Rajshahi University of Engineering and Technology

Department of Computer Science & Engineering

System Analysis Report

Savings Account of Rupali Bank Limited Motijheel Branch.

Submitted By

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Chapter 1

Introduction

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. We have selected **Savings Account of Rupali Bank Motijheel Branche** as our system analysis topic and tried to analyze it.

1.1 Rupali Bank Ltd

Rupali Bank Ltd. was constituted with the merger of three erstwhile commercial banks i.e. Muslim Commercial Bank Ltd., Australasia Bank Ltd. and Standard Bank Ltd. operated in the then Pakistan on March 26, 1972 under the Bangladesh Banks (Nationalization) Order 1972 (P.O. No. 26 of 1972), with all their assets, benefits, rights, powers, authorities, privileges, liabilities, borrowings and obligations. Rupali Bank worked as a nationalized commercial bank till December13, 1986. Rupali Bank Ltd. emerged as the largest Public Limited Banking Company of the country on December 14, 1986.

1.2 Profile of Rupali Bank Ltd

Chairman: Mr. Monzur Hossain.

Managing Director: Mr. Md. Obayed Ullah Al Masud.

Company Secretary: Mohammad Najmul Hoda(DGM).

Legal Status: Public Limited Company.

Genesis: Rupali Bank Limited has been incorporated on 14 December 1986 under the Companies Act 1913 after taking over and acquiring as a going concern the undertaking and businesses of Rupali Bank with all of its assets, liabilities, benefits, rights, powers, authorities, privileges, borrowings and obligations. Rupali Bank, which initially emerged as a Nationalized Commercial Bank (NCB) under the Bangladesh Banks (Nationalization) Order, 1972 (President's Order No. 26 of 1972),

has now become a state-owned commercial bank (SCB) through a vendor's agreement dated 15 November 2007.

Present capital structure:	
Authorized Capital	Tk. 7000 million
Paid up Capital	Tk. 2760.39 million

Break up of paid-up capital:	
Government shareholding	90.19%
Private shareholding	09.81 %

Present share structure:	
Total Number of share (Each TK 10)	276038812
Share Demated by shareholders	275452502

Number of Employees:
The total number of employees is 5490.

Branch Name: Motijheel corporate.

Branch Code: 0034

Branch Location: 59, Motijheel C/A

Routing Number: 185274272

Branch Phone & Mobile No: 9566071-073, 01716474530, 01924998922

Branch Routing Number: 0

1.3 Vision of Rupali Bank Ltd

Expand loyal customer base by being known as the financial partner of choice that constantly exceeds customer expectations.

1.4 Missions of Rupali Bank Ltd

- Develop a long-term relationship that helps our customers to achieve financial success.
- Offer rewarding career opportunities and cultivate staff commitments.
- Uphold ethical values and meet its customer's financial needs in the fastest and most appropriate way and continue innovative works in order to achieve human resource with superior qualities, technological infrastructure and service packages

1.5 Core Values of Rupali Bank Ltd

- Social Responsibility- care for and contribute to our communities.
- Performance- measure results and reward achievements.
- Integrity- uphold trustworthiness and business ethics.
- Respect- cherish every individual.
- Innovation- encourage creativity.
- Teamwork- work together to succeed.

1.6 Marketing Strategies of Rupali Bank

- The main strategy of the bank is using Rupali Banking System to attract its market.
- Providing efficient customer service
- Maintaining corporate and business ethics
- Being trusted repository of customers' and their financial advices
- Making its products superior and rewarding to the customers
- Display team spirit and professionalism
- Sound capital base
- Enhancement of shareholders wealth
- Fulfilling its social commitments by expanding its charitable and humanitarian activities
- Providing high quality financial services in export and import trade.

1.7 Principles Activities :

Three major departments of principle activities,. Those are:

1. General banking department.
2. Credit risk management department.
3. Foreign exchange department.

1.7.1 General banking department

This department is the retail department of the bank that provides personal services to the retail customers. Major services provided in this department are –

- Deposits and withdrawals
- Remittance of local and foreign currencies
- New account openings
- Purchase of various types of savings scheme.

1.7.2 Credit risk management department

Credit department can be mentioned as one of the key departments, particularly in the major or active branches of the Bank. This department provides all sorts of credit facilities to the customers. The major services of the Credit Department includes-

- Providing Overdraft Facilities
- Project Loan
- Consumer Credit Scheme
- Bank Guarantee and
- Other Services.

