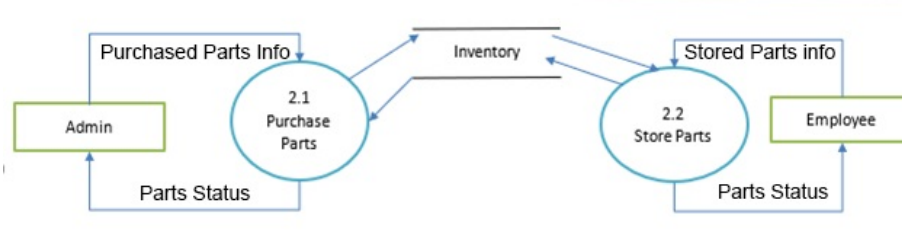


Figure 3.4: Manage Parts Process of Auto Parts Workshop Management System

3.0 Manage Workers Process:

We have 3 more processes under the Manage Workers Process. They are given below:

1. Manage Cashier
2. Manage Mechanic
3. Manage Employee

The diagram is given below:

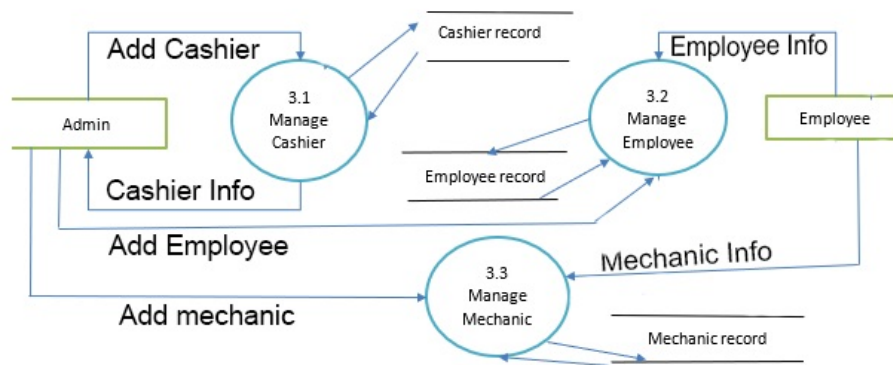


Figure 3.5: Manage Workers Process of Auto Parts Management System

4.0 Order Process:

There are more 2 sub processes under the Order Process. They are:

1. Parts Order
2. Service Order

The diagram is given below:

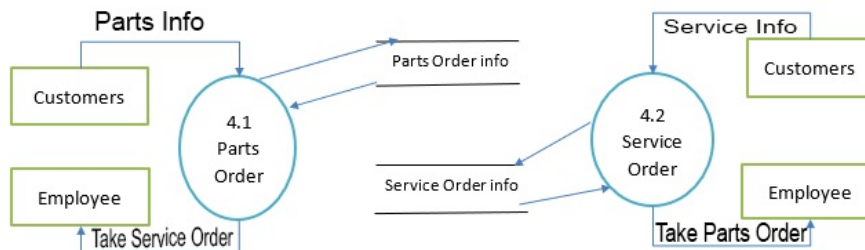


Figure 3.6: Order Process of Auto Parts Management System

5.0 Service Process: We have only 4 process under the Service Process. They are:

1. Hand Over Parts
2. AC Service
3. Engine Service
4. Gas Service

The diagram is given below:

