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SOFTWARE ENGINEERING

(Lab Manual for UG students)

by
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Bachelor of Computer Applications

Laboratory Manual

Semester IV: 194CA1A4CP-SOFTWARE ENGINEERING

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Editors

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Ex No:01 SRS for Employee Payroll Management

AIM: To design a Software Requirement Specification for Employee Payroll Management

1. Introduction

Payroll system is the heart of any Human Resource System of an organization. The solution has to take care of the calculation of salary as per rules of the company, income tax calculation and various deductions to be done from the salary including statutory deductions like Income tax and provident fund deductions. It has to generate pay-slip, cheque summary and MIS reports. It is understood that we are tired of managing thousands of odd papers, pay slips, payroll reports, and salary details and so on. Imagine that we have a payroll processing system which will generate our pay slips and payroll reports within seconds. We can help others automated your payroll system by developing a customized payroll application that suits your specific requirements.

1.1 Purpose

Main aim of developing Employee Payroll Management is to provide an easy way not only to automate all functionalities involved managing leaves and Payroll for the employees of Company, but also to provide full functional reports to management of Company with the details about usage of leave facility. We are committed to bring the best way of management in the various forms of EPM. We understand that EPM in not a product to be sold, it is a tool to manage the inner operation of Company related to employee leave and Payroll.

1.2 Scope

This Application works in Multiple PC's installed on multiple Computers but sharing same database

by which users of different department can use it sitting at different locations simultaneously. But in future we can make the Application where the database will be hosted in order to manage the all departments which will be located in different places and by keeping domain of Application as Online.

1.3 Benefits

- To improve the efficiency.

- Quickly find out information of an employee details.
-
- To provide easy and faster access information.
- To provide user friendly environment.

1.4 Definitions, Acronyms, Abbreviations

Visual Basic .NET (**VB.NET**) is an object-oriented computer programming language that can be viewed

as an evolution of the classic Visual Basic (VB) which is implemented on the .NET Framework.

Microsoft SQL Server is a relational model database server produced by Microsoft.

SRS - Software **Requirements Specification**.

EPM - Employee Payroll Management

1.5 References

- Programming Visual Basic .NET, Second Edition by Jesse Liberty
- Jones and Bartlett Publishers - Essential SQL on SQL Server 2008, 2011
- Software Engineering by "Ian Sommerville ".

1.6 Project Overview

The following subsections provide the complete overview of the software specifications requirements documentation for the product Employee Payroll Management. The entire SRS is documented in view of User and the following sub sections are arranged to give a complete outlook of the software, its perspective, features, system requirements and users know how it is.

2. Overall description

2.1 Product perspective

This software is developed specifically to cater the company employees leave management, is totally self contained and works efficiently. It provides simple database rather than complex ones for high requirements and it provides good and easy graphical user interface to both new as well as experienced user of the computer.

2.2 Product functions

2.2.1 Master module

- Designation
- Department

2.2.2 Employee module

- Employee details

2.2.3 Search module

2.2.4 Attendance module

- Leave
- Attendance
- Managing Leave

2.2.5 Salary module

- Allowance
- Deduction
- Pay Slip

2.2.6 Report module

2.3 User Characteristics

2.3.1 End Users

- No specific knowledge or skills are required from the end user.
- End user should have basic idea about computer operations and database.

2.3.2 Administrator

- Administrator must be having good knowledge of database management system.
- Administrator must be capable to manage user rights.
- If the network connection does not work properly than our system should not work as intended.
- Also that is assumed that the product is installed properly at web server.
- This system will not take care of any virus problem, which might occur either on the client or the server system. Avoiding the use of pirated software and ensuring that floppies and other removable media are scanned for viruses before use could minimize the possibility of viral infection.
- Recovery of data after a system crash will be possible only if backups are taken at regular

intervals.

- Manual interfaces cannot be fully avoided. Documented proofs like data entry of employees etc. will have to be verified by the concerned management staff before entering it into the computerized system.

2.4 Assumptions and Dependencies

Assumptions:

- The code should be free with compilation errors/syntax errors.
- The product must have an interface which is simple enough to understand.

Dependencies:

- All necessary hardware and software are available for implementing and use of the tool.
- The proposed system would be designed, developed and implemented based on the software requirements specifications document.
- End users should have basic knowledge of computer and we also assure that the users will be given software training documentation and reference material.
- The system is not required to save generated reports.

3.Specific requirements

3.1 External interface requirements

3.1.1 User interfaces

The software provides good graphical interface for the front end which is self explanatory.

3.1.2 Hardware interfaces

- Memory minimum of 1GB RAM
- Hard disk of 40 GB
- Monitor
- Mouse
- Keyboard
- Printer

3.1.3 Software interfaces

- Operating System Windows XP.

- Front End Microsoft VB.Net 2008
- Backend MS SQL Server 2008

3.1.4 Communication interfaces

Windows Forms

3.2 Functional requirements

3.2.1 Masters:

This module helps the administrator to enter the designation and the related description. It also helps to add the department.

3.2.2 Employee:

This module helps to add the details of the employee like the personal detail and the employee detail.

3.2.3 Search:

This module helps to search the employee details department wise and designation wise.

3.2.4 Attendance:

This module helps to different types of leave for different year. It also helps the employee to enter their entry and exit time. Using the attendance module the employee can also check their remaining leaves and also apply for the leave.

3.2.5 Salary:

This module helps to calculate the salary by adding the allowances and the basic salary and by deducting the deductions based on the leaves and also the PF, ESI. It also helps to generate the employee pay slip

3.2.6 Report:

This module helps to generate the administrative reports like the Salary Report, Attendance Report and the Employee Report which is in can be exported to word, pdf.

