

## **WHAT IS SOFTWARE PROJECT?**

A project, by definition, is a temporary activity with a starting date, specific goals and conditions, defined responsibilities, a budget, a planning, a fixed end date and multiple parties involved. You know what you have to do, do it, once, and that's the end of it. That's a project.

Software projects are notoriously difficult to define. Unlike a building, you can't see software or touch it or feel it or visualize it or how long it might take to build.

Clearly, a key part of project definition is establishing the project scope, but a project can only be considered properly defined when several other things are established:

Who will fill each project role (project manager, project sponsor, etc)

Who will supply what resources and when

What the project will cost (estimates)

How long it will take, what will be done when (plan/schedule)

How work will be tracked, controlled and reported

What the risks are and how they will be managed

How the quality of the project's products will be assured

### **Software development process**

A software development process is concerned primarily with the production aspect of software development, as opposed to the technical aspect. These processes exist primarily for supporting the management of software development, and are generally skewed toward addressing business concerns.

Requirements analysis is a term used to describe all the tasks that go into the instigation, scoping and definition of a new or altered computer system. Requirements analysis is an important part of the software engineering process; whereby business analysts or software developers identify the needs or requirements of a client; having identified these requirements they are then in a position to design a solution.

Risk management is the process of measuring or assessing risk and then developing strategies to manage the risk. In general, the strategies employed include transferring the risk to another party, avoiding the risk, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk.

### **Project planning, monitoring and control**

The purpose of project planning is to identify the scope of the project, estimate the work involved, and create a project schedule. Project planning begins with requirements that define the software to be developed. The project plan is then developed to describe the tasks that will lead to completion.

The purpose of project monitoring and control is to keep the team and management up to date on the project's progress. Project monitoring and control involves status meetings to gather status from the team.

## **Brief Introduction of SDLC**

Software Development Life Cycle or SDLC is a model of a detailed plan on how to create, develop, implement and eventually fold the software. It's a complete plan outlining how the software will be born, raised and eventually be retired from its function.

### **Popular Software Development Models**

The following are some basic popular models that are adopted by many software development firms

- A. Waterfall Model
- B. Prototyping Model
- C. Rapid Application Development Model
- D. Component Assembly Model
- E. Spiral Model

#### **A. Waterfall Model**

This is also known as Classic Life Cycle Model (or) Linear Sequential Model (or) System Development Life Cycle Model. This model has the following activities.

##### **1. System/Information Engineering and Modeling**

As software is always of a large system (or business), work begins by establishing the requirements for all system elements and then allocating some subset of these requirements to software. This system view is essential when the software must interface with other elements such as hardware, people and other resources. System is the basic and very critical requirement for the existence of software in any entity. So if the system is not in place, the system should be engineered and put in place. In some cases, to extract the maximum output, the system should be re-engineered and spruced up. Once the ideal system is engineered or tuned, the development team studies the software requirement for the system.

##### **2. Software Requirement Analysis**

The requirements gathering process is intensified and focused specifically on software. To understand the nature of the program to build, the software engineer must understand the information domain for the software as well as required function, behavior, performance, and interface. Requirement for both the system and the software are documented and reviewed with the customer.

##### **3. System Analysis and Design**

In this phase, the software development process, the software's overall structure and its nuances are defined. A software development model is thus created. Analysis and Design are very crucial in the whole development cycle. Much care is taken during this phase. The logical system of the product is developed in this phase.

##### **4. Code Generation**

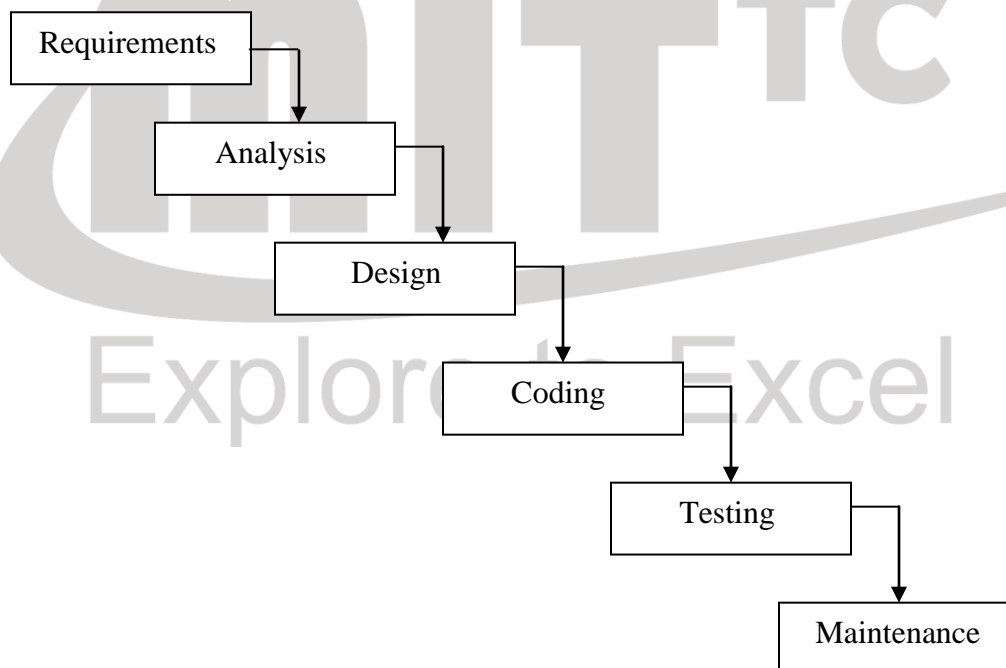
The design must be translated into a machine-readable form. The code generation step performs this task. If designed is performed in a detailed manner, code generation can be accomplished mechanistically.

### 5. Testing

Once code has been generated, program testing begins. The testing process focuses on the logical internals of the software, ensuring that all statements have been tested, and on the functional externals; that is, conducting tests to uncover errors and ensure that defined input will produce actual results that agree with required results.

### 6. Maintenance

The software will definitely undergo change once it is delivered to the customer. There can be many reasons for this change to occur. Change could happen because of some unexpected input values into the system. In addition, the changes in the system could directly affect the software operations. The software should be developed to accommodate changes that could happen during the post implementation period.



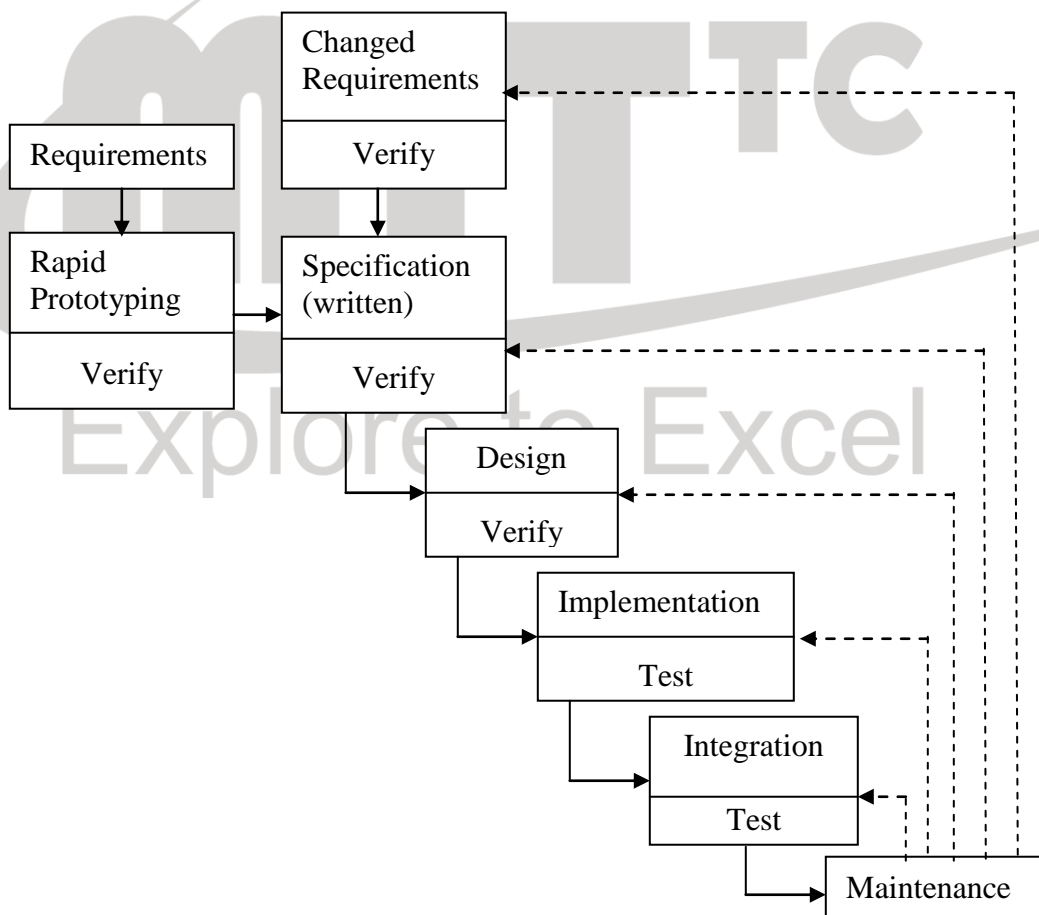
**Fig: Waterfall model**

## **B. Prototyping Model**

**Definition:** A prototype is a working model that is functionally equivalent to a component of the product.

This is a cyclic version of the linear model. In this model, once the requirement analysis is done and the design for a prototype is made, the development process gets started. Once the prototype is created, it is given to the customer for evaluation. The customer tests the package and gives his/her feed back to the developer who refines the product according to the customer's exact expectation. After a finite number of iterations, the final software package is given to the customer.

In this methodology, the software is evolved as a result of periodic shuttling of information between the customer and developer. This is the most popular development model in the contemporary IT industry. Most of the successful software products have been developed using this model - as it is very difficult (even for a whiz kid!) to comprehend all the requirements of a customer in one shot. There are many variations of this model skewed with respect to the project management styles of the companies. New versions of a software product evolve as a result of prototyping.



**Fig: Prototyping Model**

### **C. Rapid Application Development (RAD) Model**

The RAD model is a linear sequential software development process that emphasizes an extremely short development cycle. The RAD model is a "high speed" adaptation of the linear sequential model in which rapid development is achieved by using a component-based construction approach. Used primarily for information systems applications, the RAD approach encompasses the following phases:

#### **1. Business modeling**

The information flow among business functions is modeled in a way that answers the following questions:

What information drives the business process?

What information is generated?

Who generates it?

Where does the information go?

Who processes it?

#### **2. Data modeling**

The information flow defined as part of the business modeling phase is refined into a set of data objects that are needed to support the business. The characteristic (called attributes) of each object is identified and the relationships between these objects are defined.

#### **3. Process modeling**

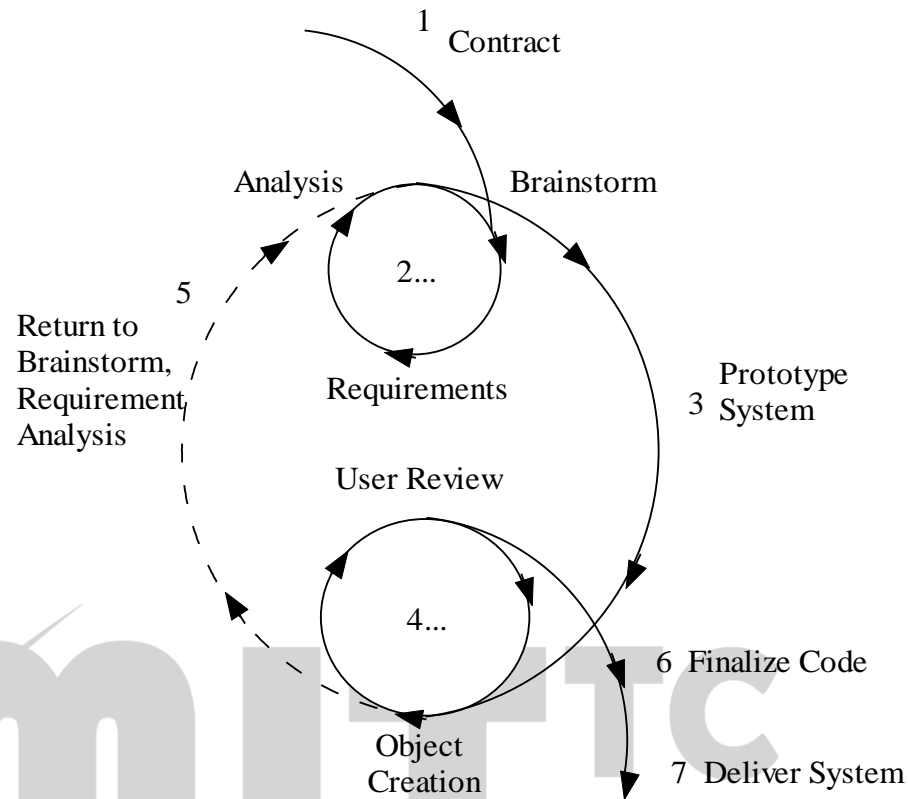
The data objects defined in the data-modeling phase are transformed to achieve the information flow necessary to implement a business function. Processing the descriptions is created for adding, modifying, deleting, or retrieving a data object.

#### **4. Application generation**

The RAD model assumes the use of the RAD tools like VB, VC++, Delphi etc... rather than creating software using conventional third generation programming languages. The RAD model works to reuse existing program components (when possible) or create reusable components (when necessary). In all cases, automated tools are used to facilitate construction of the software.

#### **5. Testing and turnover**

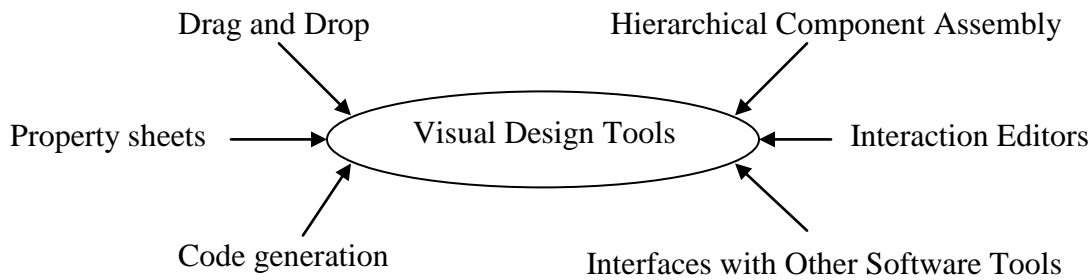
Since the RAD process emphasizes reuse, many of the program components have already been tested. This minimizes the testing and development time.



**Fig: Rapid Application Development Model**

#### **D. Component Assembly Model**

Object technologies provide the technical framework for a component-based process model for software engineering. The object oriented paradigm emphasizes the creation of classes that encapsulate both data and the algorithm that are used to manipulate the data. If properly designed and implemented, object oriented classes are reusable across different applications and computer based system architectures. Component Assembly Model leads to software reusability. The integration/assembly of the already existing software components accelerates the development process. Nowadays many component libraries are available on the Internet. If the right components are chosen, the integration aspect is made much simpler.



**Fig: Component Assembly Model**

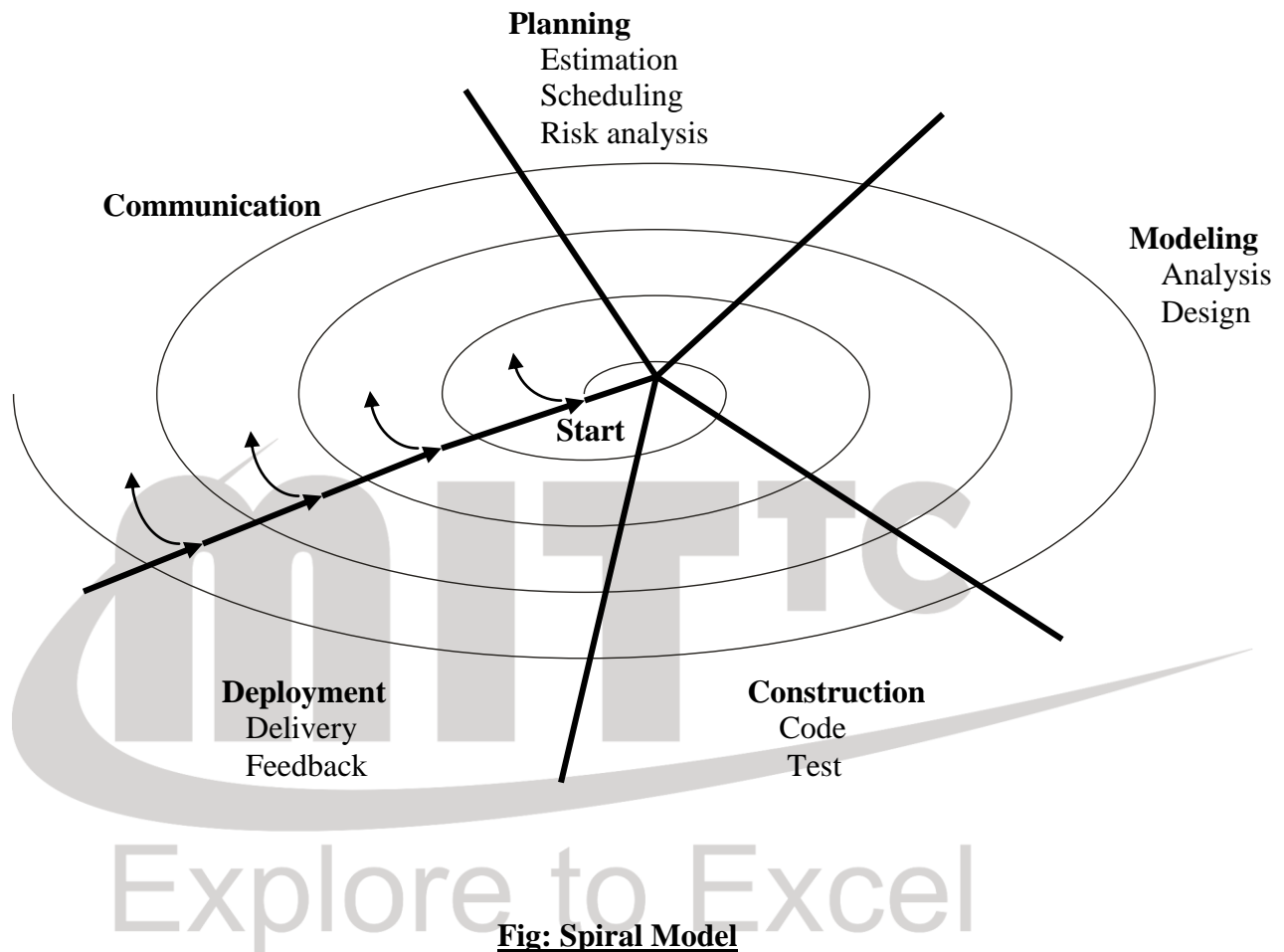
### **E. Spiral Model**

The spiral model, originally proposed by Boehm, is an evolutionary software process model that couples the iterative nature of prototyping with the controlled and systematic aspects of the waterfall model. Using the spiral model, software is developed in a series of evolutionary releases. During early iterations, the release might be a paper model or prototype. During later iterations, increasingly more complete versions of the engineered system are produced.