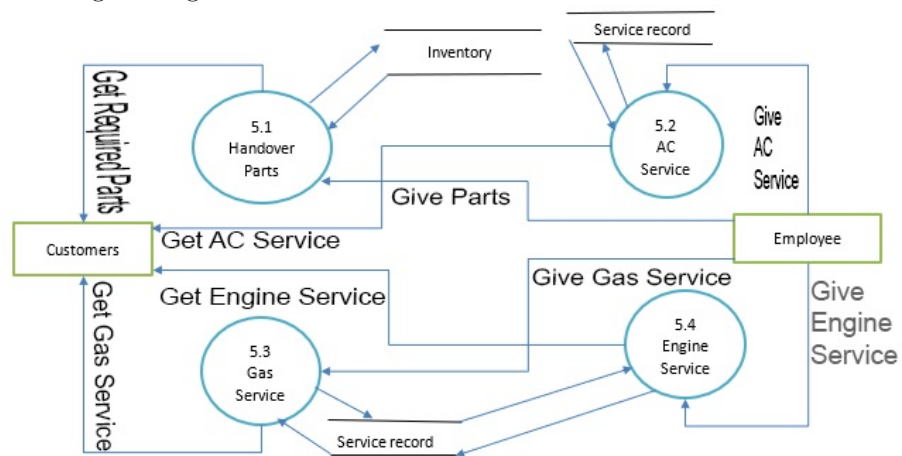


Figure 3.7: Service Process of Auto Parts Management System

6.0 Make Payment Process:

The Make Payment Process has 4 more sub processes under it. They are:

1. Payroll
2. Generate Purchase Report
3. Generate Payment Report

The diagram is given below:

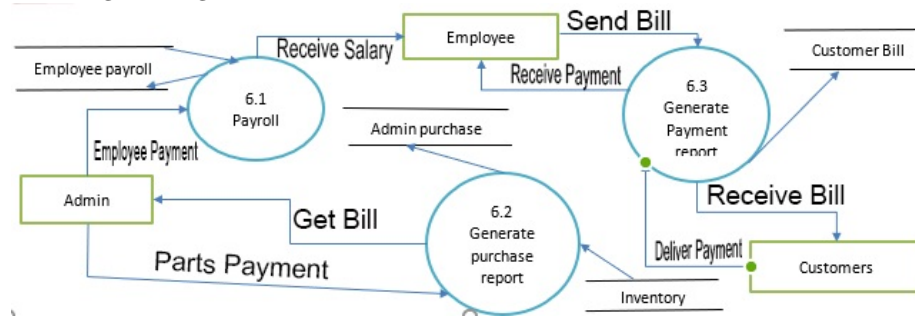


Figure 3.8: Make Payment Process of Auto Parts Management System

3.8 Use Case Diagram

A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. In this context, the term "system" refers to something being developed or operated, such as a mail-order product sales and service Website. Use case diagrams are employed in UML (Unified Modeling Language), a standard notation for the modeling of real-world objects and systems.

The Use Case diagram of our project is given below:

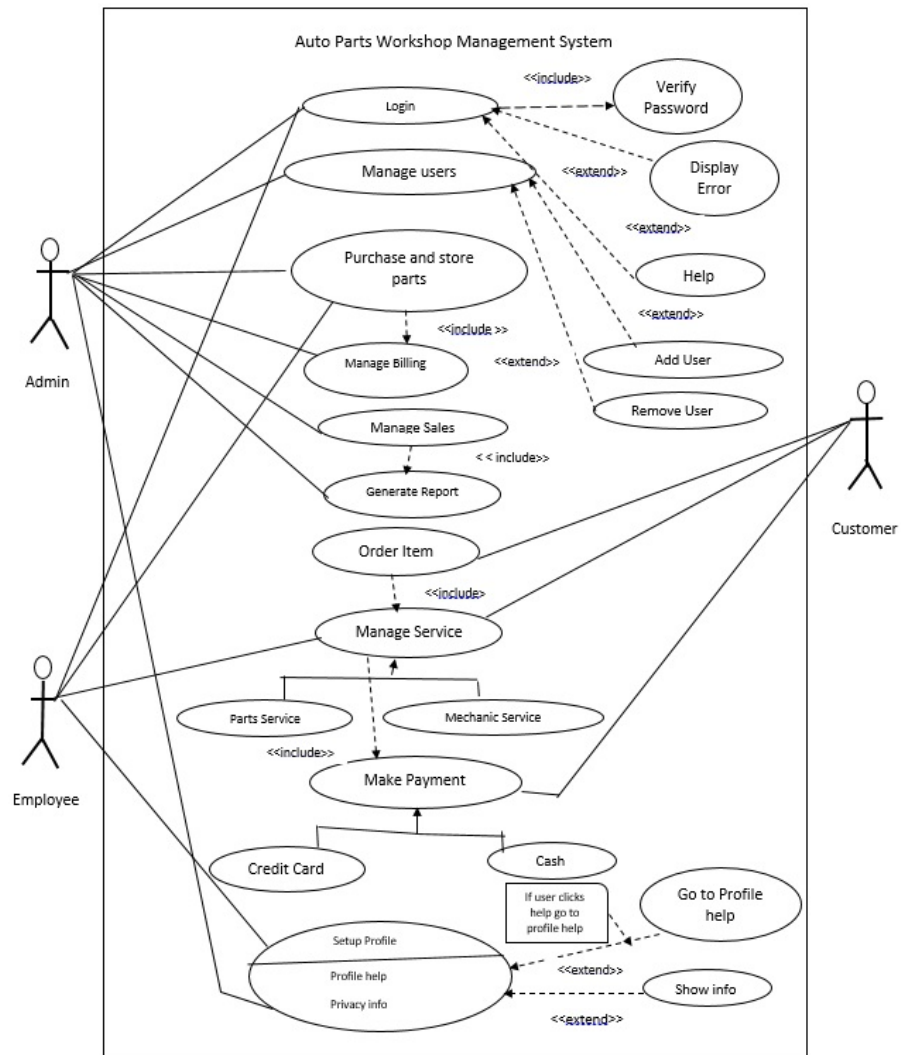


Figure 3.9: Use Case Diagram of Auto Parts Management System

3.8.1 Actors

Actors in the UML specifies a role played by a user that interacts with the system. There are 2 types of actors:

1. Primary Actor
2. Secondary Actor

Primary Actor:

It stays at left of the system. Primary actors are those who first interact with the system. They use the system to fulfill their needs.

Secondary Actor: It stays at right of the system. They work as an assistant who assist primary actors to meet up their needs and fulfill those.

In our project the primary actors are:

1. Admin
2. Employee

In our project the Secondary actors are:

1. Customer

3.9 Conclusion

A well organized DFD can depict a neat and clear representation of the system requirements graphically. We have find out how the data is elevated within the system and where the data is being preserved. A Use Case Diagram provides project planning skeleton. We have thought through every user's needs and designed our use case diagram. From the above description we have got a clear view of different aspects of our project. And also we have got a specific vision of our project through the levels of Data Flow Diagram and got a clear scenario of our project through use case diagram.

Chapter 4

Relationship Diagram and Class Diagram

Introduction To make our project error free and expedient, we should have knowledge about the relation between entities, identify the use cases and actors, generate appropriate classes and methods. In the previous chapter we have completed designing the Data flow diagram (DFD), so the next step is to draw Entity Relationship Diagram (ERD), Use Case Diagram and Class Diagram and design our project according to the diagrams in order to make our project a successful and better suited for the company. In this chapter we will discuss about the ERD, Use Case Diagram and Class Diagram of our project.

In this chapter we will discuss about the ERD, Use Case Diagram and Class Diagram of our project.

4.1 Entity Relationship Diagram (ERD)

An entity-relationship diagram (ERD) is a data modelling technique that graphically illustrates an information system's entities and the relationships between those entities. An ERD is a conceptual and representational model of data used to represent the entity framework infrastructure.