3.3 Performance requirements

- The overall system should be fast and error free.

- It should have built in error checking and correction facilities.
- The system should be able to handle large amount of data comfortably.

3.4 Design constraints

- The system runs under Windows XP.
- The application is developed on VB.Net platform and SQL server 2008 as back end.

3.5 Attributes

3.5.1Reliability

In order to ensure reliability, this system is being designed using software that is established to be stable and easy to use.

3.5.2 Availability

This system is designed to run 24/7 and be readily available to the user.

3.5.3 Security

The access to the software is given only to valid operators. We need a specific ID and password to get access to the software.

Automatic Teller Machine (ATM)

Description of ATM System

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash, a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) – both of which will be sent

to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned – except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked tothe card. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between anytwo accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to thecard.
5. A customer must be able to abort a transaction in progress bypressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will

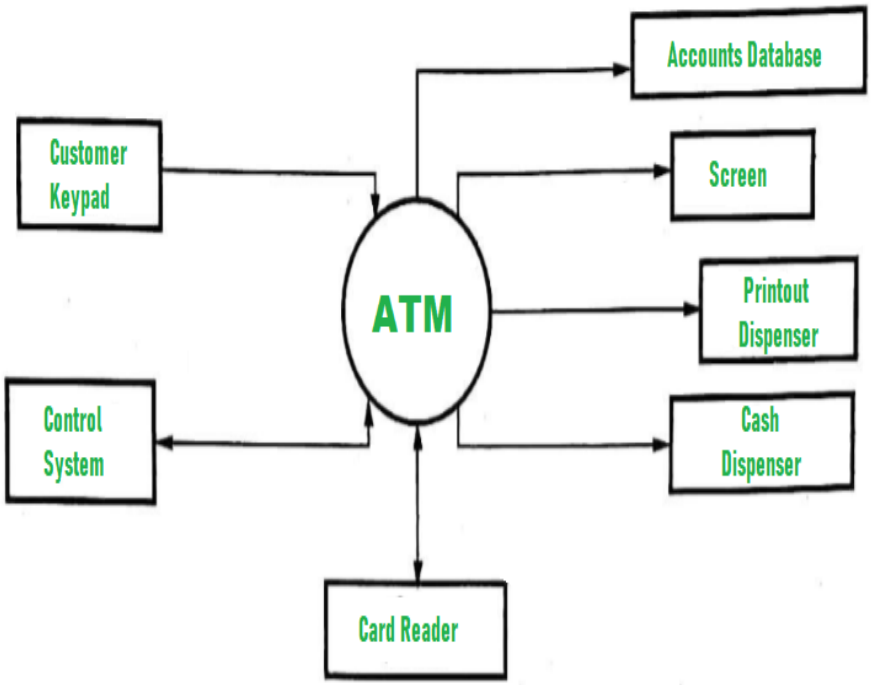
Ex.No:02 Data Flow Diagram for ATM System

AIM: To design and implement ATM system with a Level 0 and Level 1 DFD.

Purpose:

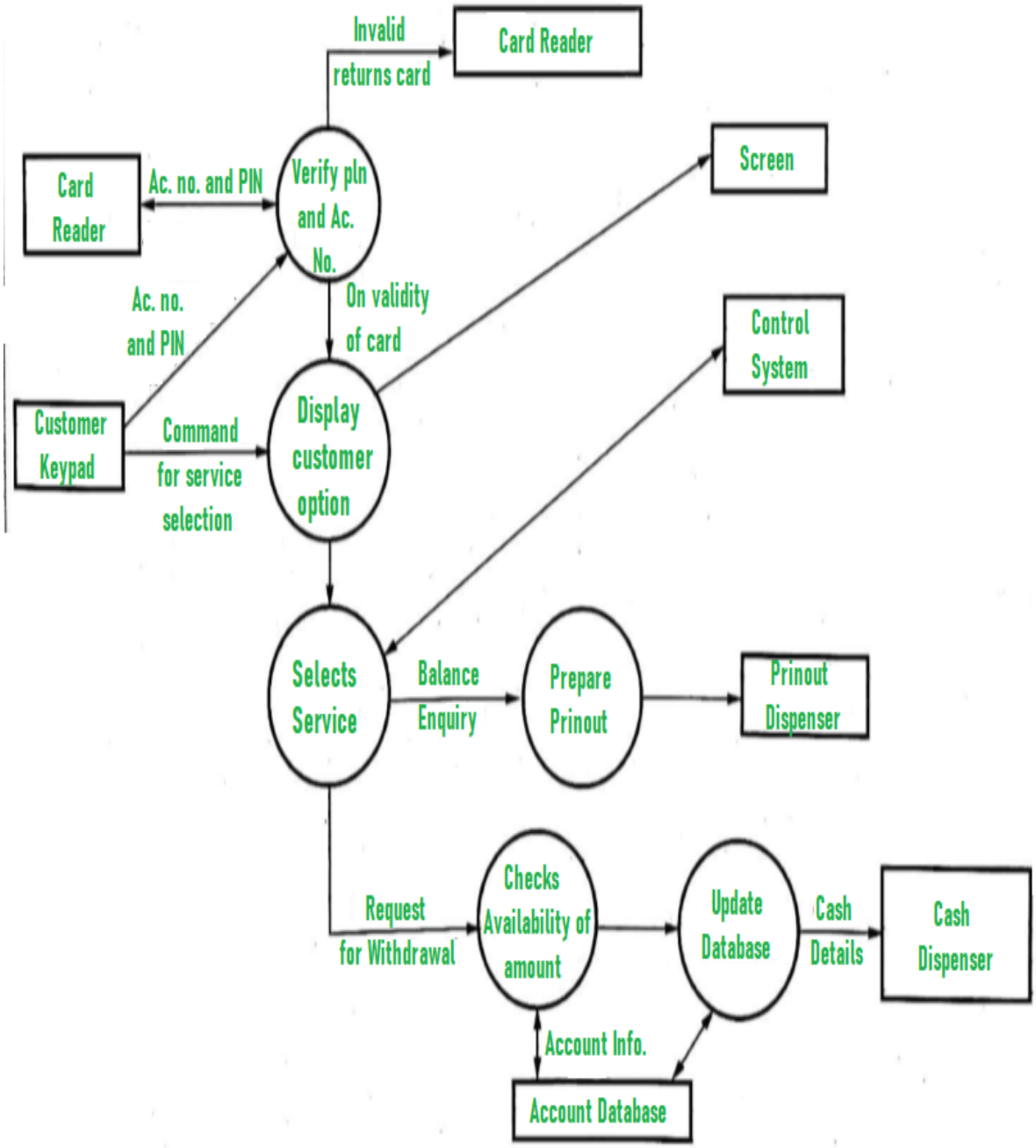
The objective of a **DFD** is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system