The steps in the spiral model can be generalized as follows:

1. The new system requirements are defined in as much detail as possible. This usually involves interviewing a number of users representing all the external or internal users and other aspects of the existing system.
2. A preliminary design is created for the new system.
3. A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.
4. A second prototype is evolved by a fourfold procedure: (1) evaluating the first prototype in terms of its strengths, weaknesses, and risks; (2) defining the requirements of the second prototype; (3) planning and designing the second prototype; (4) constructing and testing the second prototype.
5. At the customer's option, the entire project can be aborted if the risk is deemed too great. Risk factors might involve development cost overruns, operating-cost miscalculation, or any other factor that could, in the customer's judgment, result in a less-than-satisfactory final product.
6. The existing prototype is evaluated in the same manner as was the previous prototype, and, if necessary, another prototype is developed from it according to the fourfold procedure outlined above.
7. The preceding steps are iterated until the customer is satisfied that the refined prototype represents the final product desired.
8. The final system is constructed, based on the refined prototype.

9. The final system is thoroughly evaluated and tested. Routine maintenance is carried out on a continuing basis to prevent large-scale failures and to minimize downtime.



**Fig: Spiral Model**



## **Documentation Index**

This section shows the Documentation Index which consists of the points that should be included in the project documentation.

### **Index**

#### **1. Introduction**

- 1.1 Organization overview
- 1.2 Objective of the Project.
- 1.3 Scope of the Project.

#### **2. Theoretical Background**

- 2.1 Introduction to the project
- 2.2 Scope of Study
- 2.3 Existing System
- 2.4 Proposed System
- 2.5 Feasibility Study

#### **3. System Planning**

- 3.1 Gantt Chart

#### **4. System Implementation**

- 4.1 Methodology Adopted
- 4.2 Hardware & Software Requirements
- 4.3 Technologies used

#### **5. Cost and Benefit Analysis**

- 5.1 Why Cost-Benefit Analysis
- 5.2 Cost Estimation
- 5.3 Benefit Analysis

#### **6. Event Table**

#### **7. Detailed Life Cycle**

- 7.1 Data Flow Diagram.
- 7.2 Entity Relationship Diagram
- 7.3 Schema Diagram.
- 7.4 Database Table List.

7.5 Flow charts.

7.6 Structured charts.

7.7 Menu Tree.

7.8 Inputs and Output Screen Design.

7.9 Methodology used for testing.

7.10 Test Cases.

## **8. Limitations and Proposed Solution**

## **9. Conclusion**

**The next section explains each point given in the index with two examples for each.  
The examples are as follows:**

**Ex-1: Medical Store Management System**

**Ex-2: Police Support System**



## **Introduction**

### **1.1) Organization overview**

Ex-1: Medical store management system

‘The Royal Chemist’ is a very big medical store in Vile Parle (E) owned by Mr. V.B.Desai. To manage the medical store there are three workers employed. The present working system is manual.

They have decided to invest in a user-friendly system which is capable of holding details of Expired products, Shortage products, Stock in Products, Sold Products etc. They feel that new system would be needed to handle the Customers’ Transaction, Suppliers’ Transaction, Sales and Purchase etc. The system, which is referred for the purpose of undertaking the working of a project, is the Existing system.

Ex-2: Police Support system

The Police Support System is done for Mulund Police Station of Mumbai Police. The Police management needs a system that will handle all the necessary and minute details easily. They need software, which will store data about FIR, NC, police, complainant, criminal, suspicious person, witness, investigated things, law, and lock-up with Graphics User Interface (GUI).

### **1.2) Objectives of the Project:**

Ex-1:

- The main objective of the project is to design and develop a user friendly system.
- Easy to use and an efficient computerized system.
- To develop an accurate and flexible system, it will eliminate data redundancy.
- Computerization can be helpful as a means of saving time and money.
- To provide better Graphical User Interface (GUI).
- Less chances of information leakage.
- Provides Security to the data by using login and password method.

Ex-2:

- The objective of the project is to create a system that:
- Provides Security to the data.
  - Senior officers get access to all data stored by generating various data reports
  - Handles the complainant, criminal, witness, suspicious person, police, law, FIR, NC, investigated things and lock-up related information.
  - The system is built to efficiently store all the relevant data about the people involved for the proper functioning of the Police system.
  - Less prone to errors.

### **1.3) Scope of the Project:**

Ex-1:

- Storing information of customers, employees, suppliers, products, medicines.
- Check availability of product and required stock for that product.
- Storing information about the suppliers who provide medicines to the shop.
- Generating reports for expired products, shortage products, etc

Ex-2:

The system provides FIR and NC related information; with a user-friendly Graphics User Interface (GUI).The scope of this project is limited to handling FIR and NC module. This can be extended to include other modules of police system such as police management. The project aims to develop software, which will store data about FIR and NC, their complainant, witness, criminal, or suspicious person, police and so on.



## **Theoretical Background**

### **2.1 Introduction to project:**

Ex-1:

We have done a project on Medical Store Management System. This system is proposed to be an automated Sales and Purchase system. This system stores the Product Details, Stock Entry, Sales Entry, supplier details, customer Details, Shortage Products & Expired Products etc. It also provides the facility of Search & Advance Search for searching the records efficiently & immediately. This system provides accounting, billing information, with Graphics User Interface (GUI).

Ex-2:

The project aims to develop software, which will store data about FIR, NC, police, complainant, criminal, suspicious person, witness, investigated things, law, and lock-up with Graphics User Interface (GUI). The Police Support System will record details of all police, complainant, criminal and witness information relating to FIR and suspicious person information relating to NC.

### **2.2 System Study:**

Ex-1:

The most important thing is to study a system thoroughly. Here we are studying both the existing system and the proposed system so that the advantages and disadvantages of both systems can be understood.

The first task was to identifying how the system is to be computerized. Some analysis and projection was done regarding changes to be made to the existing system.

The new developed system for “**Medical Store Management System**” is simple without complexities.

Ex-2:

Here the current system is manual. Each and every record is stored in files and registers. So the first task is to computerize the system and to include all the required features of Police management into the system. The new developed system for “**Police Support System**” is simple without complexities.

### **2.3 Existing System:**

Ex-1:

The shop is working manually. The current system is time consuming and also it is very costly, because it involves a lot of paper work. To manually handle such a system was very difficult task. But now-a-days because of computerization this job is becoming easier.

The following are the reasons why the current system should be computerized:

- To increase efficiency with reduced cost.
- To reduce the burden of paper work.
- To save time of management for recording details of each and every supplier.
- To check that particular product requested is available.
- To generate bill information and required reports easily.

**Limitations of existing system:****• Time consumption:**

As the records are to be manually maintained it consumes a lot of time.

**• Paper Work:**

Lot of paper work is involved as the records are maintained in the files and registers.

**• Storage Requirements:**

As files and registers are used the storage space requirement is increased.

**• Less Reliable:**

Use of papers for storing valuable data information is not at all reliable.

**• Accuracy:**

As the system is in manual there are lot many chances of human errors. These cause errors in calculating mechanism or maintaining product and supplier data in registers.

**• Difficulty in keeping new records:**

It is difficult for keeping all the new entries of the products, their available stock, new suppliers.

Ex-2:

The current police system is manual. All the records about crimes, criminals, police (staff member as well as non-staff member), clients, etc. are stored manually in to the file registers. They have to maintain records for long duration, but the maintaining them manually is a very difficult task.

If any criminal record has been register/FIR today and after 1 year if any client or any lawyer wants to see that record then the police staff may find trouble to find it. They have to search criminal records of particular year, then search particular month record and finally, after long time they will get that perfect record. To find one of the particular records manually through all the registers is very difficult and time consuming job.

**Limitations of Existing System:**

- 1) Extremely Time Consuming :- A lot of Time is required to fill forms , daily records etc.
- 2) Excessive Paper work :- Since all the data has to be saved in files.
- 3) Abundant Storage space required :- Don't have proper way of information management , since the entire data is stored in files a lot of storage space is required.
- 4) Quick Search of data is not possible :- Since data is store in files ,lot of time is wasted in searching for old records as this is done manually.

## **2.4 Proposed System:**

Ex-1:

To reduce the inconvenience that were found in the current system, it has been automated so as to provide a user friendly GUI that will help data entry. This also includes bill and report generation.

The proposed system will include following features:

- Creating a database for the shop containing the information present with them on the paper in the existing system.
- The developed system will also print bills and reports and maintain various transactions of the shop.
- Also the system is intended to take very few inputs from the user.

Ex-2:

The aim of this project is to handle some of the Police station activities on a single interface.

- Case Information i.e. FIR , Crime Detail , Final Report etc. more efficiently and making work easier for the staff member in the Police Station.
- Aim to maintain Criminal Record easy to find particular detail of Criminal.
- The Software is designed and coded so perfectly , taking care of each and every aspect of the necessity of use in the Police Station.
- More functions and actions in the software.

### **2.4.1 Advantages of the System:**

Ex-1:

- Time Saving since all the detail information is stored in this system, it enables in significant reduction in the number of man-hours taken up for the storage and the retrieval of the information as it removes the large registers from the scene.
- Accuracy And Reliability
- Reports can be generated as per the Management requirements.
- User friendly, accurate and robust system
- To speed up all the processes sales bills or purchase receipts are generated.
- Security of data and Integration of all functions in to one system
- Remove redundancy and inconsistency of data

Ex-2:

- The Proposed system would be designed according to the conveniences of the Senior inspector. The main advantage would be reducing their Paper Work.
- The Proposed System would reduce the Man Power , because a single trained person can handle whole database.
- They could provide information in a quick time according to the requirements that are to be fulfilled.
- Easier retrieval of data will be possible as multiple search facilities will be available.
- Security of data.
- Through proper validations data inconsistency is reduced.

### **2.4.2 Limitation of Proposed System:**

Ex-1:

- The limitation of the system is that it is centralized.
- Also the data to be stored may require data entry to be done.

Ex-2:

- The limitation of the system is that it is centralized.
- This project is created only for FIR and NC module which can be further enhanced to include other departments of police system such as police management system etc.

### **2.5 Feasibility Study**

A feasibility study is the study of positive possibilities of the project. It is also measure of how beneficial or practical development of information system would be to an organization. The different types of feasibility are as follows:

- Economic feasibility
- Operational feasibility
- Technical feasibility

#### **Economic Feasibility**

Higher level of automation most often requires more funds. Hence based on the hardware and software specification a desirable alternative costs and benefits to see if the investment made in creating / developing a new system is costlier or more beneficial.

Ex-1:

My system is economically feasible as the costs involved in implementing the automated system is in lieu with the cash flow of the shop. Thus the system developed will be beneficial to the users. However there will be an additional cost for implementing the technology on which the system is to be implemented.

Ex-2:

The Police Support system is economically feasible as the costs involved will be paid by the Government. Thus the system will be beneficial for the Police station.

#### **Technical Feasibility**

It is essential to check whether the proposed system is technically feasible and to determine the technology and skills necessary to carry out the successful implementation of the project.

Ex-1:

The necessary software required for the development of system is

- VB
- SQL Server 2000

There is requirement for the mentioned software and an expertise for handling system. Thus in the presence of required hardware, software the proposed system is technically feasible.

Ex-2:

The necessary software required for the development of system is



- Microsoft Visual Studio [full version]
- SQL Server 2000 [Optional]

The required hardware is already available in the police station but there is requirement for the mentioned software and an expertise for handling system. Thus in the presence of required hardware, software the proposed system is technically feasible.

### **Operational Feasibility**

The operational feasibility is obtained by consulting the system user whether it satisfies the user's requirements. A system with an easy interface will always help the user to use the system.

Ex-1:

The new system has completely user friendly interface. It has been designed to be pretty intuitive, so that even an inexperienced person can easily handle the system. So it is operationally feasible.

Ex-2:

As the system provides a user friendly simple GUI it is operationally feasible to implement it in the Government department. This automation will save time as well as reduce errors.

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## **System Planning**

### **Gantt chart:**

A Gantt chart is a horizontal bar chart used in project management as a tool for graphically representing the schedule of a set of specific activities or tasks. The horizontal bars indicate the length of time allocated to each activity, so the x-axis of a Gantt chart is subdivided into equal units of time, e.g., days, weeks, months. The y-axis of a Gantt chart, on the other hand, simply lists all the activities or tasks being monitored by the Gantt chart. A simple look at a Gantt chart should enable its user to determine which tasks take the longest time to complete, which tasks are overlapping with each other, etc.

A Gantt chart indicates the following:

- 1) Durations and timelines of the listed activities;
- 2) The target and actual completion dates of the activities;
- 3) The cost of each activity;
- 4) The person or group of persons responsible for each activity;
- 5) Milestones in the progress of the project.

### **Symbols used:**

Since a Gantt chart is a graphical tool, it employs symbols to represent variety of information about a project. These symbols include:

- 1) The task bar, which is the horizontal bar used to indicate the duration of each activity in the Gantt chart;
- 2) The milestone marker, which denotes a major turning point in the project such as the release of an approved budget or the launching of a new product;
- 3) The link line, which shows the relationship between two tasks, such as the fact that one activity can only begin after another one is completed.

The task bar may be filled with a different color indicating the proportion of the task that has already been finished.

Ex-1:

We planned our project according to the Gantt chart as follows:

<b>Task</b>	<b>Start</b>	<b>Finish</b>	<b>Duration(in days)</b>
System study and analysis	4/12/2008	10/12/2008	6
Understanding current system	11/12/2008	13/12/2008	2
Problem definition	15/12/2008	20/12/2008	5
Information gathering	21/12/2008	31/12/2008	10
Database design	01/01/2009	20/01/2009	20
Form design	22/01/2009	1/02/2009	11
Coding	02/02/2009	20/02/2009	18
Modification of forms	21/02/2009	25/02/2009	4
Testing	26/02/2009	02/03/2009	4
Implementation	02/03/2009	06/03/2009	4
Documentation	06/03/2009	11/03/2009	5

## System Development Table

### Project development schedule

	December			January			February			March		
Project Steps:	Dec 1	Dec 15	Dec 31	Jan 1	Jan 15	Jan 31	Feb 1	Feb 15	Feb 28	Mar 1	Mar 6	Mar 11
System study and analysis	■											
Understanding current system		■										
Problem definition			■									
Information gathering			■	■	■	■						
Database design						■						
Form design							■	■	■			
Coding									■			
Modification of forms										■		
Testing											■	
Implementation												■
Documentation												

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Ex-2:

We planned our project using according to the Gantt chart as shown as follows

No	Task Name	Duration
<b>1</b>	<b>Police Support System</b>	<b>78 days</b>
2	System study and analysis	5 days
3	Understanding Current database structure	3 days
4	Understanding current system architecture	5 days
<b>5</b>	<b>System design</b>	<b>10 days</b>
	Database design	6 days
	Form design	4 days
<b>6</b>	<b>Coding</b>	<b>35 days</b>
	For all forms	28 days
	Report design and coding	7 days
<b>7</b>	<b>Testing</b>	<b>15 days</b>
	Test	10 days
	Test with user data	5 days
<b>8</b>	<b>Documentation</b>	<b>2 days</b>
<b>9</b>	<b>Implementation</b>	<b>3 days</b>

## System Development Table

### Project development schedule



## **System Implementation**

### **4.1 Methodology adapted**

Ex-1:

The methodology adopted while developing the system is the Waterfall model. Refer Page no.2 Waterfall Model.

Ex-2:

The methodology adopted here is the Prototyping model. Refer Page no.4 Prototyping Model.

### **4.2 Operating Environment**

Ex-1:

- **Hardware Requirement**  
Hard Disk: Minimum 10GB HDD  
CPU Type: Processor Type P-II and onwards  
RAM: Minimum 512 MB RAM
- **Software Requirement**  
Operating Systems: Windows 98 and onwards  
Front End: VB  
Back End: Microsoft SQL Server 2000

Ex-2:

- **Hardware Requirement**  
Hard Disk: Minimum 10GB HDD  
CPU Type: Processor Type P-IV and onwards  
RAM: Minimum 512 MB
- **Software Requirement**  
Operating Systems: Windows 2000 and onwards  
Front End: VB.Net  
Back End: SQL Express.

### **4.3 Technologies used**

Ex-1:

#### **1) VB**

Developing our project in VB was our first choice. Visual basic 6 is design to allow the programmer to develop application that run under windows without the complexity generally associated with windows programming. Visual basic is easy to learn, which makes it an excellent tool for understanding elementary programming concepts. It makes use of “GUI” for creating robust and powerful applications. User friendliness, faster application development, and many other aspects make VB an interesting tool to work.

## 2) Microsoft SQL Server

SQL Server 2000 only works on Windows-based platforms. Microsoft SQL Server is an environment used to create computer databases on a Microsoft Windows operating system. It can deal with small databases such as a personal list of contacts. It can be used for a medium business such as a car repair shop. It is also used for a larger than medium set of records such as a super market or a local bank. It can also handle a very large database such as a country's census.

Ex-2:

### 1) VB.NET

Developing our project in VB.NET was our first choice. Vb.net is an ideal programming language for developing sophisticated professional application. It makes use of “GUP” for creating robust and powerful applications. The design environment provided by Visual Studio 2005 is easy to use; since we can success all the development tools that we need for, one screen Vb.net feature such ads easier comprehensive, user friendliness, faster application development, and many other aspects make Vb.net an interesting tool to work.

### 2) SQL Express

SQL Server Express is a free and easy-to-use database product that is based on SQL Server 2005 technology. It is designed to provide a database platform that offers superior simplicity of use, enabling the fastest deployments for its target scenarios. The ease of use starts with a simple and robust graphical user interface (GUI) setup that guides the user through the installation process. The GUI tools that come for free with SQL Server Express include Express Manager (Alpha version) and Computer Manager. These tools simplify the basic database operations and are for hobbyist developers. The design and development of database applications are made easier by the integration with Visual Studio projects.

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## **Cost and benefit analysis**

### **5.1 Why cost benefit analysis**

Why should you do a cost-benefit analysis for your project? IT projects frequently over promise and under deliver. Executive managers have become aware of this performance issue and the cost-benefit analysis is their guarantee that the project team has carefully evaluated the project before commencement, studying the whole life cycle costs and the expected benefits.