Elements of ERD are:

1. Entity
2. Relationship
3. Attribute

The ERD is given below:

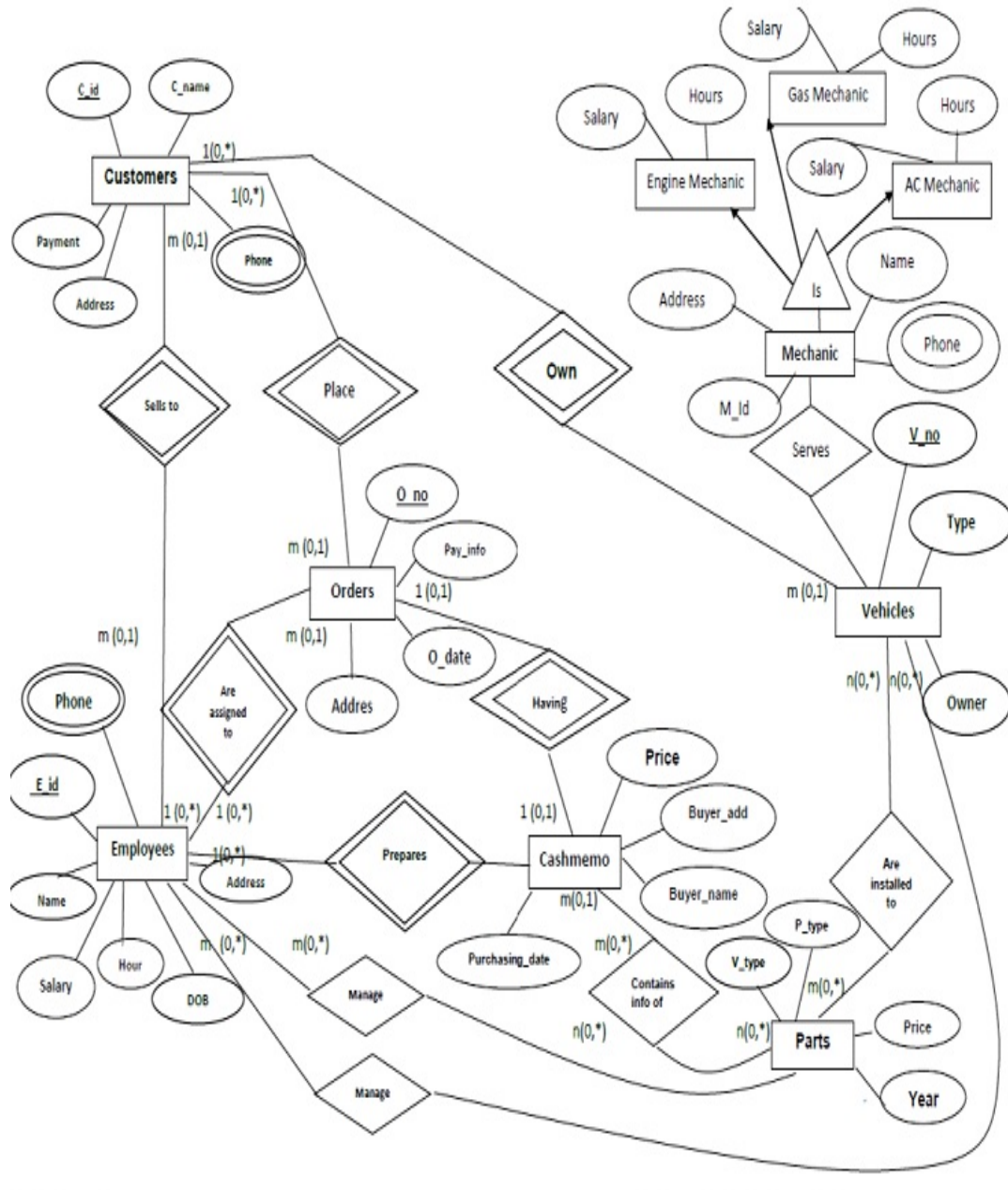


Figure 4.1: Entity Relationship Diagram

4.1.1 Entities

Each item that you track in a database is an entity, and each entity is a table in the relational database.

Usually, each entity in a database corresponds to a row.