Level 0 DFD



LEVEL 0 DFD

Level 1 DFD



LEVEL 1 DFD

Ex.No:03 **Class diagram for ATM System**

AIM: To design and implement ATM system through Class Diagram

Purpose:

The purpose of the class diagram is to model the static view of an application. The class diagrams are the only diagrams which can be directly mapped with object oriented languages and thus widely used at the time of construction. The UML diagrams like activity diagram, sequence diagram can only give the sequence flow of the application but class diagram is a bit different. So it is the most popular UML diagram in the coder community. So the purpose of the class diagram can be summarized as:

- Analysis and design of the static view of an application.
- Describe responsibilities of a system.
- Base for component and deployment diagrams.
- Forward and reverse engineering.

Contents:

Class diagrams commonly contain the following things

- Classes
- Interfaces
- Collaborations
- Dependency, generalization and association relationships

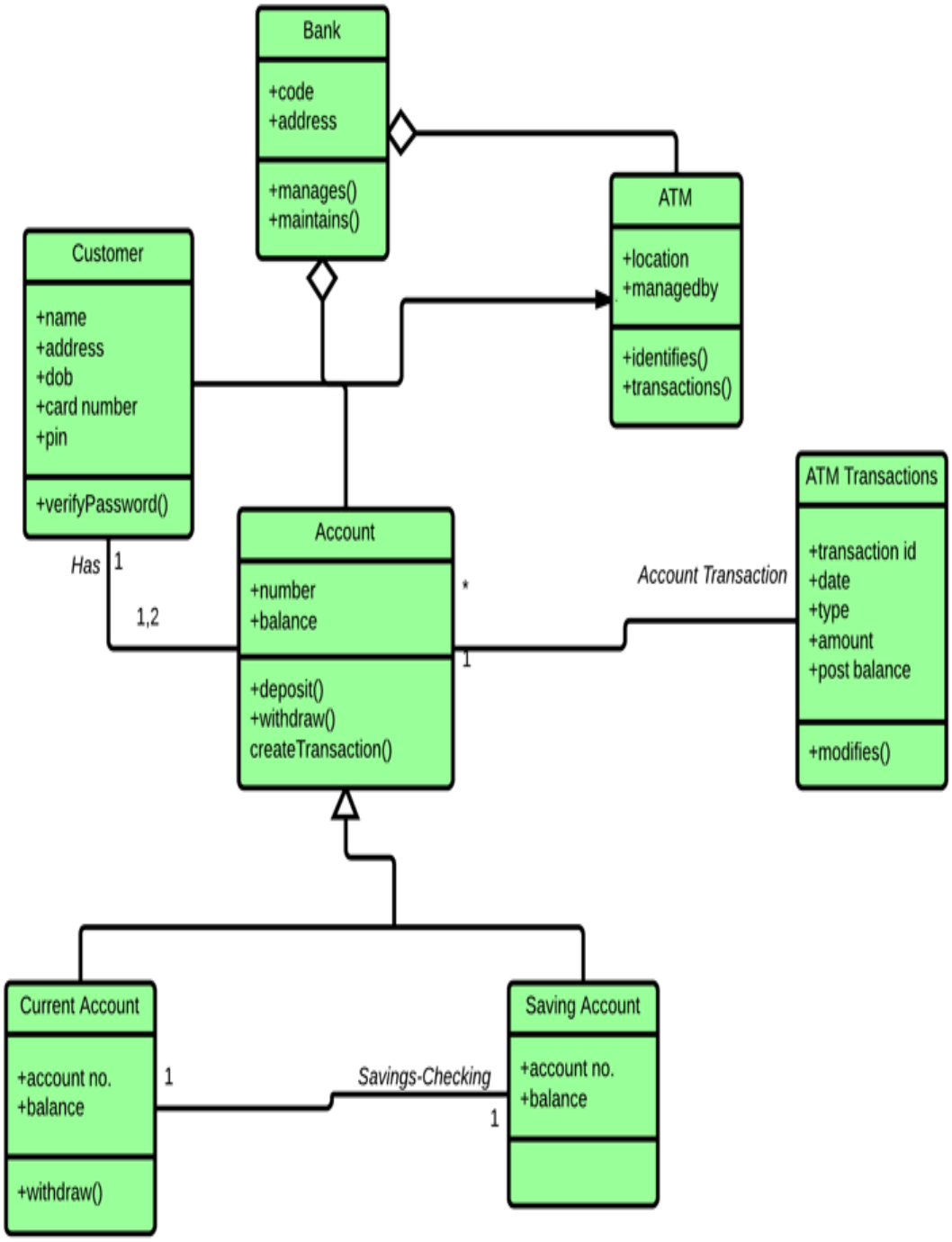
PROCEDURE:-

Step 1: First Classes are created.