### **5.2 Cost Estimation**

For a given set of requirements it is desirable to know how much it will cost to develop the software to satisfy a given requirements, and how much time development will take. The cost of a project is a function of many parameters. Foremost among them is the size of the project. Other factors that affect the cost are programmer ability, experience of the developers in the area, complexity of the project, and reliability requirements. It is also due to the requirements of software, hardware and human resources.

Ex-1:

Cost required for the project is to install the software and hardware requirements. Software may include installing SQL Server on the system. Cost due to the time taken for completion of the project which can be around 5 months. A Gantt chart given in the beginning helps to understand this in a better way.

Ex-2:

Cost required for the project is to install Microsoft Visual Studio software. SQL express comes inbuilt into it. Cost due to the time taken for completion of the project which can be around 2.5 months.

### **5.3 Benefit Analysis**

Ex-1:

In the old system the work was done manually, so the cost of handling the system was increasing. The cost mainly includes the charges for registry maintenance, receipt books, files, etc. To reduce the costs the new system was proposed.

Positive aspects of the designed system which contributed to the benefit analysis are fast and easy storage of all information. It was also easy to retrieve any required details as fast as possible. There is no need for maintaining receipt books. The new system is very beneficial than the old one because the system is fully automated.

Ex-2:

The old system was manual including cost for files and registers. The new system includes all the aspects of Police management which removes the charges for manual things. So the new system is beneficial.

### Event Table

The event table shows the flow of events happening into the system. The Event column shows the event that will happen. The Trigger column shows the action undertaken for that event. The Source column shows the source of the event. The Activity column shows how to perform the action. The Response column shows the corresponding response for that event. The Destination column shows the destination i.e. the receiver of the event.

Ex-1:

No	Event	Trigger	Source	Activity	Response	Destination
1	Customer wants to place an order	Product Inquiry	Customer	Look up for Product Availability	Product availability details	Customer
2	Customer place an Order	New Order	Customer	Create new Order		
3	Customer makes full payment	Make full payment	Customer	Produce receipt of payment for corresponding order	Receipt of payment	Customer
4	Administrator wants to check the list of shortage products	Shortage products inquiry	Administrator	Look up for shortage products	List of shortage products	Administrator
6	Administrator wants to check the list of Expired products	Expired products inquiry	Administrator	Look up for Expired products	List of Expired products	Administrator

<b>7</b>	Update Stock Details	Update Info.	Administrator	Update the stock details	Return updating confirmation	System
<b>9</b>	Administrator wants to change or cancel order	Order change request	Administrator	Update Order status	Order status details	Administrator
<b>10</b>	Administrator decides to add a product or modify	Add or Modify product	Administrator	Add or modify product		System
<b>11</b>	Generate Product Report	Static Reports Request	Administrator	Report Generation	Product Details Report	Administrator
<b>12</b>	Generate Supplier Report	Static Reports Request	Administrator	Report Generation	Supplier Report	Administrator
<b>13</b>	Generate Stock Report	Static Reports Request	Administrator	Report Generation	Stocks Report	Administrator
<b>14</b>	Generate Report of Products below minimum stock level	Report of Products below minimum stock level	Administrator	Report Generation	List of shortage products	Administrator
<b>15</b>	Generate Report of Expired products	Report of Expired products	Administrator	Report Generation	List of Expired products	Administrator
<b>16</b>	Generate Sales Report	Day Status Reports	Administrator	Report Generation	Sales Report	Administrator

Explanation:

This is the event table for the Medical store management system. Some of the events are explained below:

- 1) The 1<sup>st</sup> event is Customer desiring to place an order. Here the trigger is enquiry of the product desired, source is Customer, and activity is to look for that product availability, response will be Product availability details those will be delivered to the customer.
- 2) The 3<sup>rd</sup> event is Customer makes full payment for the product ordered. The trigger is making full payment, source is Customer who will pay, activity is producing payment receipt against that payment, and response here is the payment receipt which is delivered to the customer.
- 3) The 6<sup>th</sup> event is Administrator checks for expired products' list. The trigger is check for expired products where the source is the administrator, the activity here is that the system will check the products that are beyond expiry date and will generate the list of expired products that is delivered to the administrator.



Ex-2:

NO	EVENT	TRIGGER	SOURCE	ACTIVITY	RESPONSE	DESTINATION
1.	Add new FIR	New FIR entry, new complainant entry, new criminal entry, new witness entry.	Police	Make new FIR entry, new complainant entry, new criminal entry, witness entry	FIR registered	System
2.	Add new NC	New NC entry, new complainant entry, new suspicious person's entry.	Police	Make new NC entry, new complainant entry, new suspicious person entry.	NC registered	System
3.	Add Police detail	New police entry	Police	Make new police entry	Return addition information	System
4.	Update FIR	Update FIR	Police	Update FIR general information, complainant detail, criminal detail, witness detail and investigated things.	Return updating information	System
5	Update NC	Update NC	Police	Update NC general information, complainant detail, suspicious person detail.	Return updating information	System

Explanation:

This is the event table for Police support system. Some of the events are explained below:

1) The 1<sup>st</sup> event is adding new FIR when a complainant comes. Here the trigger is new FIR entry, source is the police who will make this entry, and activity is to make the FIR entry, the complainant's entry, the criminal's entry against whom the FIR is filed and the witness entry, response will be Confirmation of FIR registration that is added to the system.

2) The 3<sup>rd</sup> event is Addition of Police information. The trigger is new police entry, source is Police who will make this entry, activity is Addition into the Police database, and response will be the Return of addition information to the user. The destination is the system into which the addition is done.



## **Detailed Lifecycle of the project**

### **7.1 Data Flow Diagram**

Refer Page no. **56**. Data flow diagram

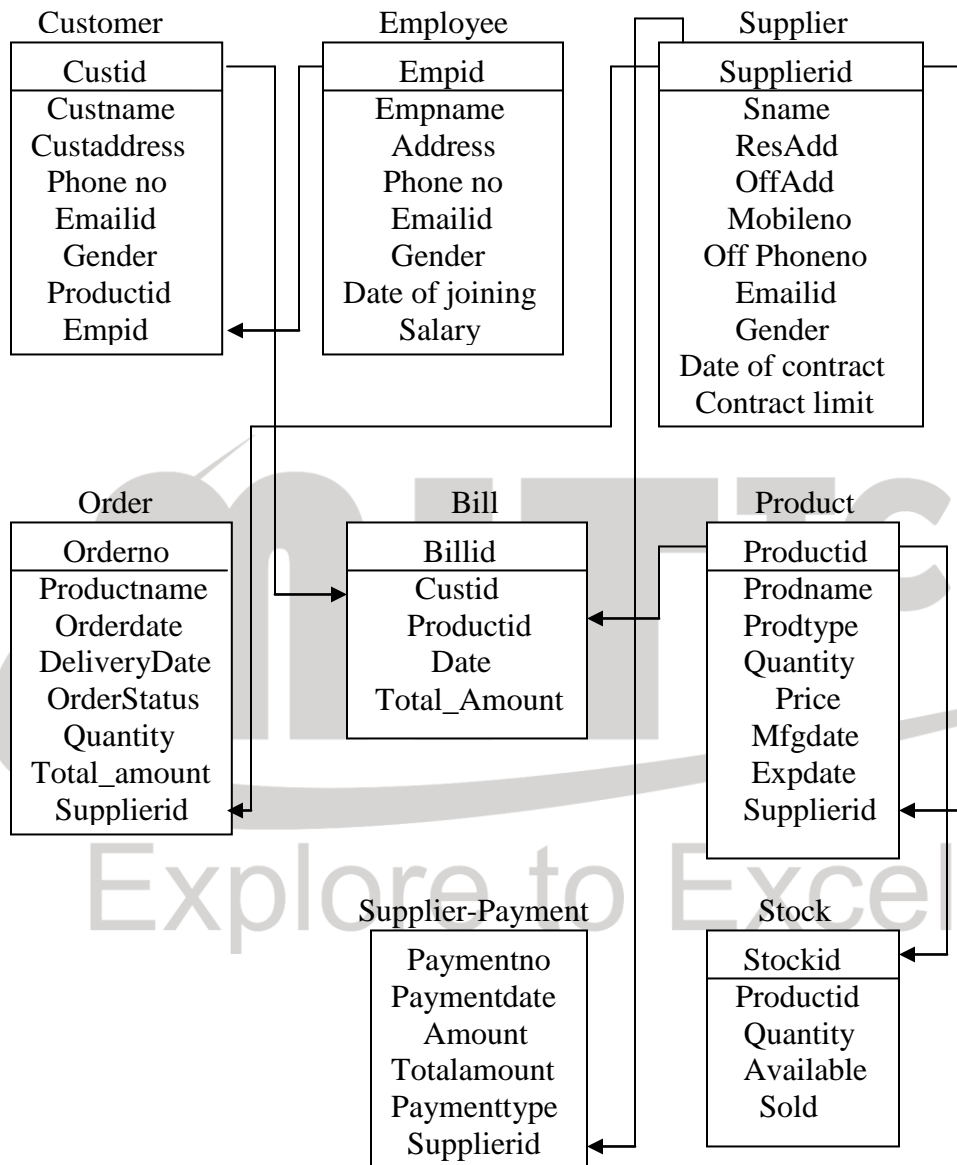
### **7.2 Entity Relationship Diagram**

Refer Page no. **52**. Entity Relationship diagram

### **7.3 Schema Diagram**

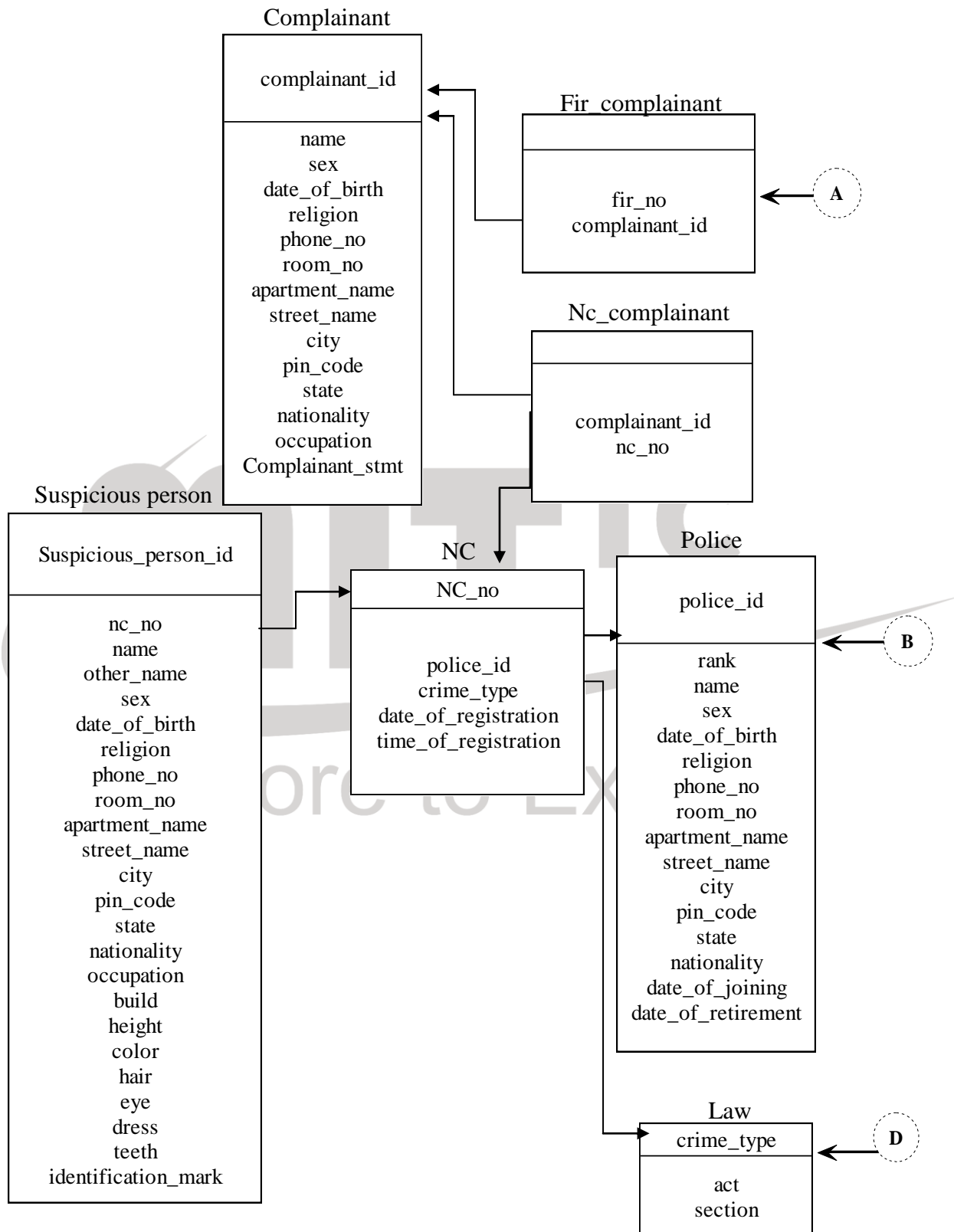
Description of database is called schema. Description of database includes specifying the primary key, foreign key etc on data to be stored on database. It comprises of tables, views, indices, etc. The word schema is defined as the description of the data which is represented within a database. The format of the description or schema varies but includes a layout, in the form of a table, for a relational database or a diagram which represents an entity-relationship. The primary key is underlined and the foreign key is indicated with an arrow between the primary key and the foreign key table.

**Ex-1:** This is the schema for Medical store management system.

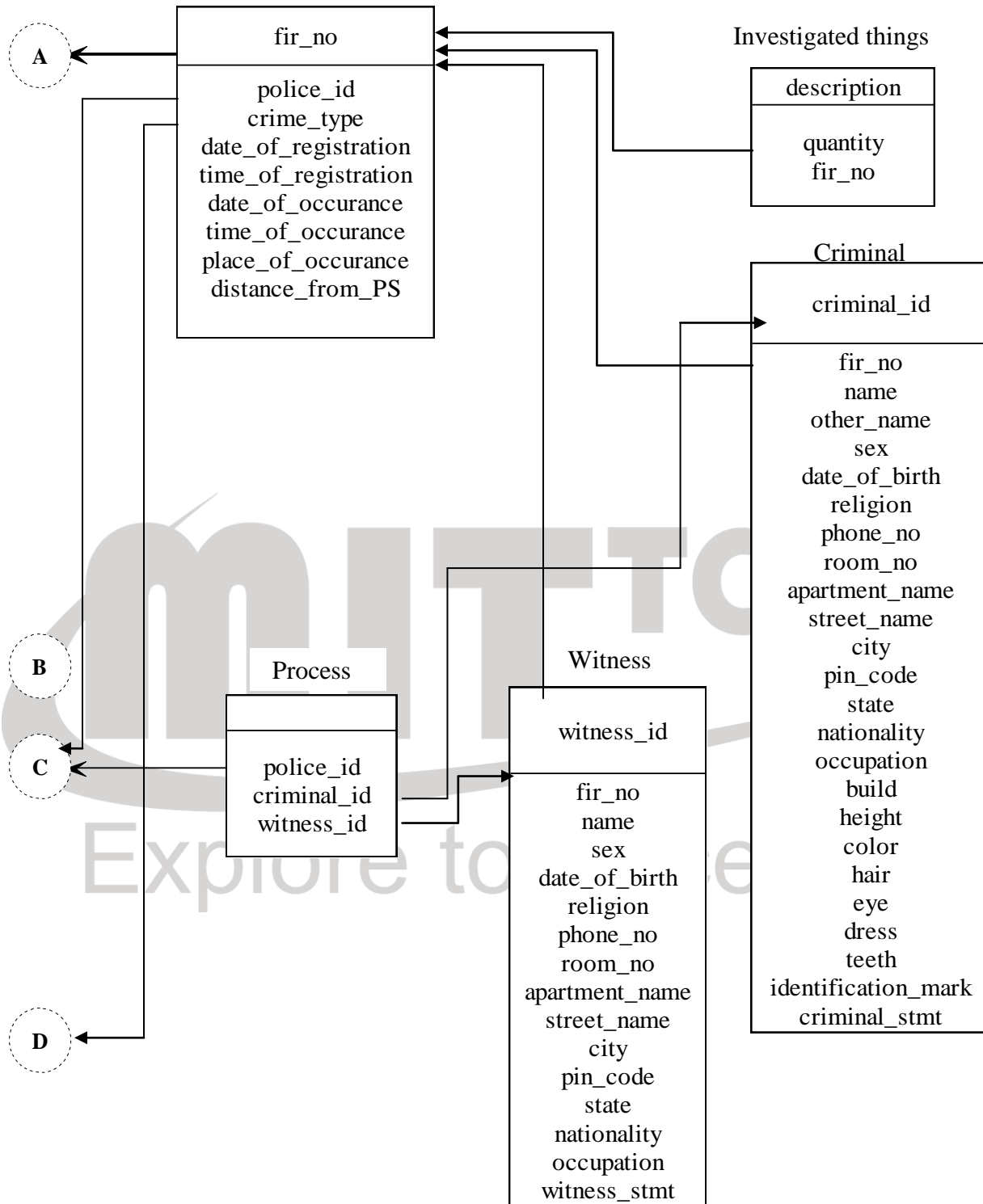




**Ex-2:** This is the schema for Police Support system.



FIR



## 7.4 Database Table List

**Ex-1:**

**Table Name: Customer**

Column Name	Data Type	Constraint
Custid	Varchar(5)	Primary Key
Custname	Varchar(20)	Not Null
Custaddress	Varchar(50)	Not Null
[Phone no]	Numeric(9)	Not Null
Emailid	Varchar(20)	Not Null
Gender	Varchar(5)	Not Null
Productid	Varchar(10)	Foreign key
Empid	Varchar(5)	Foreign key

**Table Name: Employee**

Column Name	Data Type	Constraint
Empid	Varchar(5)	Primary Key
Empname	Varchar(20)	Not Null
Address	Varchar(50)	Not Null
[Phone no]	Numeric(9)	Not Null
Emailid	Varchar(20)	Not Null
Gender	Varchar(5)	Not Null
[Date of joining]	Varchar(10)	Not Null
Salary	Money	Not Null

**Table Name: Supplier**

Column Name	Data Type	Constraint
Supplierid	Varchar(5)	Primary Key
Sname	Varchar(20)	Not Null
ResAdd	Varchar(50)	Not Null
OffAdd	Varchar(50)	Not Null
[Mobile no]	Numeric(9)	Not Null
[Off Phoneno]	Numeric(9)	Not Null
Emailid	Varchar(20)	Not Null
Gender	Char(1)	Not Null
[Date of contract]	Datetime(8)	Not Null
[Contract limit]	Varchar(10)	Not Null