As credit quality remains the prime indicator of any banks commercial success, an unsound credit may reduce banks' ability to provide credit towards profitable borrowers and undermine liquidity and solvency. So it's necessary to develop sound credit policy, use modern techniques and properly analyze the credit proposals to assess risks.

1.7.3 Foreign exchange department

Foreign exchange Department provides services regarding financing of International Trade to its customers. Financing can be in terms of both funded and non-funded facilities. Major types of services provided by this department include-

- Financing of Letter of Credit
- Back to Back letter of Credit
- Foreign Currency Accounts
- LTR, LIM and
- Other service

1.8 Employee Hierarchy of Motijheel Branch

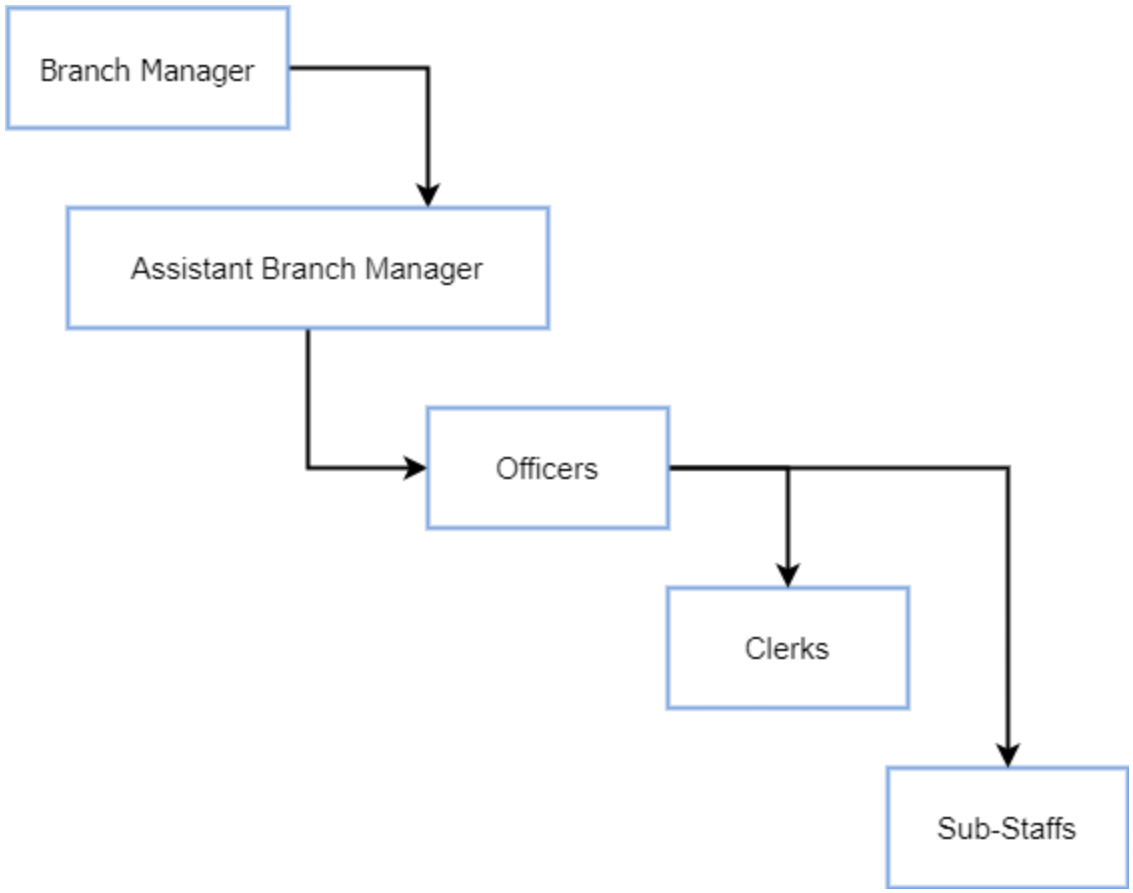

Fig 1.1: Employee Hierarchy of Rupali Bank Motijheel Branch

1.9 Reputation of Rupali Bank Ltd

Rupali Bank ltd has already established a favorable reputation in the banking industry of the country. It is one of the leading govt sector commercial banks in Bangladesh. The bank has already shown a tremendous growth in the profits and deposits sector. The top management officials have all worked in reputed banks and their years of banking experience, skill, and expertise will continue to contribute towards further expansion of the bank. Rupali Bank ltd has already achieved a high growth rate accompanied by an impressive profit growth rate in 2004. The number of deposits and the loans and advances are also increasing rapidly. Rupali Bank ltd has an interactive corporate culture. The working environment is very friendly, interactive and informal. And, there are no hidden barriers or boundaries while communicate between the superior and the employees. This corporate culture provides as a great motivation factor among the employees. It has the reputation of being the provider of good quality services too its, potential customers.