Step 2: Named as PinValid, Account Type, Transaction, Update, Server, Customer classes are created.

Step 3: Appropriate relationships are provided between them as association.

DIAGRAM


Bank
+code
+address
+manages()
+maintains()
ATM
+location
+managedby
+identifies()
+transactions()
Customer
+name
+address
+dob
+card number
+pin
+verifyPassword()
Has
1
1,2
Account
+number
+balance
+deposit()
+withdraw()
createTransaction()
*
1
Account Transaction
ATM Transactions
+transaction id
+date
+type
+amount
+post balance
+modifies()
Current Account
+account no.
+balance
+withdraw()
1
Savings-Checking
1
Saving Account
+account no.
+balance

Ex.No: 04 Use case diagram for ATM System

AIM: To design and implement ATM System through Use case Diagram.

Purpose:

The purpose of use case diagram is to capture the dynamic aspect of a system. Because other four diagrams (activity, sequence, collaboration and State chart) are also having the same purpose. So we will look into some specific purpose which will distinguish it from other four diagrams. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. So when a system is analyzed to gather its functionalities use cases are prepared and actors are identified.
So in brief, the purposes of use case diagrams can be as follows:

- Used to gather requirements of a system.
- Used to get an outside view of a system.
- Identify external and internal factors influencing the system.
- Show the interacting among the requirements are actors.

PROCEDURE:

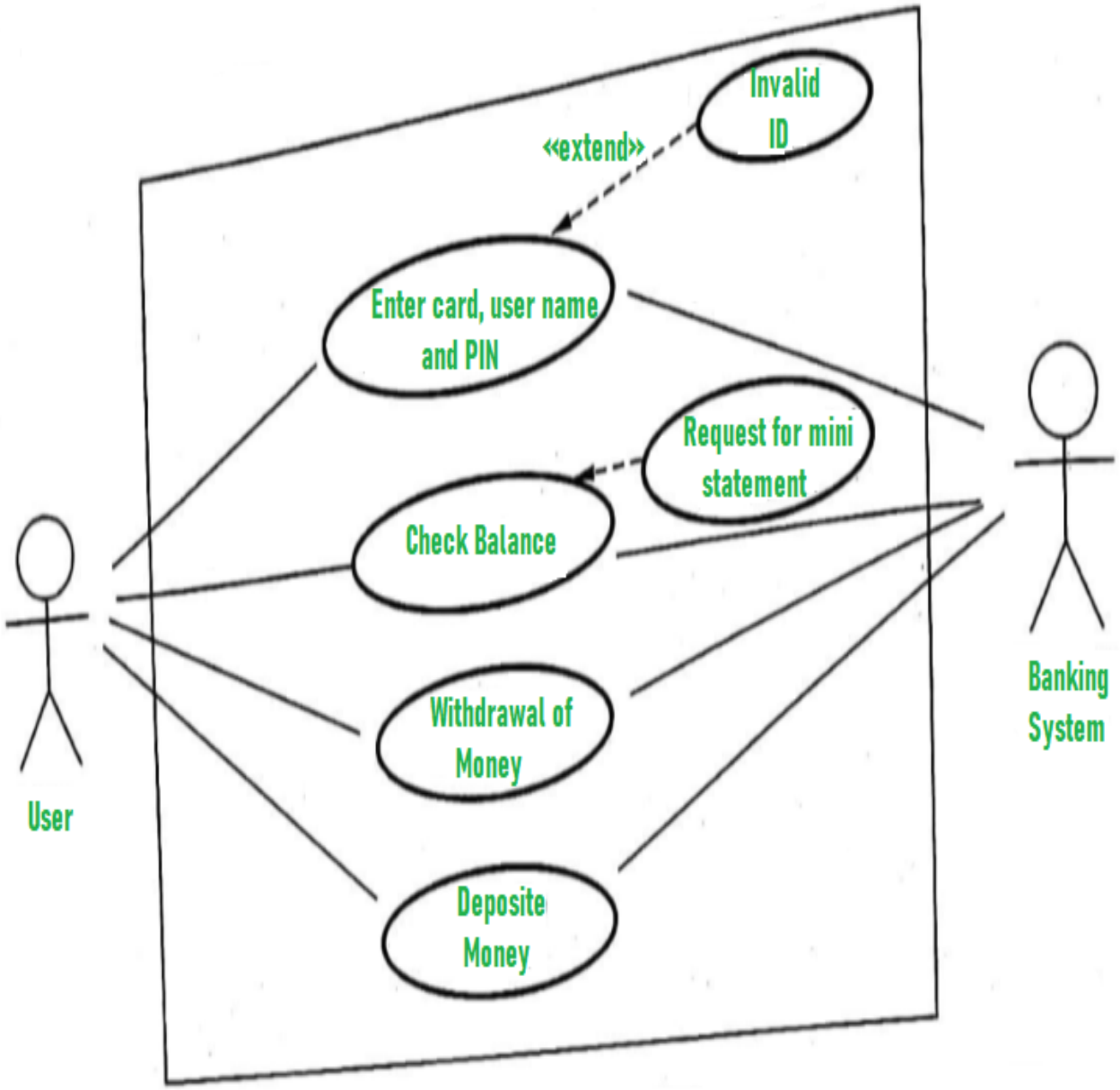
Step 1: First an Actor is Created and named as User/Customer.