**Table Name: Product**

Column Name	Data Type	Constraint
Productid	Varchar( 10)	Primary Key
Prodname	Varchar(50)	Not Null
Prodtype	Varchar(50)	Not Null
Quantity	Numeric(5)	Not Null
Price	Money	Not Null
Mfgdate	Datetime(8)	Not Null
Expdate	Datetime(8)	Not Null
Supplierid	Varchar( 5)	Foreign Key

**Table Name: Bill**

Column Name	Data Type	Constraint
Billno	Integer	Primary Key
Custid	Varchar(5)	Foreign key
Productid	Varchar(10)	Foreign key
Date	Datetime(8)	Not Null
Total_Amount	Money	Not Null

**Table Name: Stock**

Column name	Data Type	Constraint
Sid	Varchar(5)	Primary key
Productid	Varchar (10)	Foreign key
Quantity	Integer	Not Null
Available	Integer	Not Null
Sold	Integer	Not Null

**Table Name: Order**

Column Name	Data Type	Constraint
Orderno	Integer	Primary Key
Productname	Varchar(50)	Not Null
OrderDate	Datetime(8)	Not Null
DeliveryDate	Datetime(8)	Not Null
OrderStatus	Varchar(50)	Not Null
Quantity	Integer	Not Null
Total_Amount	Money	Not Null
Supplierid	Varchar(5)	Foreign key

**Table Name: Supplier-Payment**

Column Name	Data Type	Constraint
Paymentno	Int(4)	Not Null
Paymentdate	Datetime(8)	Not Null
Amount	Money(8)	Not Null
Totalamount	Money(8)	Not Null
Paymenttype	Varchar(10)	Not Null
Supplierid	Varchar(5)	Foreign Key

**Ex-2:****Table Name: Login**

Sr no.	Column Name	Data Type	Allow null	Key
1	username	nvarchar	No	
2	pswd	nvarchar	No	

**Table Name: Police**

Sr no.	Column Name	Data Type	Allow null	Key
1	Police_id	varchar(10)	No	Primary key
2	Rank	Varchar(20)	No	
3	Date_of_joining	Smalldatetime	No	
4	Date_of_retirement	Smalldatetime	No	
5	name	varchar(20)	No	
6	sex	varchar(10)	No	
7	date_of_birth	smalldatetime	No	
8	religion	varchar(20)	No	
9	phone_no	numeric(18, 0)	No	
10	room_no	varchar(10)	No	
11	apartment_name	varchar(20)	No	
12	street_name	varchar(20)	No	
13	city	varchar(20)	No	
14	pin_code	numeric(18, 0)	No	
15	state	varchar(20)	No	
16	nationality	varchar(20)	No	

**Table Name: Complainant**

Sr no.	Column Name	Data Type	Allow null	Key
1	complainant_id	varchar(10)	No	Primary key
2	name	varchar(20)	No	
3	sex	varchar(10)	No	
4	date_of_birth	smalldatetime	No	
5	religion	varchar(20)	No	
6	phone_no	numeric(18, 0)	No	
7	occupation	varchar(50)	Yes	
8	room_no	varchar(10)	No	
9	apartment_name	varchar(20)	No	
10	street_name	varchar(20)	No	
11	city	varchar(20)	No	
12	pin_code	numeric(18, 0)	No	
13	state	varchar(20)	No	
14	nationality	varchar(20)	No	
15	complainant_stmt	varchar(MAX)	No	

**Table Name: Criminal**

Sr No.	Column Name	Data Type	Allow Null	Key
1	criminal_id	varchar(10)	No	Primary key
2	fir_no	varchar(10)	No	Foreign key
3	Name	varchar(20)	Yes	
4	other_name	varchar(20)	Yes	
5	Sex	varchar(10)	Yes	
6	date_of_birth	smalldatetime	Yes	
7	Religion	varchar(20)	Yes	
8	phone_no	numeric(18, 0)	Yes	
9	Occupation	varchar(50)	Yes	
10	room_no	varchar(10)	Yes	
11	apartment_name	varchar(20)	Yes	
12	street_name	varchar(20)	Yes	
13	City	varchar(20)	Yes	
14	pin_code	numeric(18, 0)	Yes	

15	State	varchar(20)	Yes	
16	Nationality	varchar(20)	Yes	
17	Build	varchar(20)	Yes	
18	Height	numeric(18, 0)	Yes	
19	Color	varchar(10)	Yes	
20	Hair	varchar(20)	Yes	
21	Eye	varchar(20)	Yes	
22	Dress	varchar(20)	Yes	
23	Teeth	varchar(20)	Yes	
24	identification_mark	varchar(50)	Yes	
25	criminal_stmt	varchar(MAX)	Yes	

**Table Name: Suspicious\_Person**

Sr No.	Column Name	Data Type	Allow Null	Key
1	Suspicious_person_id	varchar(10)	No	Primary key
2	nc_no	varchar(10)	No	Foreign key
3	Name	varchar(20)	Yes	
4	other_name	varchar(20)	Yes	
5	Sex	varchar(10)	Yes	
6	date_of_birth	smalldatetime	Yes	
7	Religion	varchar(20)	Yes	
8	phone_no	numeric(18, 0)	Yes	
9	Occupation	varchar(50)	Yes	
10	room_no	varchar(10)	Yes	
11	apartment_name	varchar(20)	Yes	
12	street_name	varchar(20)	Yes	
13	City	varchar(20)	Yes	
14	pin_code	numeric(18, 0)	Yes	
15	State	varchar(20)	Yes	
16	Nationality	varchar(20)	Yes	
17	Build	varchar(20)	Yes	
18	Height	numeric(18, 0)	Yes	
19	Color	varchar(10)	Yes	
20	Hair	varchar(20)	Yes	

21	Eye	varchar(20)	Yes	
22	Dress	varchar(20)	Yes	
23	Teeth	varchar(20)	Yes	
24	identification_mark	varchar(50)	Yes	
25	criminal_stmt	varchar(MAX)	Yes	

**Table Name: Witness**

Sr no.	Column Name	Data Type	Allow null	Key
1	witness_id	varchar(10)	No	Primary key
2	name	varchar(20)	No	
3	sex	varchar(10)	No	
4	date_of_birth	smalldatetime	No	
5	religion	varchar(20)	No	
6	phone_no	numeric(18, 0)	No	
7	occupation	varchar(50)	Yes	
8	room_no	varchar(10)	No	
9	apartment_name	varchar(20)	No	
10	street_name	varchar(20)	No	
11	city	varchar(20)	No	
12	pin_code	numeric(18, 0)	No	
13	state	varchar(20)	No	
14	nationality	varchar(20)	No	
15	witness_stmt	varchar(MAX)	No	

**Table Name: FIR**

Sr No.	Column Name	Data Type	Allow Null	Key
1	fir_no	varchar(10)	No	Primary Key
2	police_id	varchar(10)	No	Foreign Key
3	crime_type	varchar(50)	No	Foreign Key
4	date_of_registration	smalldatetime	No	
5	time_of_registration	smalldatetime	No	
6	date_of_occurance	smalldatetime	Yes	
7	time_of_occurance	smalldatetime	Yes	
8	place_of_occurance	varchar(20)	Yes	



9	distance_from_ps	Real	Yes	
---	------------------	------	-----	--

**Table Name: Fir\_complainant**

Sr No.	Column Name	Data Type	Allow Null	Key
1	fir_no	varchar(10)	No	Foreign Key
2	complainant_id	varchar(10)	No	Foreign Key

**Table Name: NC**

Sr No.	Column Name	Data Type	Allow Null	Key
1	nc_no	varchar(10)	No	Primary Key
2	police_id	varchar(10)	No	Foreign Key
3	crime_type	varchar(50)	No	Foreign Key
4	date_of_registration	smalldatetime	No	
5	time_of_registration	smalldatetime	No	

**Table Name: NC\_complainant**

Sr No.	Column Name	Data Type	Allow Null	Key
1	nc_no	varchar(10)	No	Foreign Key
2	complainant_id	varchar(10)	No	Foreign Key

**Table Name: Investigated\_things**

Sr No.	Column Name	Data Type	Allow Null	Key
1	name	varchar(50)	No	
2	fir_no	varchar(10)	No	Foreign key
3	quantity	int	No	

**Table Name: Law**

Sr No.	Column Name	Data Type	Allow Null	Key
1	Crime_type	varchar(50)	No	Primary key
2	Act	varchar(20)	No	
3	Section	Varchar(10)	No	

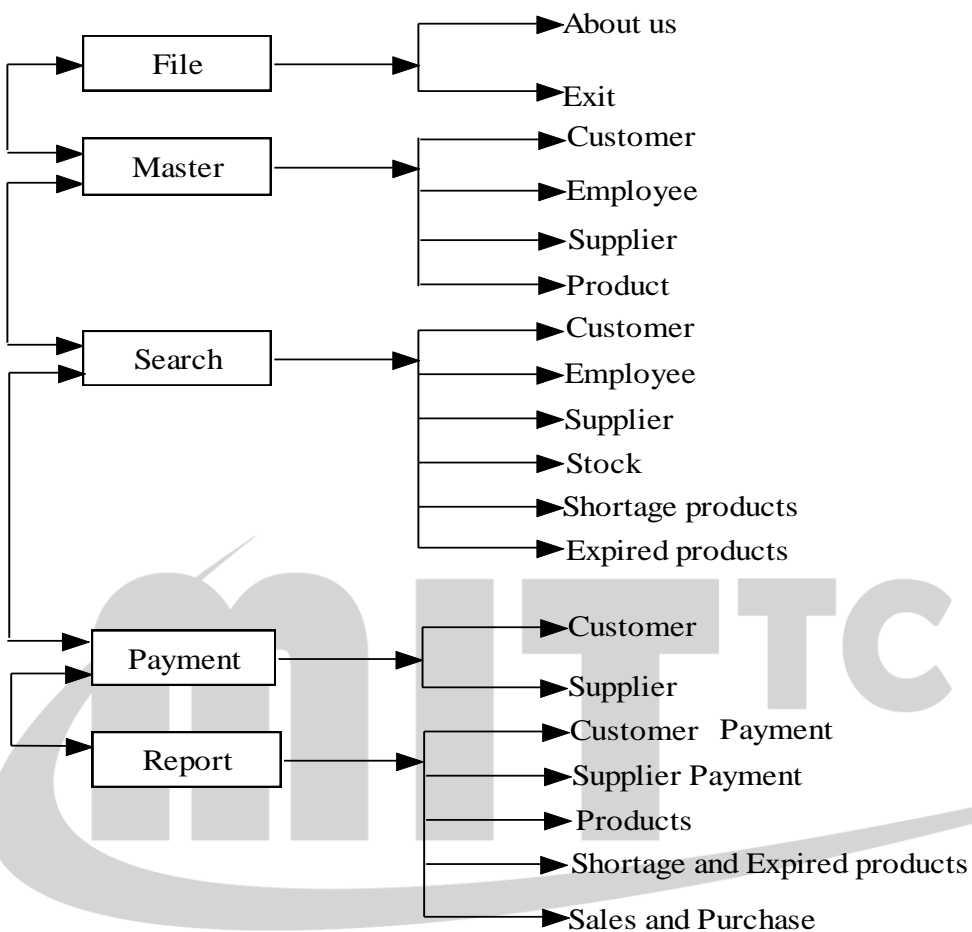
**Table Name: Lock-up**

Sr No.	Column Name	Data Type	Allow Null	Key
1	Criminal_id	varchar(10)	No	Foreign key
2	fir_no	varchar(10)	No	Foreign key
3	Police_id	Varchar(10)	No	Foreign key

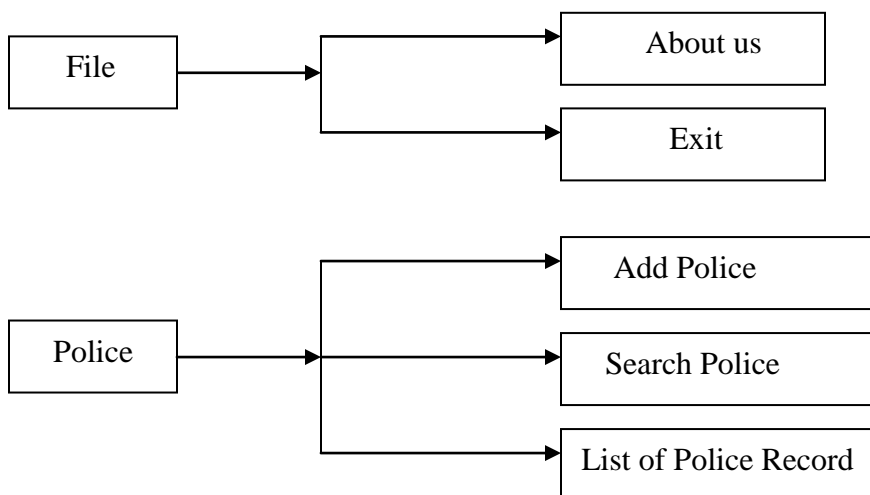
**7.5 Flow Chart**Refer Page no. **65****7.6 Structured Chart**Refer Page no. **69**

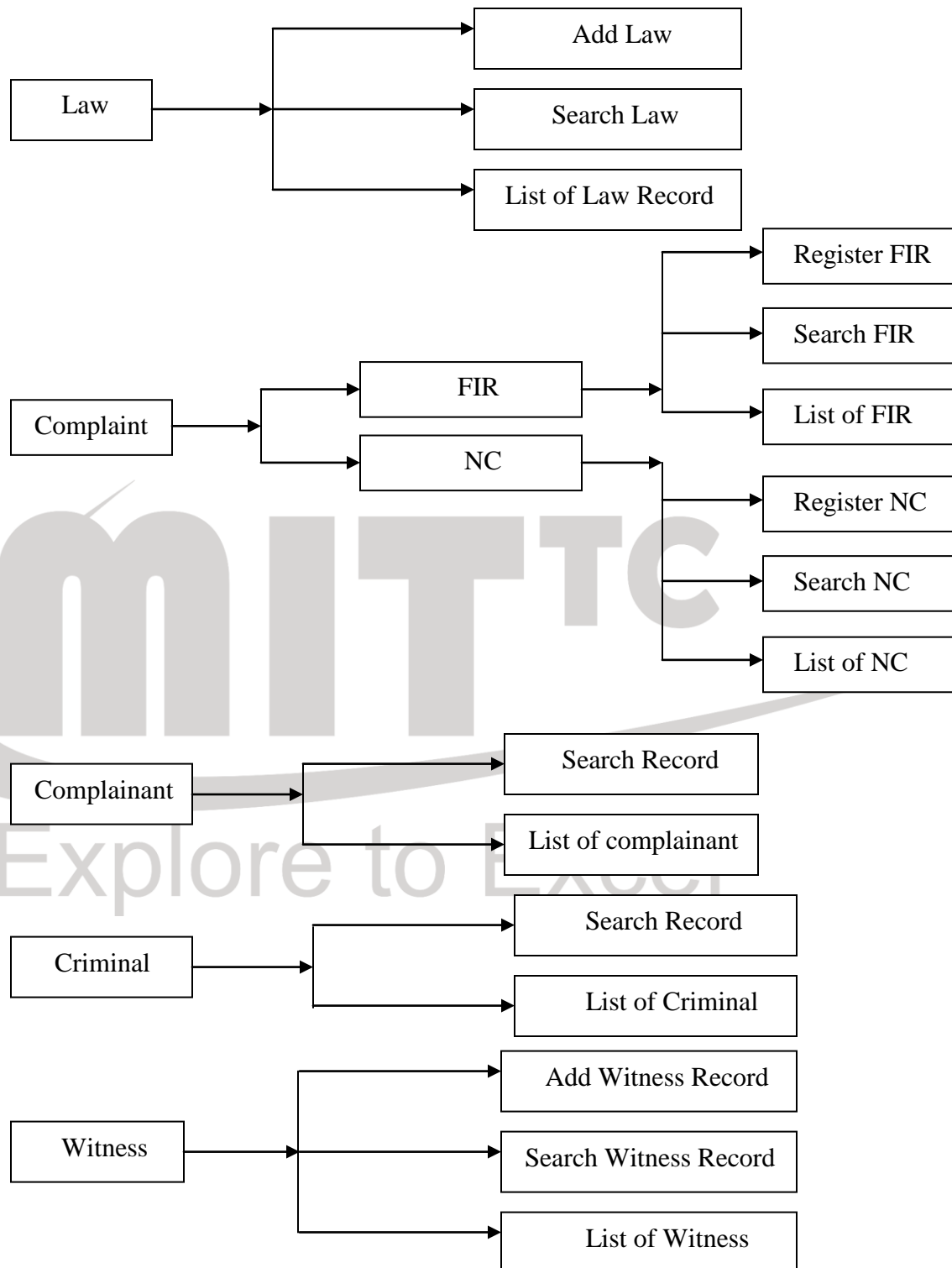
## 7.7 Menu Tree

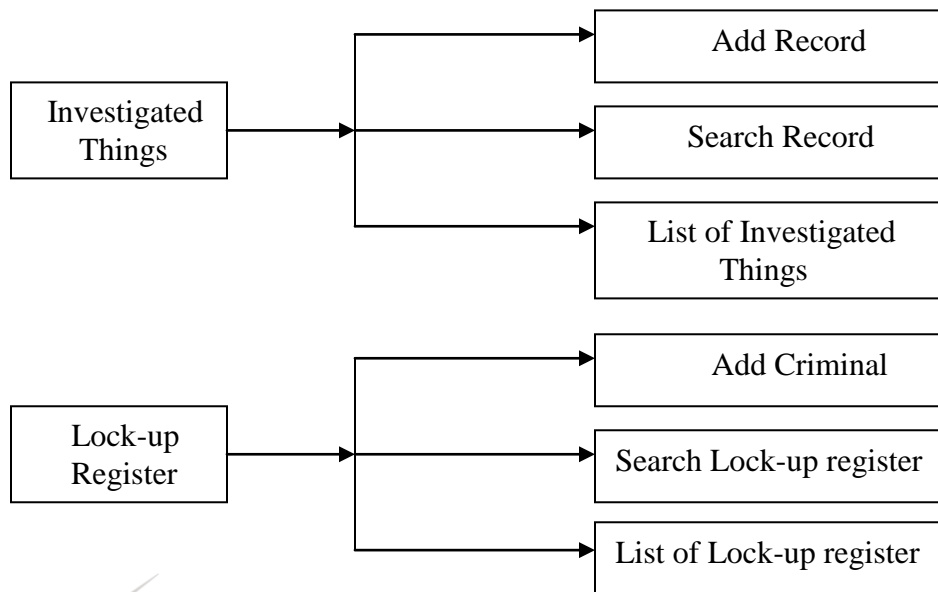
Ex-1:



Ex-2:





**Explanation:**

A Menu Tree is a hierarchical data representation .It is drawn where your software has a menu based interface. It shows the menus that you see in your MDI form etc. A menu tree provides a complete view of the menus included into your software.