There are thirteen Entities in our ERD:

1. Employees
2. Customers
3. Mechanic
 - Engine Mechanic
 - AC Mechanic
 - Gas Mechanic
4. Parts
5. Vehicles
6. Order

4.1.2 Relationships

The value of an entity-relationship diagram lies in its ability to display information about the relationships between entities. The three main cardinalities are:

1. A one-to-one relationship (1:1).
2. A many-to-many relationship (M:N).
3. A one-to-many relationship (1:M).

4.1.3 Attributes

Databases contain information about each entity. This information is termed "attributes." and it consists of information unique for each entity lists

The Attributes alongside with their respective Entities are:

Entity No 1: Employees

Attributes:

1. e_id
2. e_Name
3. e_Phone

4. e_Address
5. e_Hours
6. e_DOB
7. e_Salary

Entity No 2: Customer
Attributes:

1. c_id
2. c_name
3. c_Phone
4. c_Email
5. c_Address
6. c_Payment

Entity No 3: Mechanic
Attributes:

1. M_id
2. M_Name
3. M_Address
4. M_Phone
 - Engine Mechanic
Salary, Hours
 - Gas Mechanic
Salary, Hours
 - AC Mechanic
Salary, Hours

Entity No 4: Parts
Attributes:

1. p_Type
2. v_type

3. year

4. price

Entity No 5: Cashmemo

Attributes:

1. Buyer_Name

2. Buyer_add

3. Price

4. Purchasing_date

Entity No 6: Budget

Attributes:

1. User_id

2. E_id

3. Bud_id

4. Total_Amount

5. Amount_Due

6. Amount_Paid

7. Discount

Entity No 7: Vehicles

Attributes:

1. V_no

2. Types

3. Owner

Entity No 8: Order

Attributes:

1. O_no

2. O_date

3. Pay_Info

4. Address

4.2 Class Diagram

Class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modelling Language (UML). In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity.

Class diagram has 3 major components:

1. **Class:** A class is represented by a rectangle on a class diagram. In the simplest format, the rectangle may include only the class name, but it may also include the attributes and methods.
2. **Attribute:** Attributes are those, which the class knows about the characteristics of the objects and methods. These are also called operations which the class knows about how to do things.
3. **Method:** Methods are small sections of code work with attributes.

The class diagram is given below:

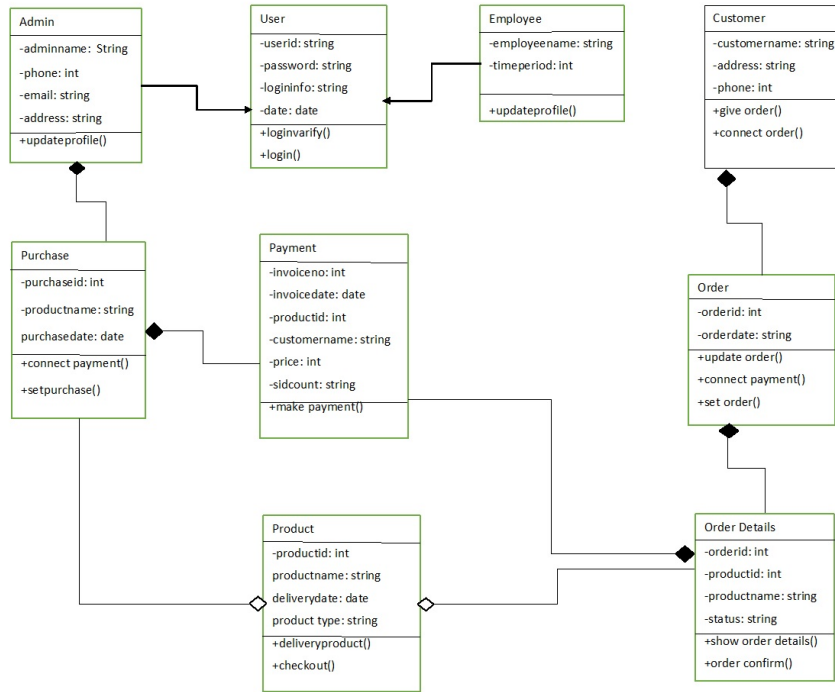


Figure 4.2: Class Diagram of Auto Parts Management System

4.2.1 Relationship in Class Diagram

There are 4 types of relationships in a class diagram:

Inheritance

Refers to a type of relationship wherein one associated class is a child of another by virtue of assuming the same functionalities of the parent class. In other words, the child class is a specific type of the parent class. To show inheritance in a UML diagram, a solid line from the child class to the parent class is drawn using an unfilled arrowhead.

Association

Is a broad term that encompasses just about any logical connection or relationship between classes .

Aggregation

Refers to the formation of a particular class as a result of one class being aggregated or built as a collection. For example, the class “library” is made up of one or more books, among other materials. In aggregation, the contained classes are not strongly dependent on the lifecycle of the container. In the same example, books will remain so even when the library is dissolved

Composition

The composition relationship is very similar to the aggregation relationship. With the only difference being its key purpose of emphasizing the dependence of the contained class to the life cycle of the container class. That is, the contained class will be obliterated when the container class is destroyed. For example, a shoulder bag’s side pocket will also cease to exist once the shoulder bag is destroyed.

4.2.2 Classes of our project

Admin User Employee Customer Purchase Order Order Detail Product Payment

4.3 Conclusion

The entity relationship diagram (ERD) is the logical structure of database and shows relationships of entity sets stored in a database. We have illustrated all the entities, attributes, data types and relationships of our entity relationship diagram. Again our class diagram contains all relevant relations and data types. From the above description we have got an explicit view of different perspective of our project. Above mentioned diagrams helped us to see the futurity of our project and now we can easily visualize the whole system more evidently.

Chapter 5

Discussion

Conclusion

We wanted to build a fully automated system for our company so that it can use all the potentials in using technology to increase the company productivity in the market. Otherwise, it would be hard for them to compete in the future. Because keeping tracks of parts and doing other calculations in ledgers manually most often leads to error. To survive they need to develop, learn, and practice how to maintain a company's audit using technology. Maintenance is a major sector to develop, and maintenance of spare part is an important branch in the main system. "Auto Parts Management System" is a good sector for the companies to increase the efficiency where there is a lot of potentials in it.

We initiated our plan of making a system suitable for our company by setting the goals of our project. As we have seen, earlier we discussed about the feasibility, analyzed the cost benefit and cash flow of our project. After that, according to our project schedule we designed the Gantt chart.

After the planning we started gathering information regarding our project, interviewed selected personnel in order to have the idea about user as well as company's demand.

We designed our system's Data Flow Diagrams (DFD), Use Case Diagram, Entity Relationship Diagram and Class Diagram according to the information we gathered during our survey. We built and upgraded our system using the processes, use cases, entities from the diagrams. Thus we were able to make a complete automated system for the company which we hope will be suitable and user friendly for the users.

5.1 Limitation

We designed our system's Data Flow Diagrams (DFD), Use Case Diagram, Entity Relationship Diagram and Class Diagram according to the information we gathered during our survey. We built and upgraded our system using the

processes, use cases, entities form the diagrams. Thus we were able to make a complete automated system for the company which we hope will be suitable and user friendly for the users.

The limitations of our project are given below:

1. The project is for small business only. It is incapable of keeping track of the details for large multinational companies.
2. Desktop/ Laptop pc is needed to run the program as it is not an android app.
3. Extra cost for server is a big handicap of our project as internet is needed to run the system.
4. If it was an android app, it would be cheaper.

5.2 Future Work

We will modify our project so that other companies also find it suitable to use. In future we will try to add some extra features in our system.

The future work of our project is given below:

1. We will add an update option so that the stock and other cost details can be updated.
2. We will try to add time tracking option as well.
3. We want to add direct web cam in our system.