Step 2: Secondly a system is created for ATM.

Step 3: A use case Enter PIN, Withdraw money is created and connected with user as association relationship.

Step 4: Similarly various use cases like Deposit money, Balance Enquiry, Manage Account etc are created and appropriate relationships are associated with each of them.

DIAGRAM



Use Case Diagram for Bank ATM System

Ex.No: 05 **Sequence Diagram for ATM System**

AIM: To Design and Implement ATM System through Sequence Diagram

PROCEDURE:

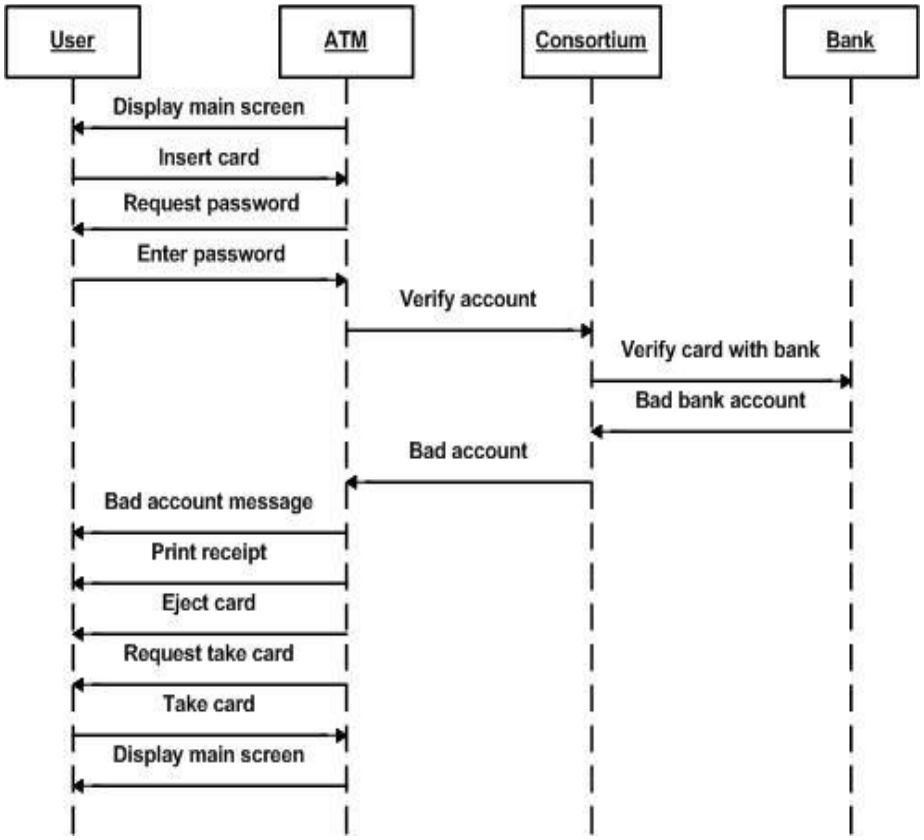
Step 1: First An actor is created and named as user.

Step 2: Secondly an object is created for ATM.

Step 3: Timelines and lifelines are created automatically for them.

Step 4: In sequence diagram interaction is done through time ordering of messages. So appropriate messages are passed between user and ATM is as shown.

DIAGRAM



Ex.No:06 Collaboration for ATM System.

AIM: To design and implement ATM System through Collaboration diagram.

PROCEDURE:

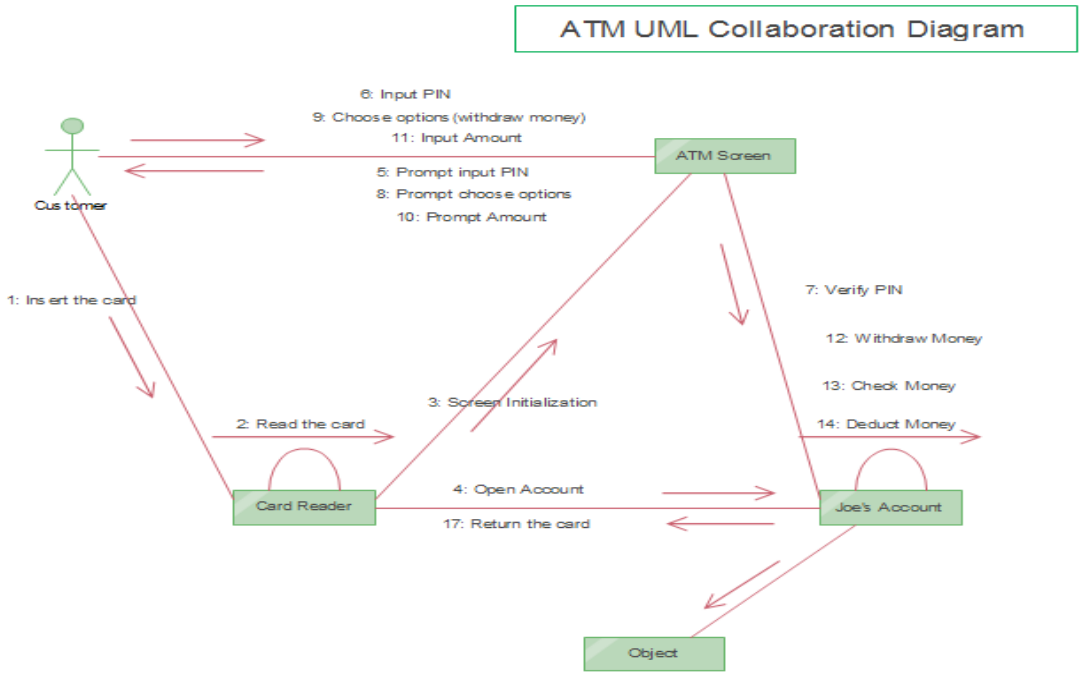
Step 1: First an actor is created and named as user.