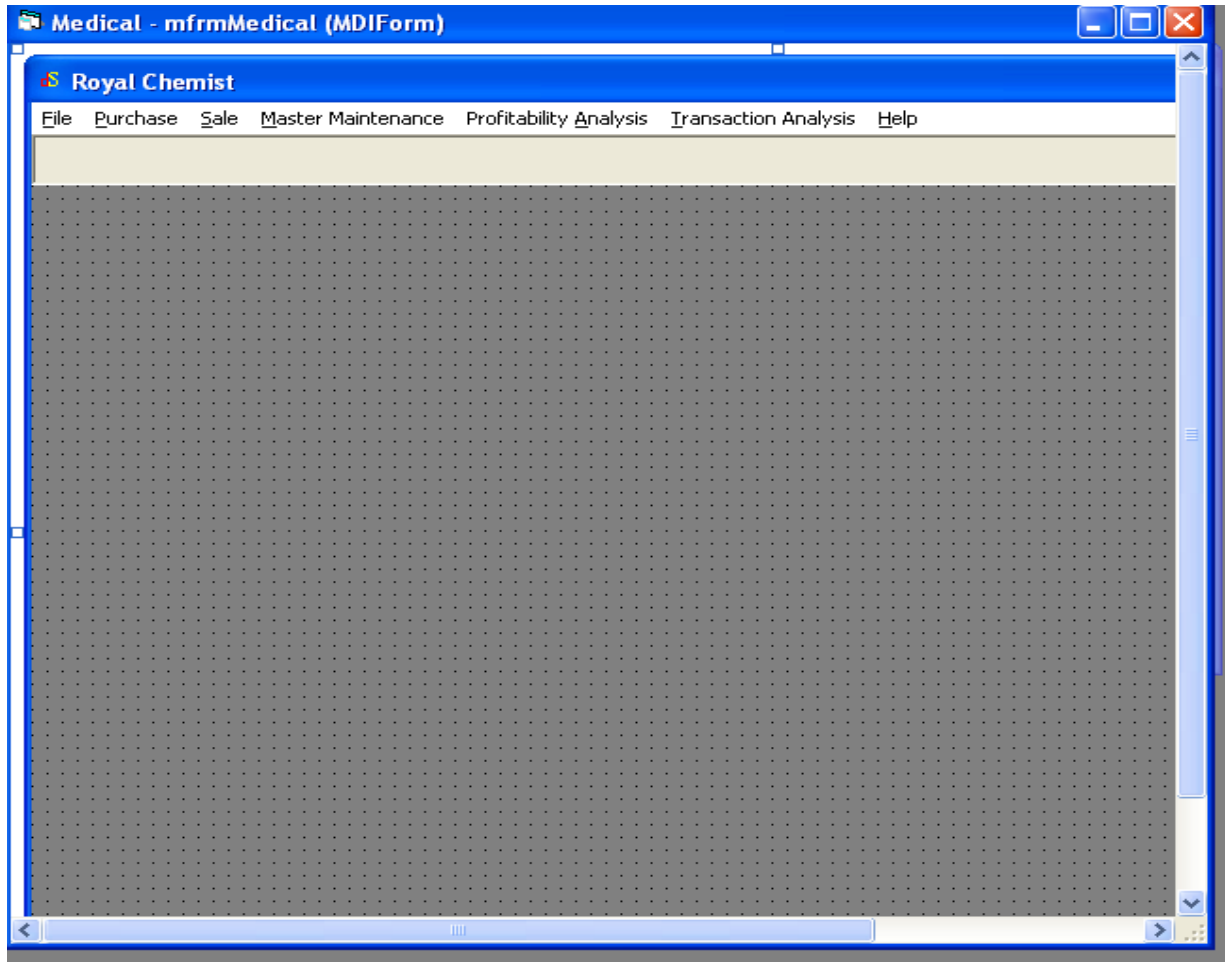
Creating a menu tree is very simple. First show the Main menu then link it to the submenus as shown above. A submenu may further have a submenu. For eg: the above example shows File Menu which has About us and Exit submenus.

## 7.8 Input and Output Screen design

Ex-1:

### 1) **MDI form:**

This is our MDI form. This is main form which is always visible to the user.



**Fig: MDI Form**

Ex-2:

### 1) Login Form

This is the initial form displayed is the Login form. This can be used to login to the system.



The screenshot shows a login window titled "Login". The background is dark blue with the text "महाराष्ट्र पोलीस" (Maharashtra Police) in white Devanagari script. In the center is a white star logo containing a hand symbol. Below the star is a white banner with the text "सद्रक्षणाय खलनिवहणाय" (For the sake of protection and removal of evil). The login form itself is white and contains two input fields: "Username :-" and "Password :-". Below these fields are two buttons: "Ok" and "Cancel". To the left of the form is a 3D illustration of two people in blue uniforms.

**Fig: Login Screen**

Explore to Excel

## **7.9 Methodology used for testing**

Ex-1:

The testing methodology implemented for testing of the project is the Black Box Testing.

In the black box testing, the internal logic of the system under testing is not considered and the test cases are decided from the specification or the requirements. It is often called functional testing. It aims to test the functionality according to the requirements. Equivalence class partitioning, boundary value analysis, and because effecting graphing are examples of methods for selecting test cases for black box testing. State-based testing is another approach in which the system is modeled as a state machine and then this model is used to select test cases using some transition or path based coverage criteria. State-based testing can also be viewed as grey-box testing in that it often requires more information than just the requirements.

Ex-2:

The testing methodology implemented for testing of the project is the Black Box Testing. Refer the above paragraph for explanation.

## **7.10 Test Cases**

The forms were tested for their functionality and error messages are displayed wherever the input does not meet the required requirements.



## **Limitations and Proposed solution**

Ex-1:

After the entire development of the project, there are certain limitations involved. These limitations can be covered in the future, by enhancing them with the methods specified.

- The limitation of the system is that it is centralized.  
The system developed is applicable for a standalone system only. This can be further enhanced to integrate the data from various branches.
- The system can also be further enhanced to be a web-based system allowing the customers access to various product details, online purchasing and billing etc.

Ex-2:

After the entire development of the project, there are certain limitations involved. These limitations can be covered in the future, by enhancing them with the methods specified.

- The data to be stored may require data entry to be done. All the data entry requires a manual data entry process. This can be controlled by allowing the data to be scanned and stored in a proper format.
- This project is created only for FIR and NC module. It can be further enhanced to include other departments of police system such as police management.

Explore to Excel

## Conclusion

Ex-1:

Medical Store Management System was made such that the problems faced by the store with its meeting the requirements would be over. The burden of the manually done activities was made easy with the development of the system. The user can view the data and performance analysis can be done.

The main aim of the project was to provide required amount of reporting tools with a back end that can handle ample amount of data.

The developed system:

1. Maintains a record of employees, suppliers, customers, products, their stock details, supplier order, supplier payment etc.
2. Tracks data about reports & orders sent & received.
3. Generates bills, receipts, reports.

Thus the “**MEDICAL STORE MANAGEMENT SYSTEM**” is an effective and efficient system fulfilling the needs required by any store.

Ex-2:

Police Support System was made such that the problems faced by the police with its meeting the requirements would be over. The Police officers can view the data and performance analysis can be done.

The developed system:

1. Maintains a record of FIR, NC, police men, complainant, criminal, suspicious person, witness, lock up register etc.
2. Tracks data about reports
3. Analyzes status of case, individual officer performance
4. Generates reports.

Thus the “**POLICE SUPPORT SYSTEM**” is an effective and efficient system fulfilling the needs of the police system.

**Diagrams required in Documentation**

The important diagrams that must be included in your project documentation are:

- 1) **Entity relationship diagram**
- 2) **Data flow diagram**
- 3) **Flow chart**
- 4) **Structured chart**



### **Entity Relationship Diagram:**

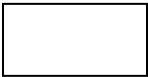

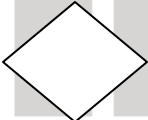


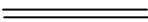
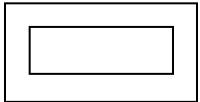

An entity is a “thing” or “object” in the real world that is distinguishable from all set of objects. An entity set is a set of entities of the same type that share same properties, or attributes. An entity is represented by a set of attributes.

A relationship is an association among several entities .A relationship set is a set of relationships of the same type .The association between entity sets is referred to as participation.

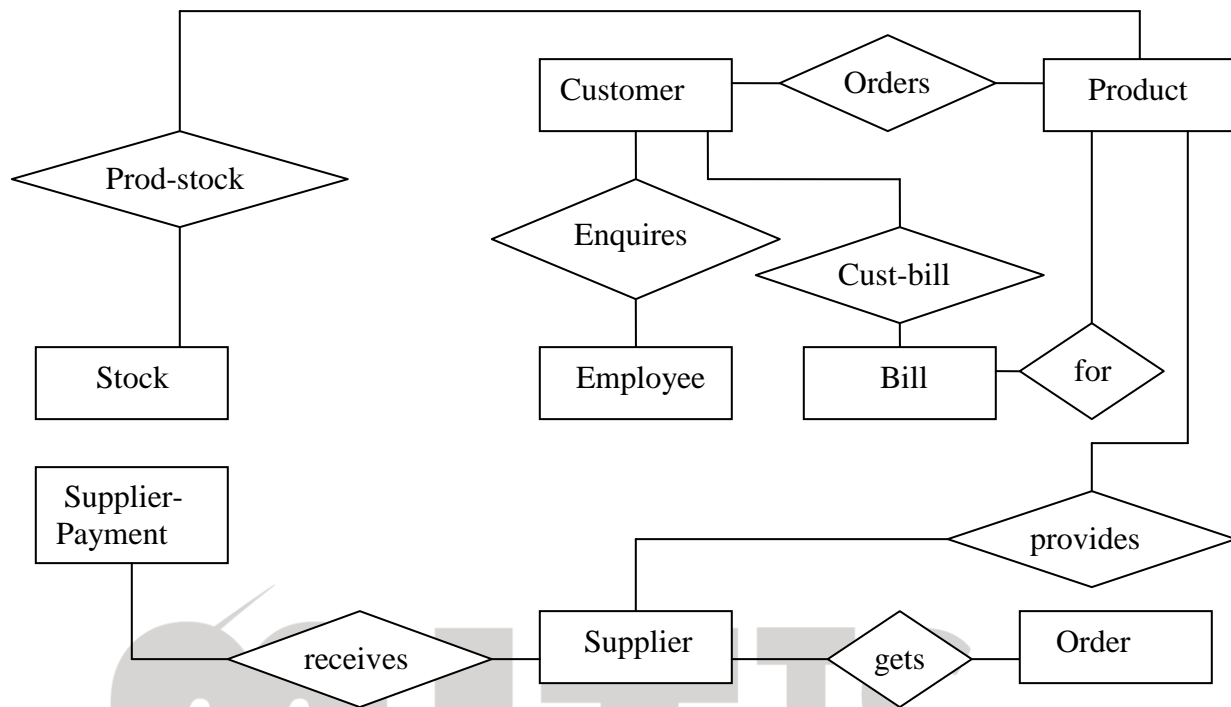
E-R diagram is a relationship between two entity sets. E-R diagram can express the overall structure of a database graphically. E-R diagrams are simple and clear.

### **Symbols used:**

E-R diagram consists of the following major components:

Sr no	Symbol	Name	Description
1		Rectangles	Represent entity sets
2		Ellipses	Represent attributes
3		Diamonds	Represent relationship sets
4		Lines	Link attributes to entity sets and entity sets to relationship sets
5		Double ellipses	Represent multivalued attributes
6		Double lines	Indicate total participation of an entity in a relationship set
7		Double rectangles	Represent weak entity sets
8		Dashed ellipses	Represent derived attributes

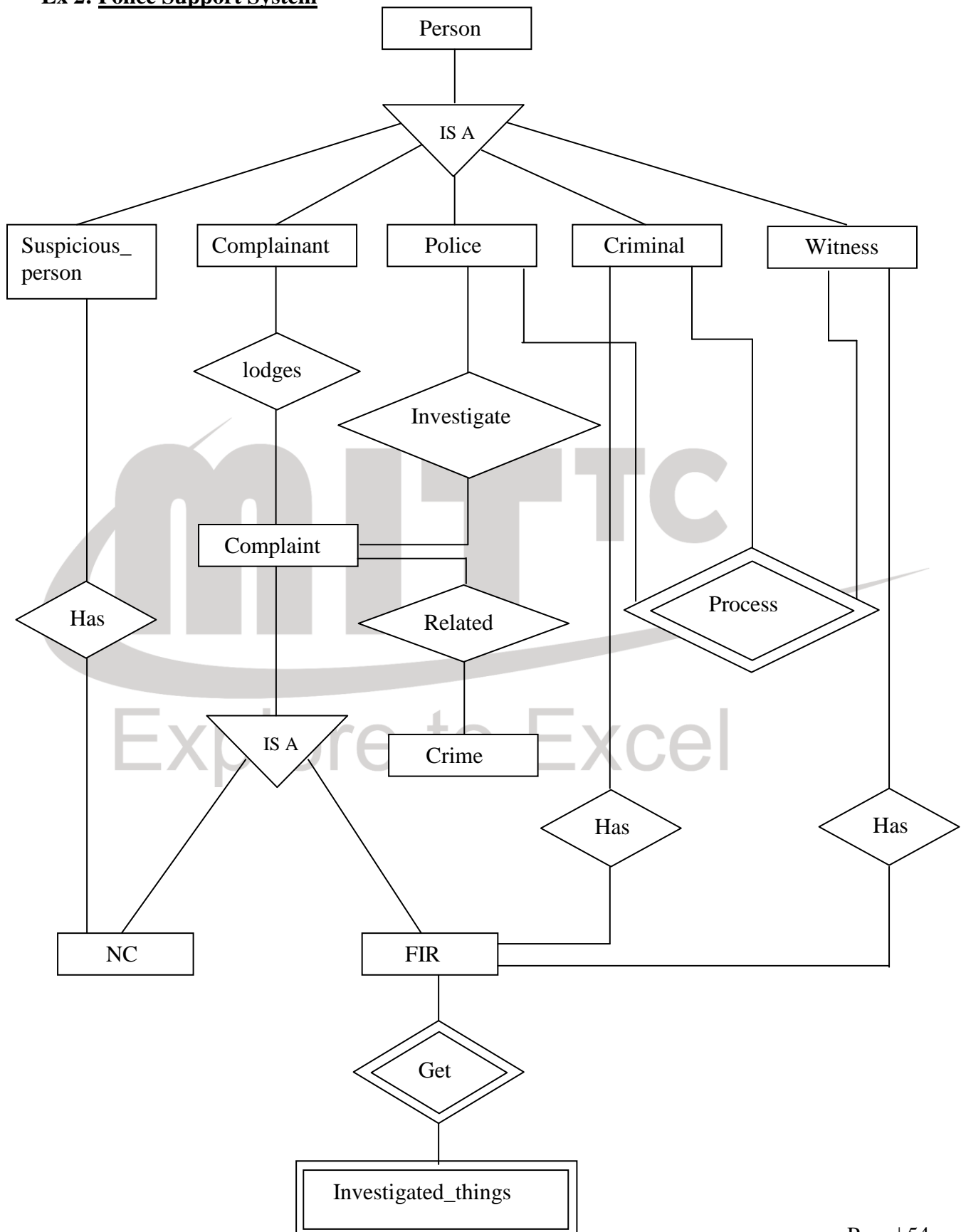
### **Ex-1: Medical store Management System**



#### Explanation:

- Customers are identified by their customer-id values. Customers are associated with the products they have booked.
- Employees of the system are identified by their employee-id values. The system stores the name, addresses, salary of each employee. It also keeps track of the employee's date of joining and, thus, length of employee.
- The system also keeps the information about the suppliers. Each supplier is identified by its supplier-id. It also stores the name, address and other details of the supplier.
- The system also keeps the information of all of the products available and the corresponding stock available at present.

Here, the flow begins with the Customer who makes product enquiry to the employee which is shown by Enquires relationship. Now the system checks if the product is available and if the product has an appropriate stock. The Product table and Stock table are associated by the Productid. If the product is available then the customer will order the product and the Customer data is stored in the Customer table. Next the customer will make payment to the employee which is stored into the Bill table. Bill table is associated with Product table by the Productid of the product being ordered. The database also stores the Supplier information who supplies the Products to the store. When the system shows that a particular product is below stock level, the store person will place an order for that product which is stored into the Order table. After completion of the order, the supplier is paid and the payment is stored into the Supplier-Payment table.

**Ex 2: Police Support System**

**Explanation:**

This diagram makes use of Generalization which is a containment relationship that exists between a higher level entity set and one or more lower-level entity sets. In this example, Person is the higher level entity set and Suspicious-person, Complainant, Police, Criminal, Witness are lower level entity sets. Higher and lower entity sets may also be designated by the terms superclass and subclass respectively. The Person entity set is the superclass of the mentioned subclasses. Also, Complaint is the superclass of NC and FIR subclasses.

- Person entity set has the common attributes like name, address, phone no, gender, Date of birth etc.
- Suspicious-person entity set stores the Suspicious-person id and the occupation
- The system also keeps the information about the policemen. Each policeman is identified by the Police-id. It also stores the name, address and other details of the policeman.
- The system also keeps the information of all of the criminals, complainants and the witnesses.
- The system keeps track of the complaints registered.
- The system also stores the Crime information like the Crime type, under which Act it comes and the respective Section.
- The system also keeps the information of all of the investigated things.

Here, Complainant lodges a complaint whether FIR or NC. Then the complaint is filed and this is stored into FIR or NC table. Simultaneously the Complainant records, the Criminal record, the Witness record if it is FIR are stored into the database. With respect to the FIR, the Police will make investigation and the investigated things are recorded into the database.


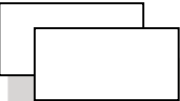
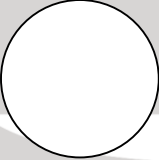
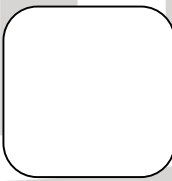


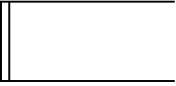

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### **Data Flow Diagram:**

A data flow diagram (DFD) is a graphical system model that shows all of the main requirements for an information system in one diagram: inputs and outputs, processes, and data storage. A DFD describes what data flows rather than how it is processed. Everyone working on a development project can see all aspects of the system working together at once with DFD. That is one reason for its popularity. The DFD is also easy to read because it is graphical model.

The DFD is mainly used during problem analysis. End Users, management, and all information systems workers typically can read and interpret the DFD with minimal training.

### **Symbols used:**

Sr no	Symbol	Name	Description
1	 Or 	External entity	An external entity is source or destination of a data flow which is outside the area of study. For e.g. , Customer, Student etc.
2	 Or 	Process	A process shows a transformation or manipulation of data flows within the system.
3	 Or 	Dataflow	A data flow shows the flow of information from its source to its destination. A data flow is represented by a line, with arrowheads showing the direction of flow.
4	 Or 	Datafile or Datastore	A data store is a holding place for information within the system. Data stores may be long-term files such as sales ledgers, or may be short-term accumulations: for example batches of documents that are waiting to be processed.



### **Leveling of DFD's:**

If one DFD contains all the details then it will have too many processes and data flow lines. Thus, it will be complicated and it will be difficult to understand all the data flows and their processing. To overcome this first an overview of problem is represented using context diagram and the process is expanded into a connected set of processes.

### **Leveling rules:**

- 1) If process P in a DFD is leveled (expanded) into 'n' process then each process is numbered as P.1, P.2,... P.n respectively.
- 2) New files which are not referred to in a process may appear in equivalent DFD of that process. This implies that this file is local to the process and will not appear in the context diagram.
- 3) The number of processes at each level is usually kept small (not exceeding 7). This is mainly to aid understanding of each level.

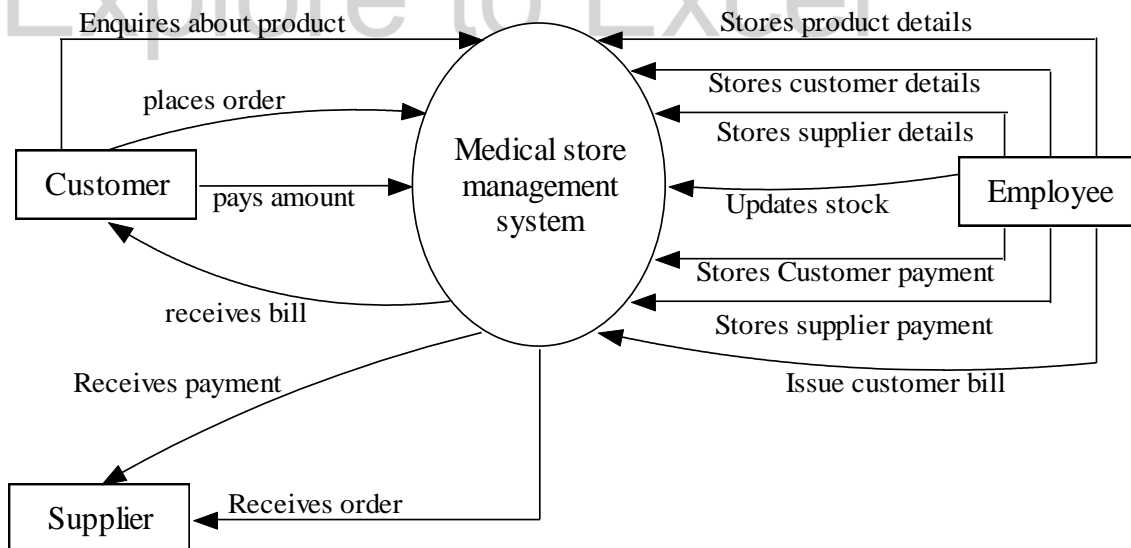
### **Context level diagram:**

The context diagram is useful for showing boundaries. The system scope is defined by what is represented within single process and what is represented as an external agent. External agents that supply or receive data from the system are outside of the system scope. Everything else is inside the system scope.

Data stores are not usually shown on the context diagram because all of the system's data stores are considered to be within the system scope. The context diagram is simply the highest-level DFD. It is also called as Level 0 DFD.

The context diagram provides a good overview of the scope of the system, showing the system in "context" but it does not show any detail about the processing that takes place inside the system.

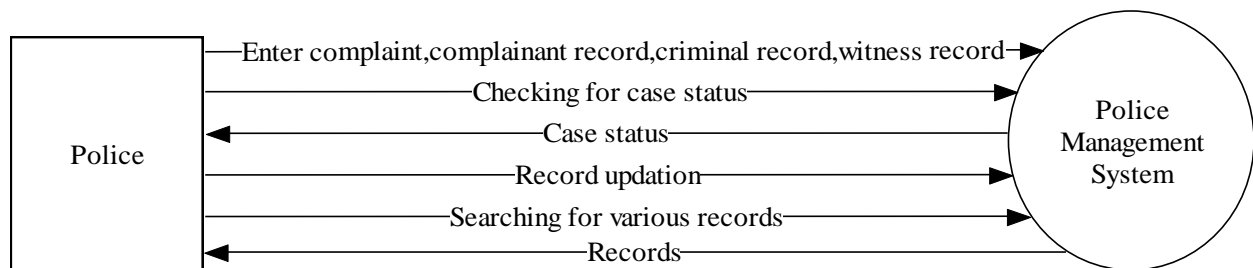
### **Ex-1: Medical store Management System**



Explanation:

This is an overview of the medical store management system. The customer makes product enquiry, places order and receives payment receipt. The employee stores the customers, suppliers, products, their stock, updates the stock, generates reports, stores supplier payment and also issues customer bill.

### **Ex-2: Police Support System**



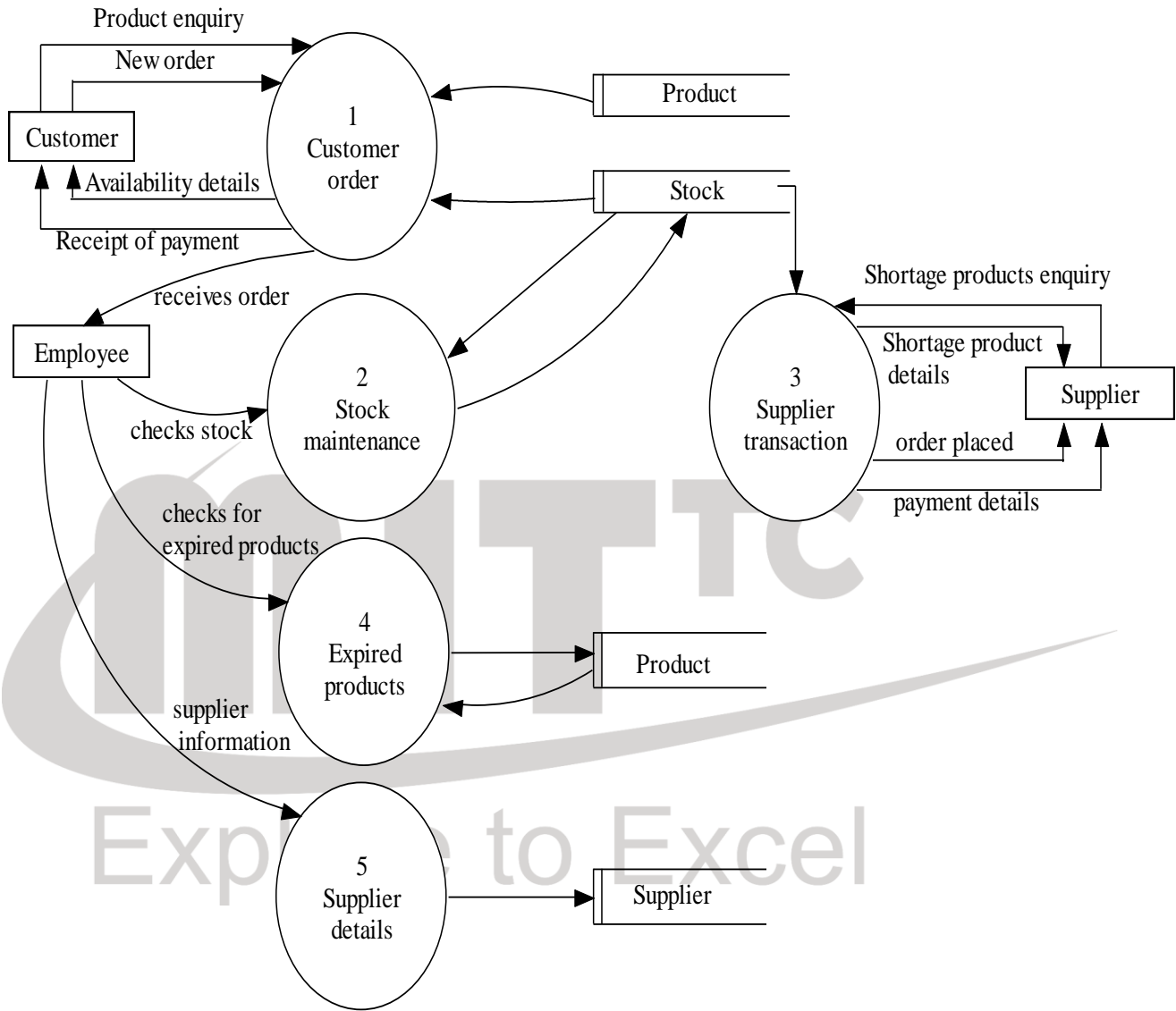
#### **Explanation:**

This is an overview of the Police management system. The Police registers the complaints, enters the complainant record, criminal and witness record. He also checks for the status of a particular case and updates the records. The system also searches for various records and returns the record information to the police.

#### **Level 1 DFD:**

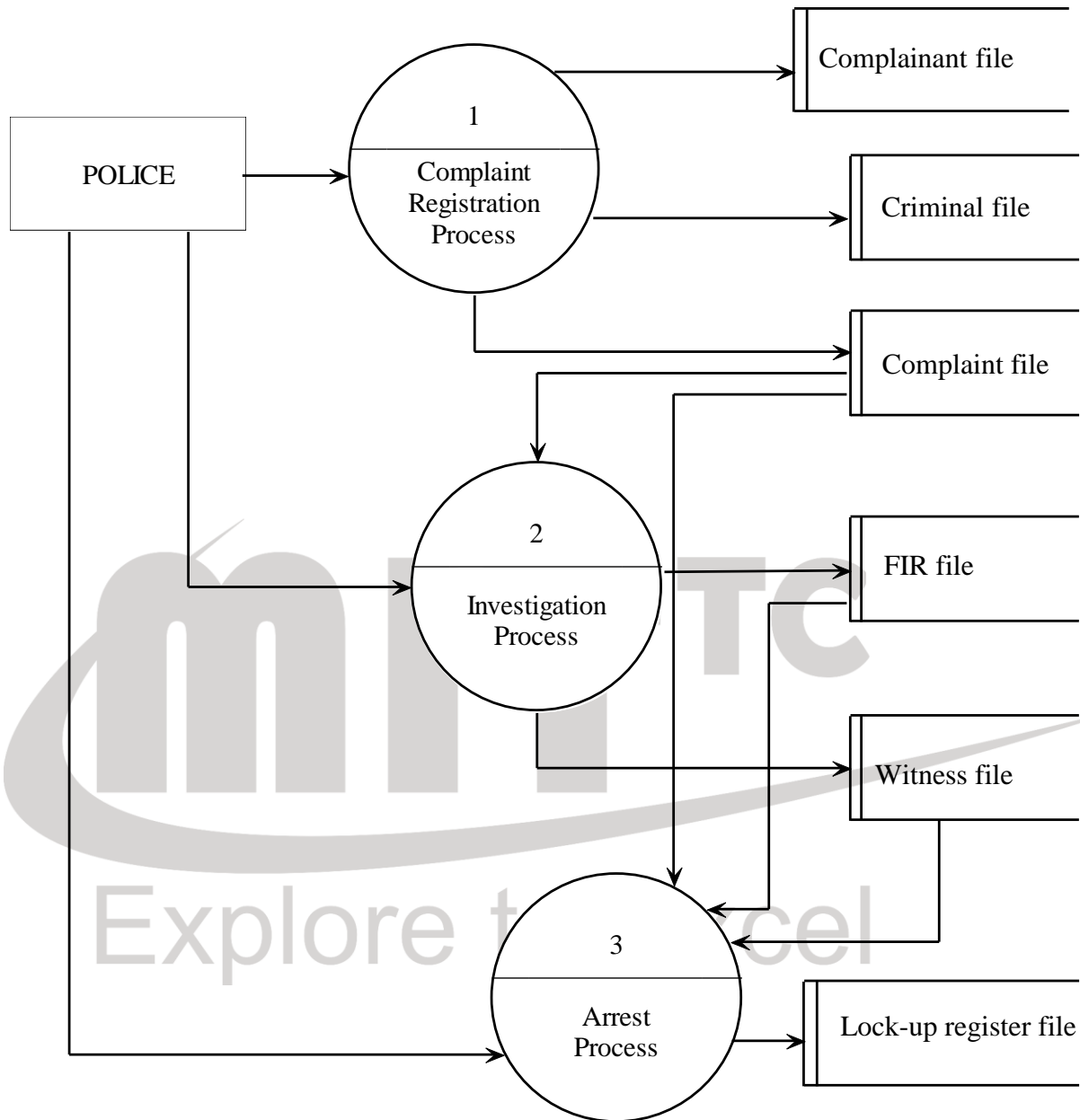
Context diagrams are diagrams where the whole system is represented as a single process. A level 1 DFD notates each of the main sub-processes that together form the complete system. We can think of a level 1 DFD as an 'exploded view' of the context diagram.

You may also need some downward leveling. That is, the processes identified in the preliminary DFD may not turn out to be primitive processes and may require downward partitioning into lower-level DFDs.

**Ex-1: Medical store Management System**

**Explanation:**

Here, Customer order process shows that the customer makes product enquiry and places order. The Stock maintenance process shows that the employee checks for the product availability and checks stock. If stock is available then the customer will be given the product and the stock will be updated. Supplier transaction process shows that the supplier makes shortage products enquiry, receives order for those products and gets payment details. Expired products process shows that the expired products enquiry is made and the system returns a list of expired products. Supplier details process shows that the employee adds, updates and retrieves supplier details as and when required.

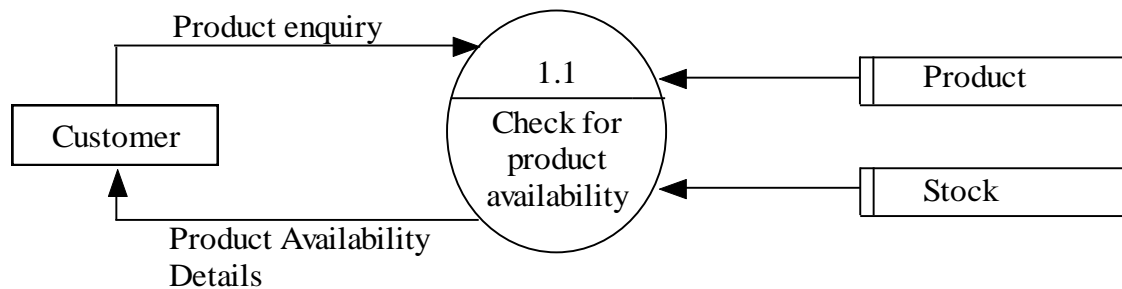
**Ex-2: Police Support System**


**Explanation:**

This figure shows the main processes taking place, which are registering new complaint, filling in complainant details and criminal details. Complaint can be of two types either Cognizable i.e. First Investigation Report (FIR) or Non-Cognizable i.e. NC. The Complaint Registration process shows that the Police registers the complaints into the Complaint record, stores the Complainant information and the corresponding Criminal record. The Investigation process retrieves the complaint record; the police register FIR for that complaint against the criminal and will also store the witness information. The Arrest process shows that the police retrieve the complaint, FIR and witness information from the system and after arresting the criminal, record of the criminals in the lockup is stored in the Lock-up register database.

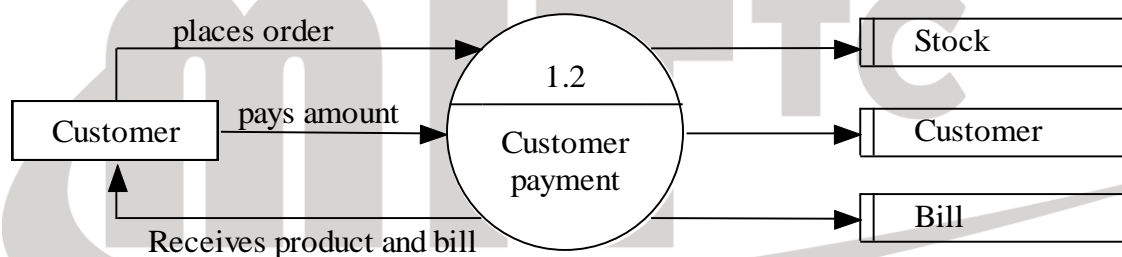
## 2<sup>nd</sup> level DFD:

### Ex-1: Medical store Management System



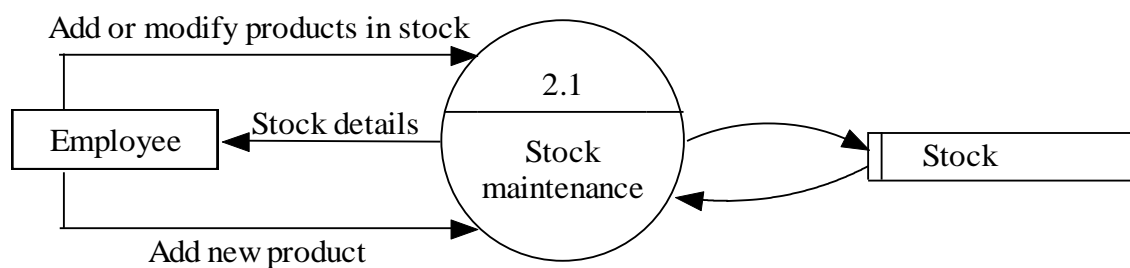
Explanation:

Here, the customer makes product enquiry. The system checks if the product is available with the required stock and passes the information back to the customer.



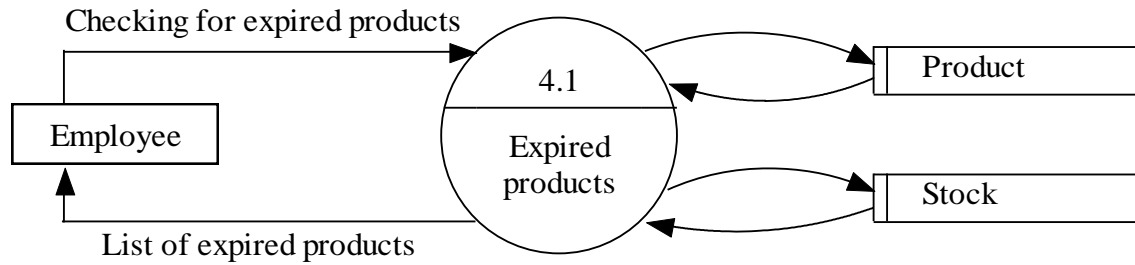
Explanation:

Here, the customer will place order and pay the total amount. The stock will be updated. The customer information is stored and customer payment will be stored in Bill database. The customer will receive the product and the payment receipt.