Step 2: Secondly an object is created for ATM.

Step 3: In collaboration diagram interaction is done through organization.

Step 4: So appropriate messages are passed between user and ATM as shown in the figure.

DIAGRAM



Ex.No:07 State chart diagram for ATM System

AIM: To design and implement ATM System through State Chart diagram.

Purpose:

Following are the main purposes of using State chart diagrams:

1. To model dynamic aspect of a system.
2. To model life time of a reactive system.
3. To describe different states of an object during its life time.
4. Defines a state machine to model states of an object.

PROCEDURE:

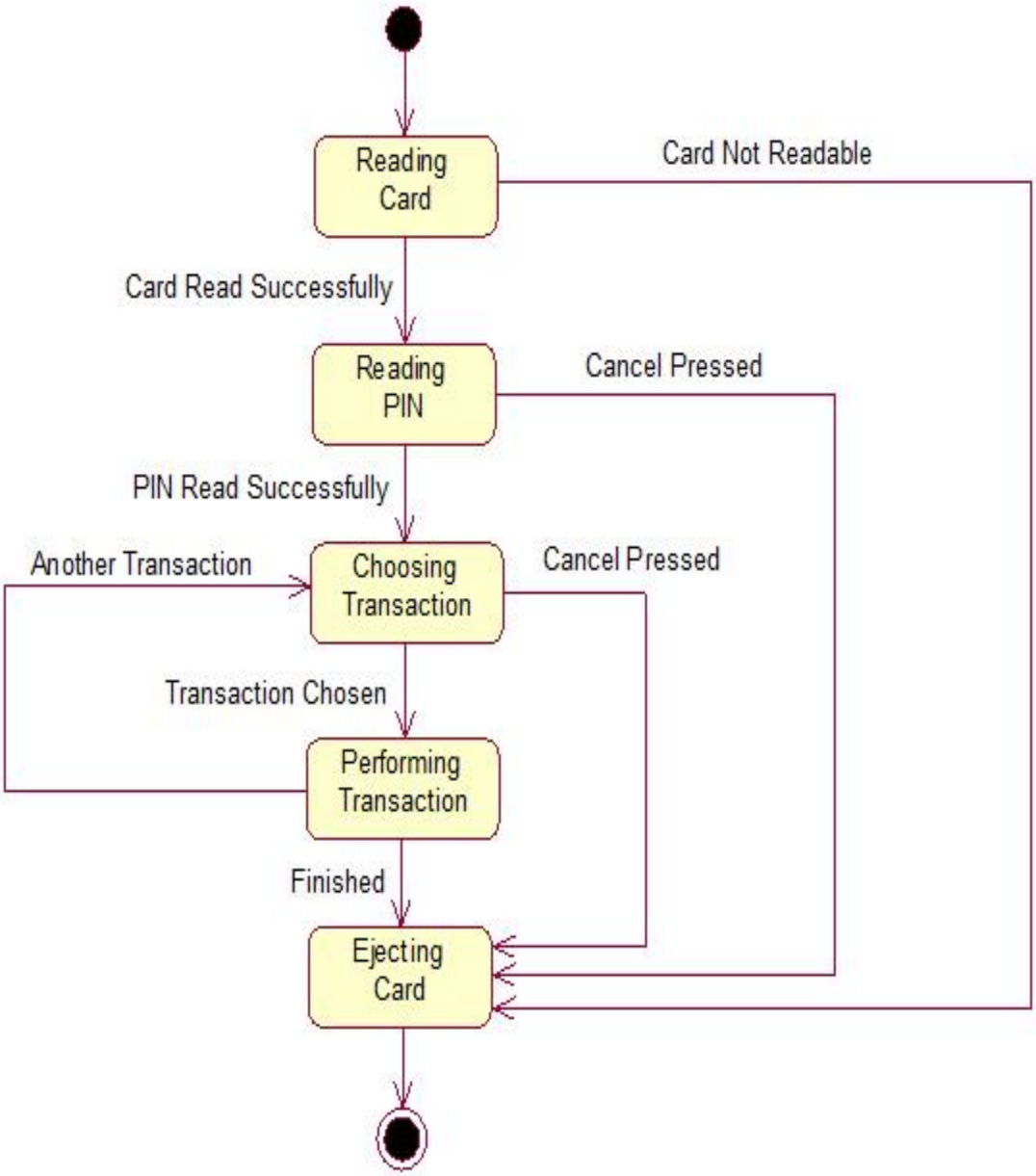
Step 1: First after initial state control undergoes transition to ATM screen.

Step 2: After inserting card it goes to the state wait for pin.

Step 3: After entering pin it goes to the state account verification.

Step 4: In this way it undergoes transitions to various states and finally reaches the ATM screen state as shown in the fig.

DIAGRAM



Ex.No:08 **Activity diagram for ATM System**

AIM: To design and implement ATM System through Activity Diagram.

THEORY: An activity diagram shows the flow from activity to activity .An activity is an ongoing non atomic execution within a state machine .Activities ultimately results in some action, which is made up of executable atomic computations. We can use these diagrams to model the dynamic aspects of a system.