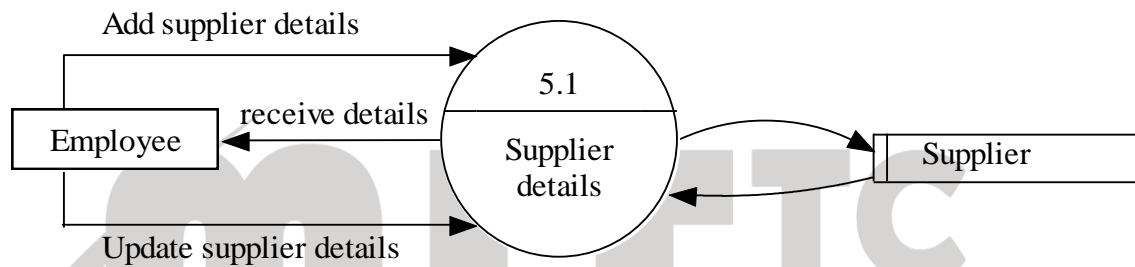
Explanation:

Here, the employee adds or modifies the stock, checks for stock availability, adds new product stock and retrieves stock details.



Explanation:

Here, the employee checks for expired products from Product and Stock database and the system returns the list of expired products.

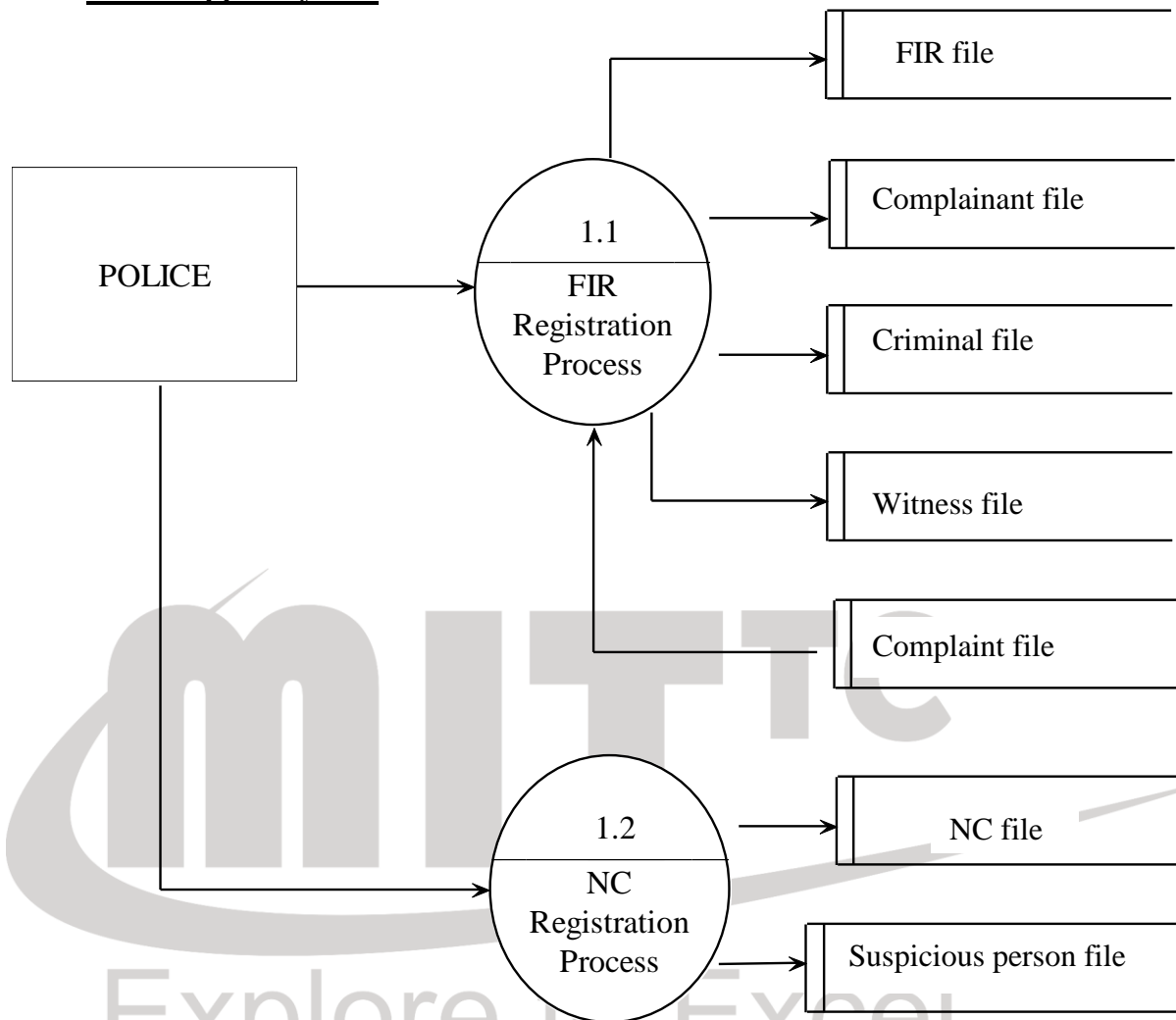


ation:

Here, the employee adds, deletes or modifies the supplier details and also retrieves the details.

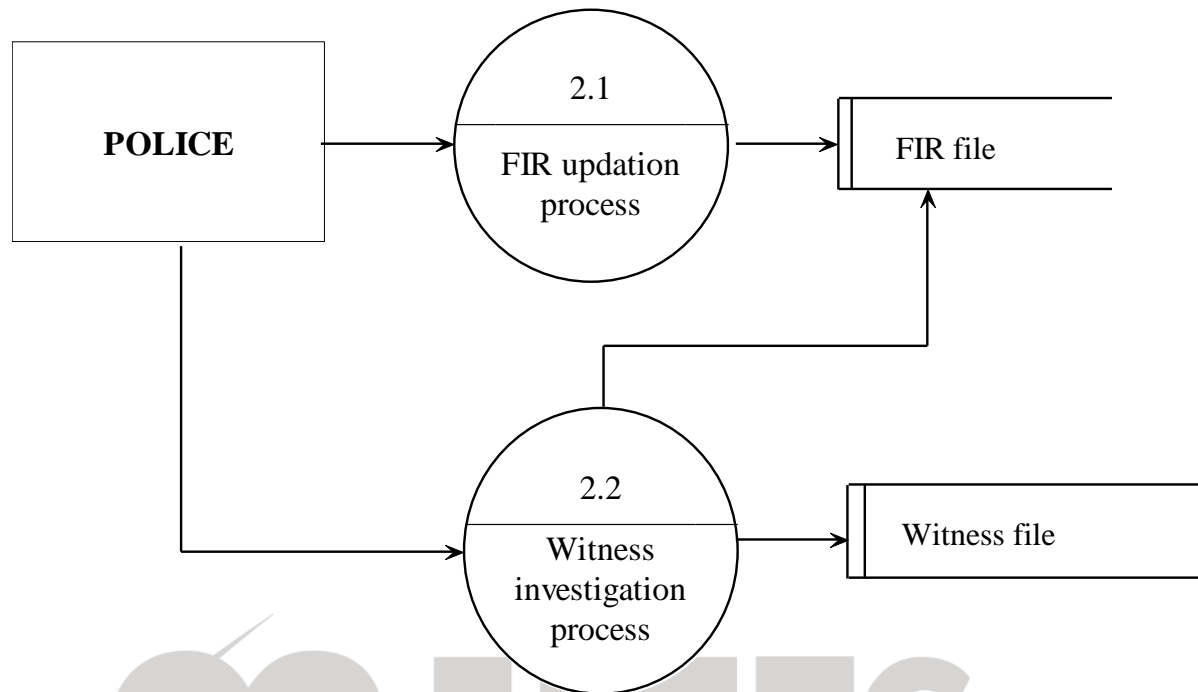
Explan

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**Ex-2: Police support system**

Explanation:

This is the Level 2 DFD shows the process registering new complaint. Complaint can be of two types either cognizable i.e. First Investigation Report (FIR) or Non-cognizable i.e. NC .



Explanation:

This is the Level 2 DFD for Investigation process. This figure shows the further steps which are generally taken by police officer while investigating FIR. Whatever updation happens while investigation, the process also updates its related records such as witness record.



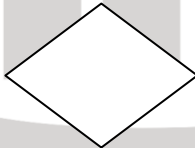
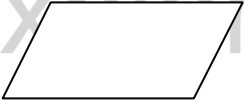

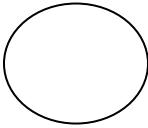


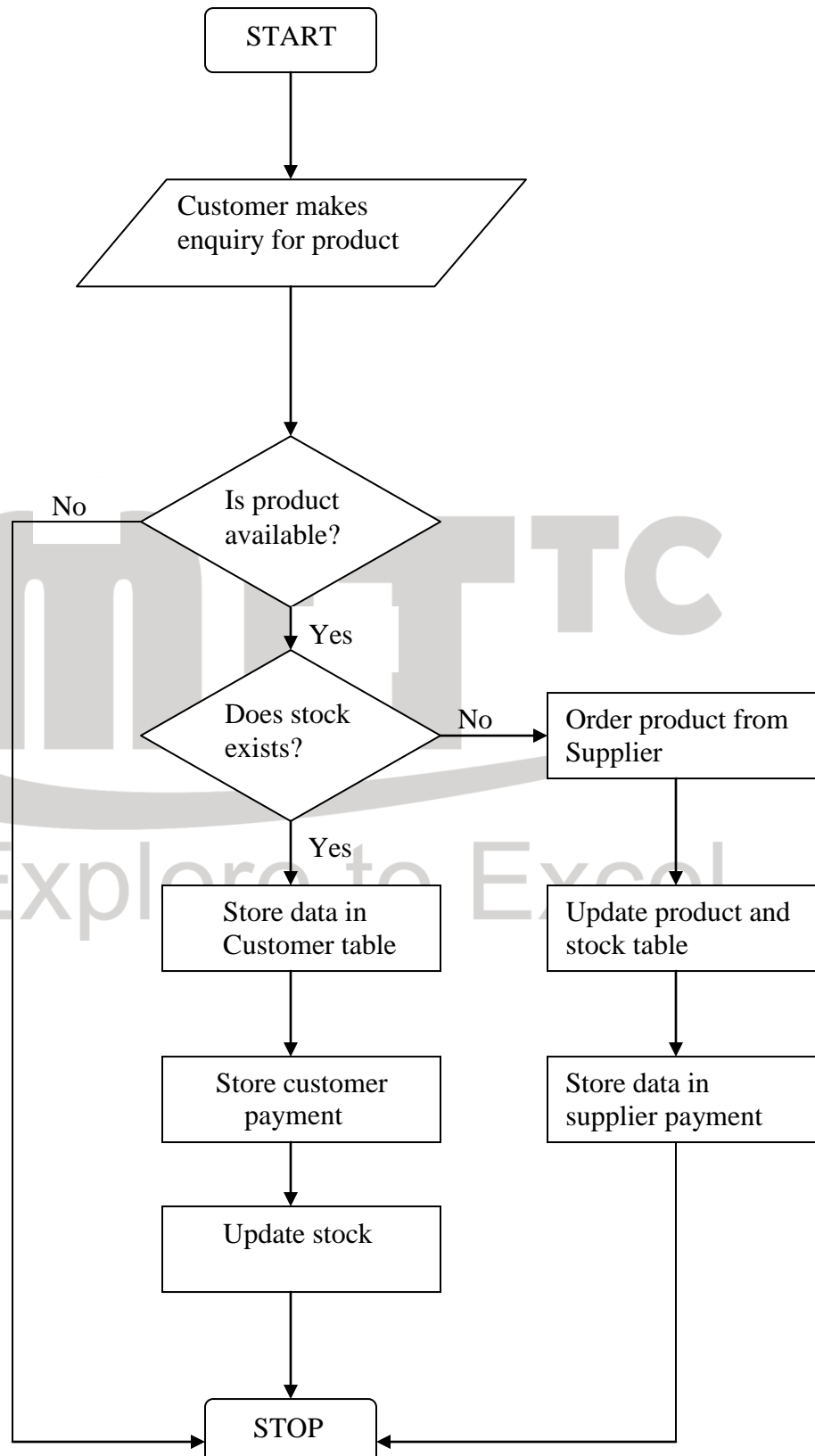
## **Flowchart:**

Flow Charts are required to understand the system well. With the help of these charts it becomes easy to understand the inputs and outputs of the system which is helpful in later stages of development of the software.

### **Symbols used:**

The following symbols are used in drawing a flow chart:

Sr no	Symbol	Name	Description
1		Rounded Rectangle	Represents the start and end of the flow chart
2		Rectangle	Represents a process to be carried out
3		Diamond	Represents decision making
4		Parallelogram	Represents input events
5		Arrow	Represents transition from one state to another
6		Circle	Represents a connector

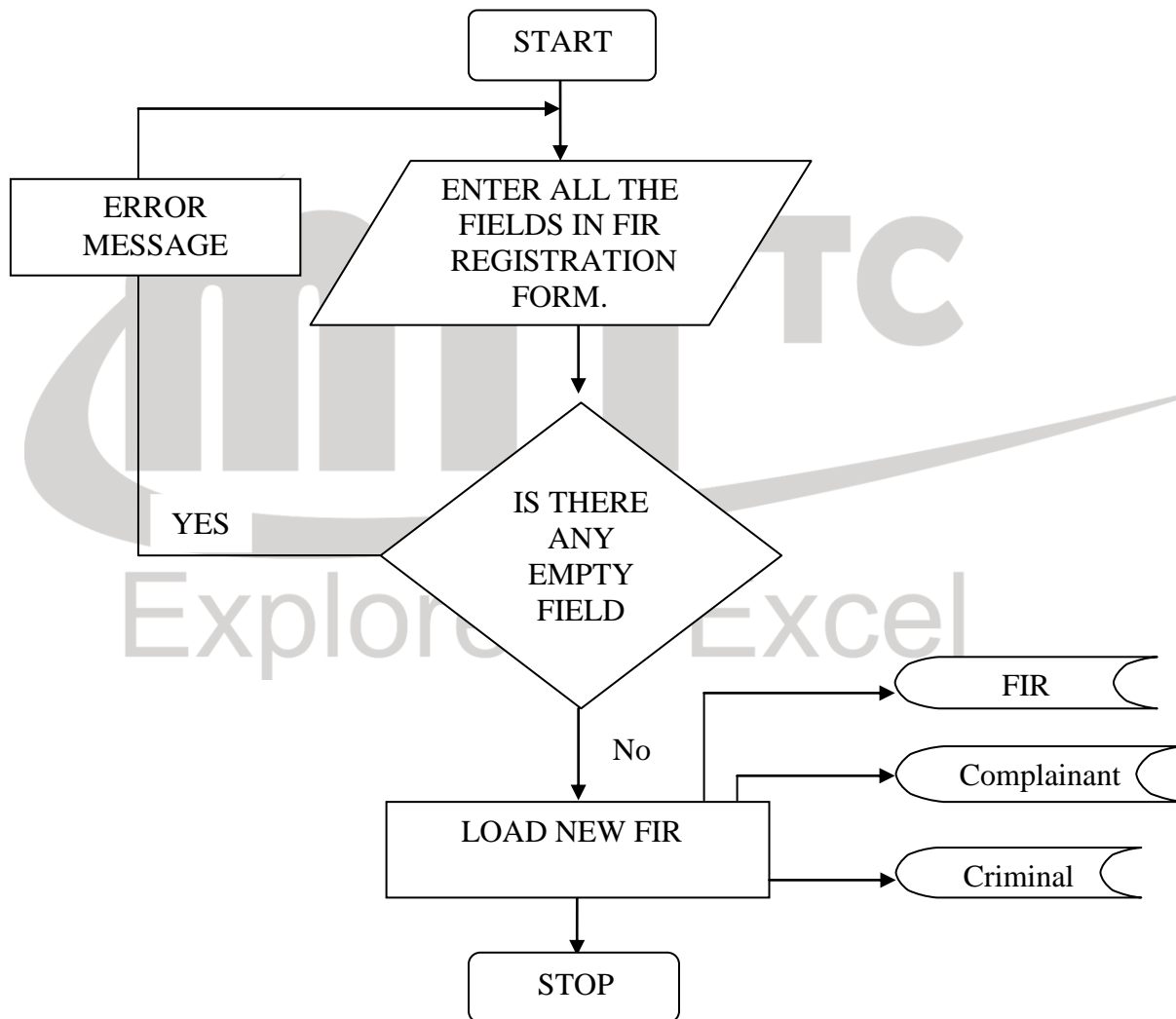
**Ex-1: Medical store Management System**

Explanation:

In this system, when a customer makes enquiry for a product, the employee first checks if the product is available with the shop. If the product is available, then the employee checks whether required stock for the corresponding product exists. If required stock exists then customer information and customer payment is stored and product stock is updated. If required stock does not exist then the employee will order the required product from the supplier. After receiving the product ordered, the stock will be updated and the supplier payment is stored.