Activity diagram is basically a flow chart to represent the flow form one activity to another. The activity can be described as an operation of the system. So the control flow is drawn from one operation to another. This flow can be sequential, branched or concurrent. Activity diagrams deals with all type of flow by using elements like fork, join etc.

Contents

Initial/Final State, Activity, Fork & Join, Branch, Swim lanes

Fork

A fork represents the splitting of a single flow of control into two or more concurrent Flow of control. A fork may have one incoming transition and two or more outgoing transitions, each of which represents an independent flow of control. Below fork the activities associated with each of these path continues in parallel.

Join

A join represents the synchronization of two or more concurrent flows of control. A join may have two or more incoming transition and one outgoing transition. Above the join the activities associated with each of these paths continues in parallel.

Branching

A branch specifies alternate paths takes based on some Boolean expression Branch is represented by diamond Branch may have one incoming transition and two or more outgoing one on each outgoing transition, you place a Boolean expression shouldn‟t overlap but they should cover all possibilities.

Swimlane:

Swimlanes are useful when we model workflows of business processes to partition the activity states on an activity diagram into groups. Each group representing the business organization responsible for those activities, these groups are called Swimlanes.

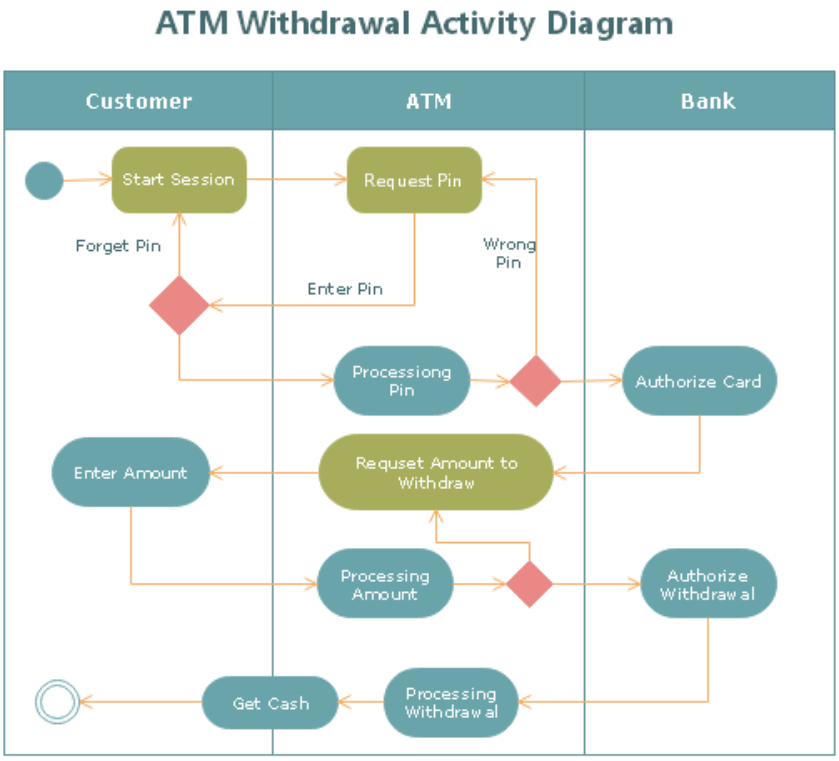
PROCEDURE:

Step 1: First initial state is created.

Step 2: After that it goes to the action state insert card.

Step 3: Next it undergoes transition to the state enter pin Step4: In this way it undergoes transitions to the various states. Step5: Use forking and joining wherever necessary.

DIAGRAM



Ex.No: 09 Component diagram for ATM System

AIM: To design and implement Component diagram for ATM System.

THEORY:

Component diagrams are used to model physical aspects of a system. Physical aspects are the elements like executables, libraries, files, documents etc which resides in a node. So component diagrams are used to visualize the organization and relationships among components in a system. These diagrams are also used to make executable systems.

Purpose:

Component diagrams can be described as a static implementation view of a system. Static implementation represents the organization of the components at a particular moment. A single component diagram cannot represent the entire system but a collection of diagrams are used Before drawing a component diagram the following artifacts are to be identified clearly:

- Files used in the system.
- Libraries and other artifacts relevant to the application.
- Relationships among the artifacts.
- Now after identifying the artifacts the following points needs to be followed:
- Use a meaningful name to identify the component for which the diagram is to be drawn.
- Prepare a mental layout before producing using tools.
- Use notes for clarifying important points.

Contents

Components, Interfaces, Relationships

PROCEDURE:

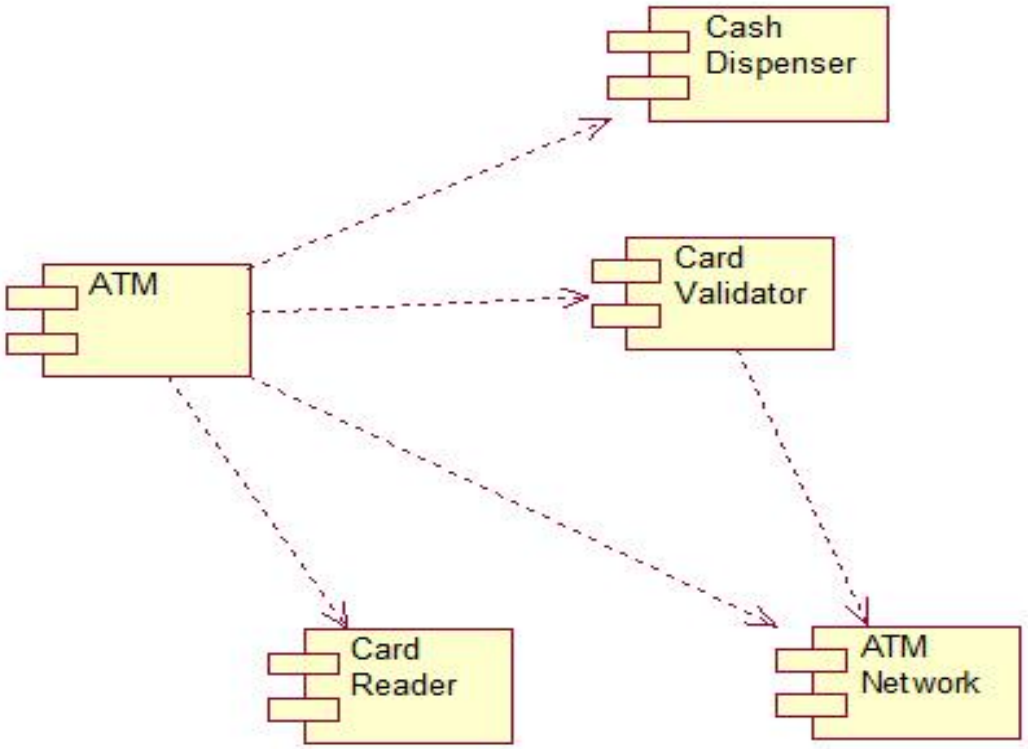
Step 1: First user component is created.

Step 2: ATM system package is created.

Step 3: In its various components such as withdraw money, deposit money, check balance, transfer money etc. are created.

Step 4: Association relationship is established between user and other components.

DIAGRAM



Ex.No: 10 **Preparation of Gantt chart**

AIM: To prepare a Gantt chart for the given project using MS-Excel.

Purpose:

Gantt chart is a project management tool (simplest form of time line) assisting in the planning and scheduling the projects of all sizes, although they are particularly useful for simplifying complex projects.

With the help of Gantt charts we can easily see,

- A visual display of the whole project
- Timelines and deadlines of all the tasks.
- Relationships and dependencies between the various activities.
- Project phases.

PROCEDURE:

Step 1: Prepare the project schedule in the project table in MS-Excel.

Step 2: Begin making your Excel Gantt by setting it up as a stacked Bar chart.

Step 3: Add the start dates of your tasks to the Gantt chart.

Step 4: Add the durations of your tasks to the Gantt chart.

Step 5: Add the descriptions of your tasks to the Gantt chart.

Step 6: Format the chart so it look like a Gantt chart.

Step 7: Finish your Gantt chart with the styling tips.

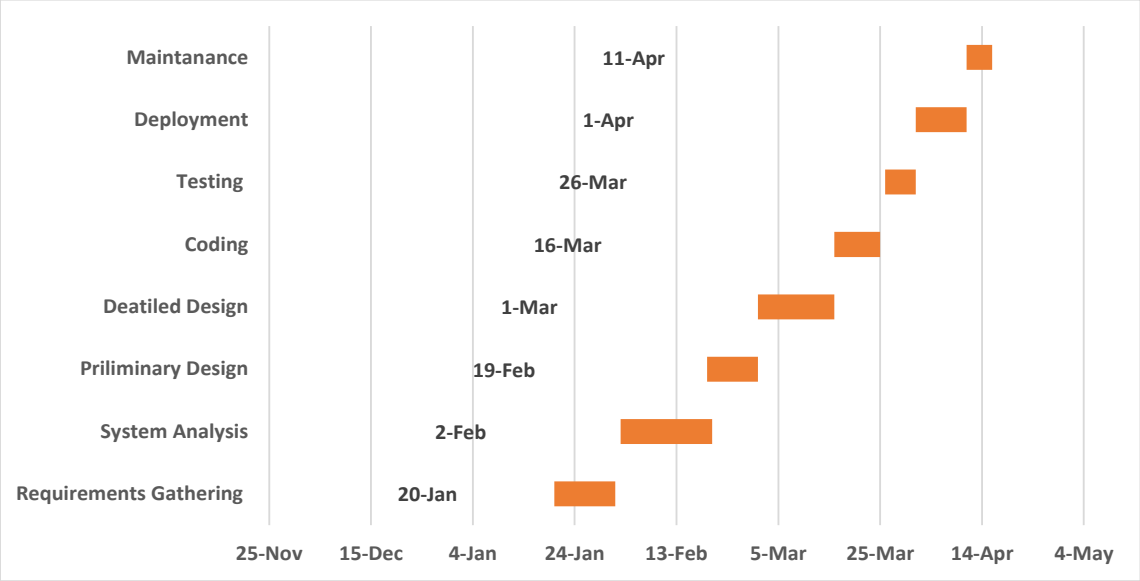
\

DIAGRAM

Project Table

PROJECT TABLE			
Activity/Task	**Start Date**	**End Date**	**Duration**
Requirements Gathering	**20-Jan**	**01-Feb**	**12**
System Analysis	**02-Feb**	**18-Feb**	**18**
Preliminary Design	**19-Feb**	**28-Feb**	**10**
Detailed Design	**01-Mar**	**15-Mar**	**15**
Coding	**16-Mar**	**25-Mar**	**9**
Testing	**26-Mar**	**31-Mar**	**6**
Deployment	**01-Apr**	**10-Apr**	**10**
Maintenance	**11-Apr**	**15-Apr**	**5**

Gantt chart



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