## Ex-2: Police Support System

### Flow chart for FIR registration



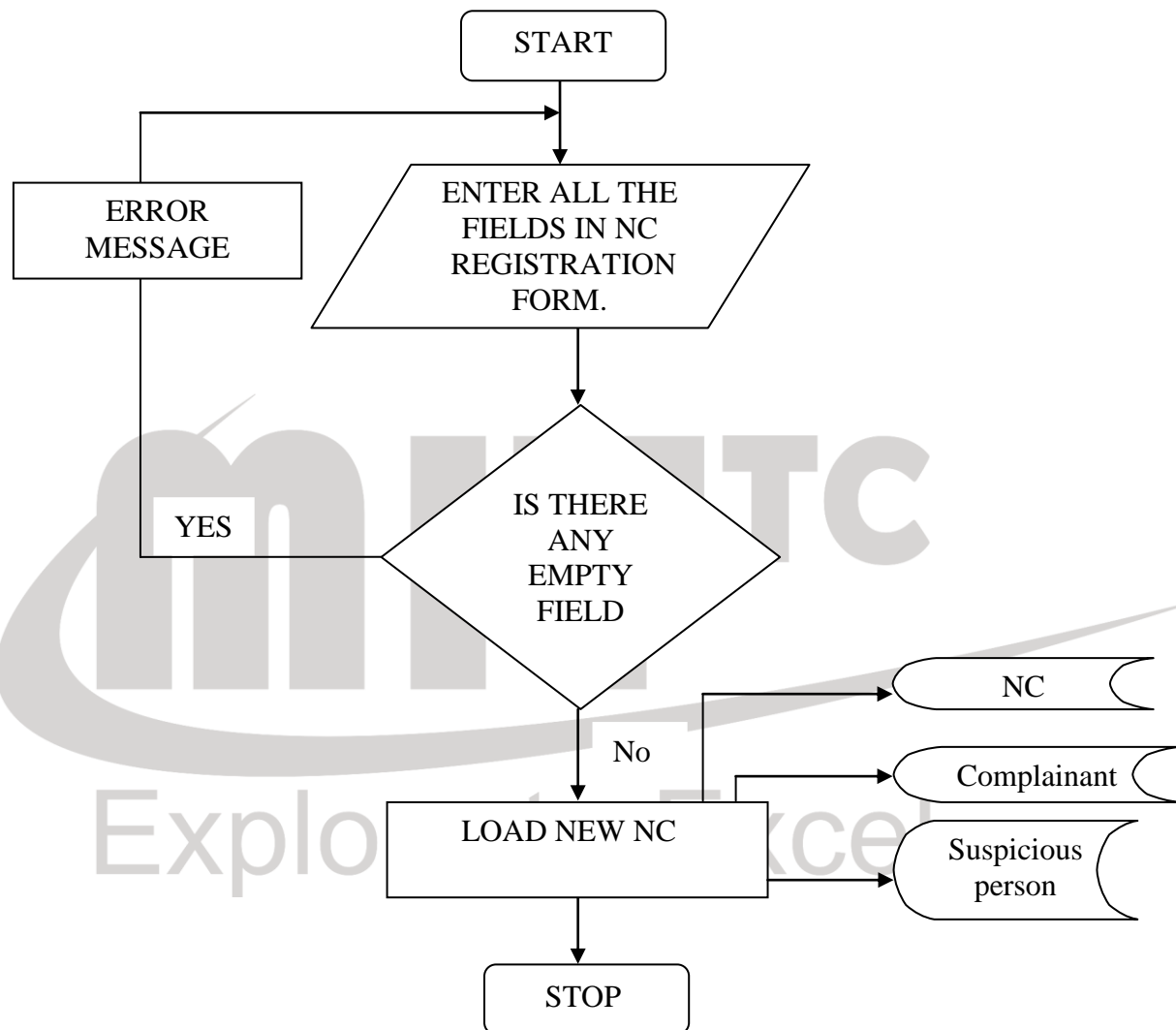
**Fig. 9.11 FIR registration**

**Explanation:**

This is the flowchart for FIR registration. Here, first the FIR registration form is filled. If there is any empty field then the system will display error message. Otherwise the FIR is

registered and data is stored in FIR table. Also the respective Complainant's and Criminal's record is stored into the database.

### Flow chart for NC registration



**Fig. 9.12 NC registration**

### Explanation:

This is the flowchart for NC registration. Here, first the NC registration form is filled. If there is any empty field then the system will display error message. Otherwise the NC is registered and data is stored in NC table. Also the respective Complainant's and Suspicious person's record is stored into the database.

### Structured chart:

For a function oriented design, the design can be represented graphically by structure charts. The structure of program is made up of modules of that program together with the interconnections between modules. Every computer program has a structure, and give a program its structure can be determined. The structure chart of program is a graphic representation of its structure. In a structure chart a module is represented by a box with the module name written in the box. An arrow for a module A to module B represents that module A invokes module B. B is called subordinate of A, and A is called super ordinate of B. The arrow is labeled by the parameters received by B as input and the parameters returned by B as output with the direction of flow of the input and the output represented by the small arrows. The parameters can be shown to be data (unfilled circle at the tail of the label) or control (filled circle at the tail).

A structure chart is a nice representation mechanism for a design that uses functional abstraction. It shows the module and their call hierarchy, the interface between the modules, and what information passes between modules. It is a convenient and compact notation that is very useful while creating a design.

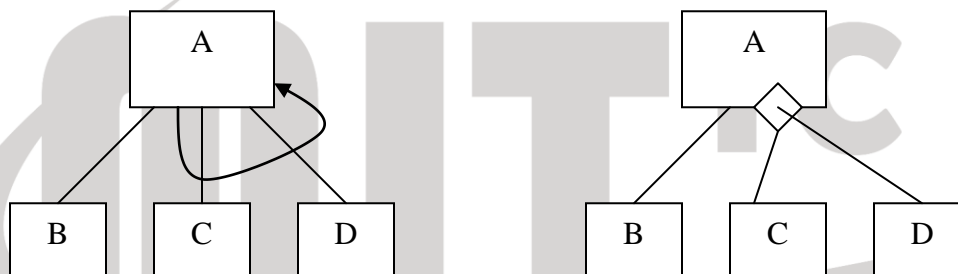


Figure: Iteration and decision representation

Let us consider a situation where module A has subordinates B, C and D, and A repeatedly calls the modules C and D. This can be represented by a looping arrow around the arrows joining the subordinates C and D to A as shown in the figure above. All the subordinate modules activated within a common loop are enclosed in the same looping arrow.

Major decisions can be represented similarly. For example, if the invocation of modules C and D in module A depends on the outcome of some decision, that is represented by a small diamond in the box for A, with the arrows joining C and D coming out of this diamond, as shown in figure above.

**Different types of modules:****Input module:**

There are some modules that obtain information from their subordinates and then pass it to their superordinate. This kind of module is an input module. It is used for input from and to the environment. Input modules get the data from the sources and get it ready to be processed.

**Output module:**

There are output modules that take information from their superordinate and pass it on to its subordinates. It is used for output of data from and to the environment. The output modules take the output produced and prepare it for proper presentation to the environment.

**Transform module:**

Transform module are used for transforming data into some other form. Most of the computational modules typically fall into this category.

**Coordinate module:**

Coordinate module manage the flow of data to and from different subordinates.

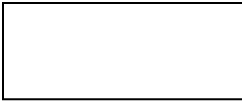
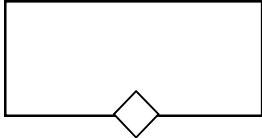




**Composite module:**

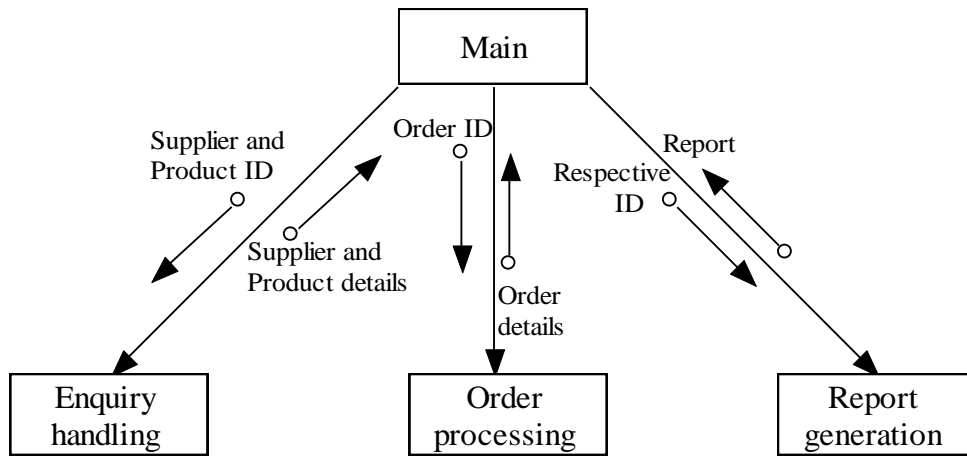
A module that can perform functions of more than one type of module is called a composite module.

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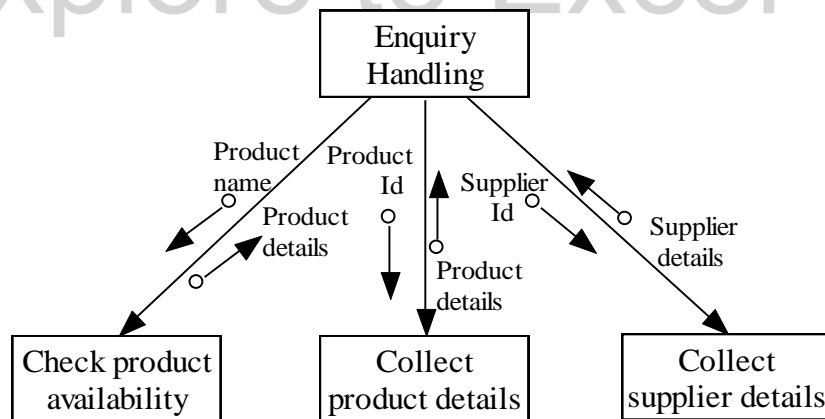
**Symbols used:**

The following symbols are used in drawing a structured chart:

Sr no	Symbol	Name	Description
1		Module	A module of software
2		Transaction centre	A module that selectively calls one of the set of lower-level modules connected to it on the basis of some condition (it acts like an if-then-else).
3		Module call	Indicates that a module could call another module, and calls it zero or more times at runtime.
4		Module invocation	Indicates that a module calls another module that thereafter executes in an independent manner; used for processes and tasks.
5		Data couple	An item of data either passed to, or returned by, a module.
6		Control couple	A control or status value or flag that affects the operation of its recipient module.

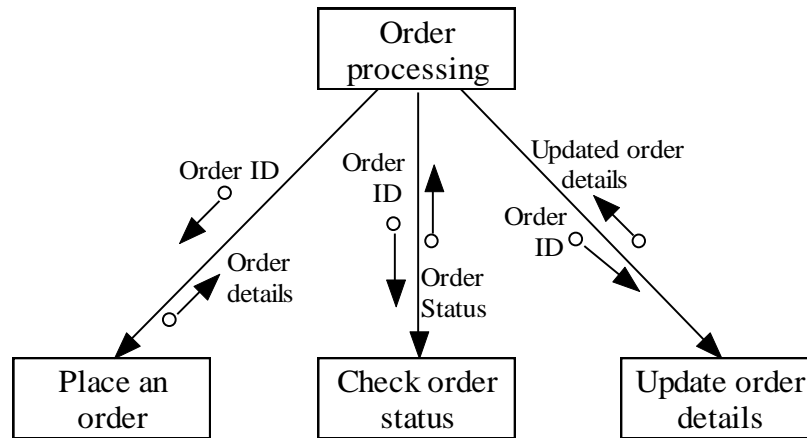
**Ex-1: Medical store Management System**

**Explanation:**

Here, the three modules shown are the transform modules whose purpose is to accept data from the main module and then return the appropriate data back to the main module. The Enquiry Handling module receives supplier id, processes it and returns the supplier details to the main module. Similarly, when a product enquiry is received, the Enquiry Handling module gets the Product Id from the main module and returns the Product details to the main module. The Order processing module gets the Order Id from the main module, processes it and returns the corresponding order details to the main module. The Report generation module gets the respective ids from the main module and returns their corresponding reports to the main module.


**Explanation:**

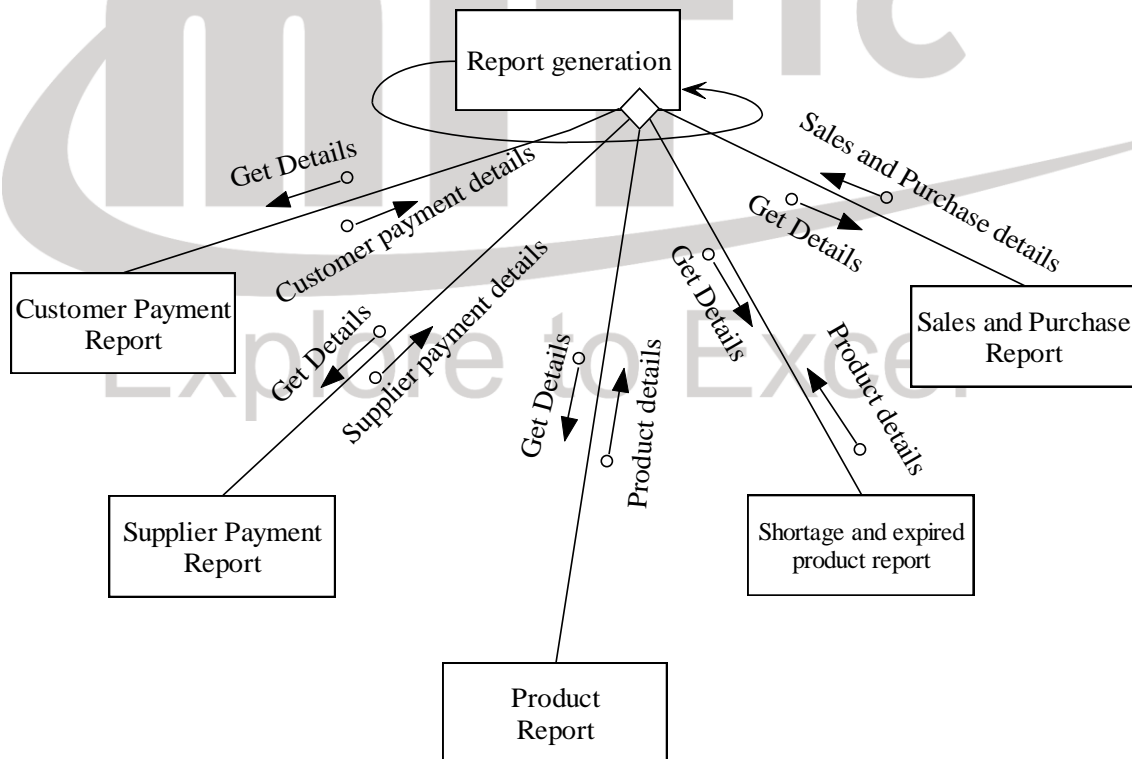
The Enquiry Handling module checks whether the requested product is available and returns those details to the system. It also enquires about the available suppliers.





Explanation:

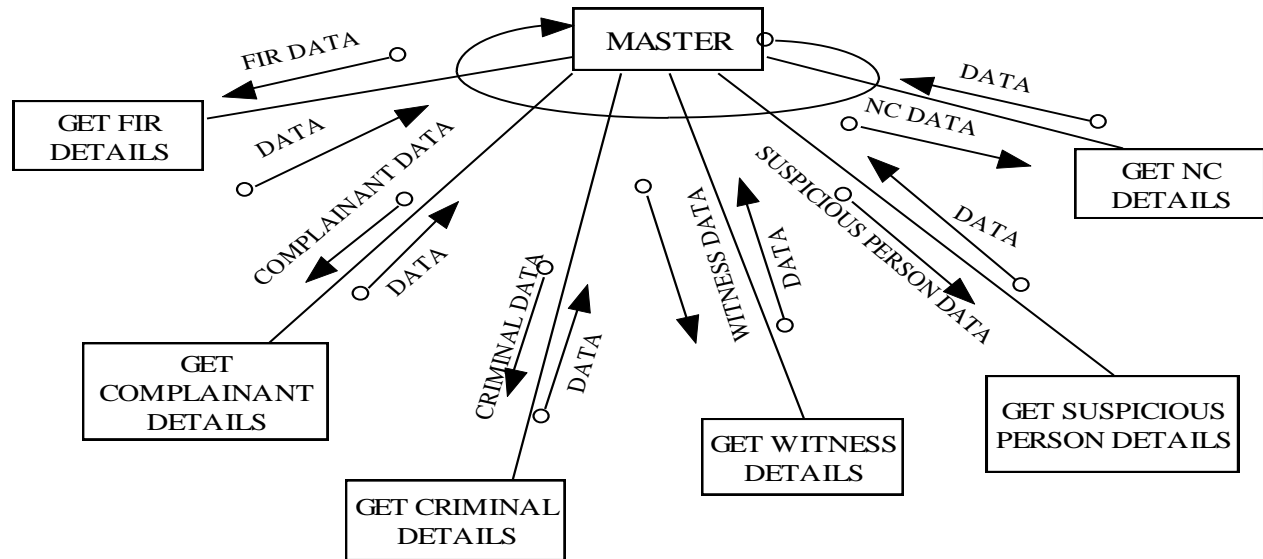
The Order processing module receives the supplier order; it checks the order status and returns the status to the system, also updates the order details accordingly.



Explanation:

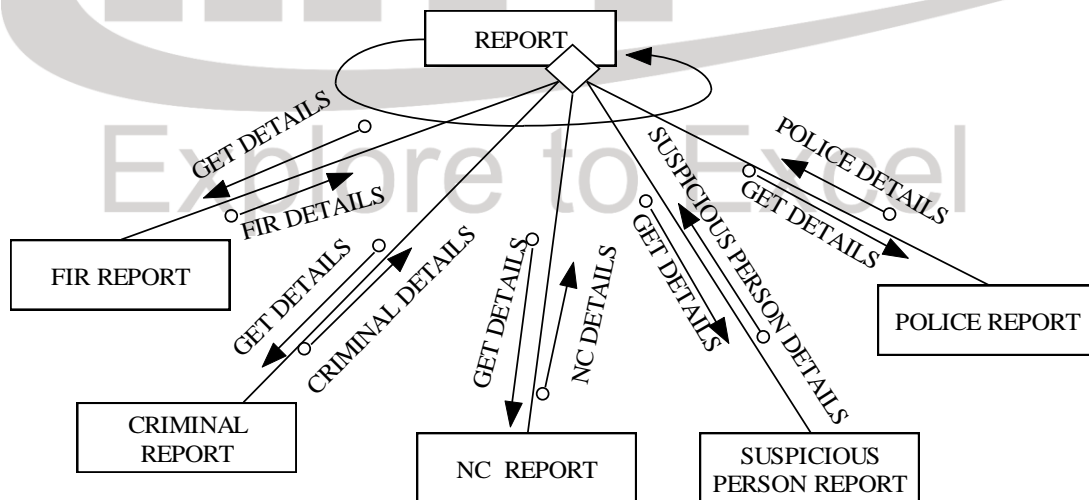
The Report generation module receives the respective request and accordingly generates the report for it. The requested reports are Customer Payment, Supplier Payment, Product, Shortage and Expired Products and Sales and Purchase report.

Ex-2: **Police Support system**



### Explanation

Here, the master module asks the system for the required data like the FIR, Complainant, Criminal, Witness, Suspicious person and NC; and the system returns the respective records to the master module.



### Explanation:

The Report generation module receives the respective request and accordingly generates the report for it. The requested reports are FIR report, Criminal report, NC report, Suspicious person report and Police report.