Rupali Bank Ltd. was constituted with the merger of 3 (three) erstwhile commercial banks i.e. Muslim Commercial Bank Ltd., Australasia Bank Ltd. and Standard Bank Ltd. operated in the then Pakistan on March 26, 1972 under the Bangladesh Banks (Nationalization) Order 1972 (P.O. No. 26 of 1972), with all their assets, benefits, rights, powers, authorities, privileges, liabilities, borrowings and obligations. Rupali Bank worked as a nationalized commercial bank till December13, 1986.

Rupali Bank Ltd. emerged as the largest Public Limited Banking Company of the country on December 14, 1986.

1.10 Conclusion

The Banking sector in any country plays an important role in economic activities. Bangladesh is no exception of that. As because it's financial development and economic development are closely related. That is why the private commercial banks are playing significant role in this regard. From the practical implementation of customer dealing procedure during the whole period of our practical orientation in Rupali Bank Ltd we know that, Rupali Bank Ltd. is one of the largest and oldest government commercial bank in Bangladesh, with years of experience also this bank serves peoples and government simultaneously.

Chapter 2

Problem Statement

2.1 Problems

Rupali banks, Savings accounts are bank accounts that allows to hold money and earn some interest, but also have access to the money in the event when anyone needs cash in a pinch. Savings accounts aren't invested in the market, so the value won't go down, also it has some problems like –

- **Low interest**
  Though savings account gives opportunity to store money and have some interest from it. Also take out the money from account when needed, holding all money in a savings account probably isn't best option because of the disadvantages of savings accounts. Savings accounts will typically pay more interest than checking accounts, but not as high a rate of return as you can achieve in other types of accounts like. For example, if anyone have money that he/she knows he/she won't need for a certain period of time, he/she can usually attain a higher interest rate on a certificate of deposit. That means, savings account is a great place to save safe money. but not a great place for money to grow over the long term.

- **Withdrawal restriction**
  Savings accounts of this bank aren't as flexible when it comes to moving money as checking accounts. Anyone can deposit money in a savings account as often as want, but banking regulations restrict to six pre-authorized, automated, or telephone transfers or withdraws during any given month. But anyone can also do as many transfers as you want to pay a loan at the same bank.

- **Online experience is hard to use**
  If anyone wants to know about current status of his/her savings account, it is very hard to know about it. Though, Rupali Bank provides some messaging facility to notify about transaction but, there are many banks who offers great interfaces and apps for customers.

2.2 Feasibility Report

This feasibility study report is a formal proposal. Objective of our feasibility study is not to solve the problem but to acquire a sense of its scope. So, this is a formal document detailing the nature and scope of the proposal solutions.

2.2.1 Major questions of feasibility study that we followed

- What are the users demonstrable needs and how does a candidate system meet them?
- What resources are available for given candidate systems? Is the problem worth solving?

2.2.2 Feasibility study

- What are the users demonstrable needs and how does a candidate system meet them?

  Rupali Bank has an annual interest rate of 3-3.5%. It is relatively lower than some existing non-government banks. This is an issue in case of inspiring new users to start a new savings account.
  Moreover, the online services of the bank and the mobile banking system is also limited by only deposit and withdrawal. This system should be more digitalized to ensure more user engagement.
  On top of that, without MICR check or an ATM card, it is not possible to withdraw money from any branch of Rupali bank other than the specific branch from which the account was created. This creates a substantial issue on user experience leading to inconveniency of withdrawal. As a result the bank fails to make a solid user base among middle class and lower class.
  A proper online mobile banking can eliminate these obstacles from the system.

- What resources are available for given candidate systems? Is the problem worth solving?

  Rupali bank has undergone major changes in most of the branches. Most of the branches has been digitalized, made compatible for online banking and online services. So, it is safe to say that the bank currently possesses enough resources to tackle the ongoing problems.
  In any service-based company it is a must to maintain user satisfaction.
  The issues of incompatibility in case of withdrawal of money from any branch of the bank is a major point of inconvenience for a vast number of users. Also the physical attendance of the user in order to withdraw also can be considered

as a red flag in case of user satisfaction. So, it is definitely a worthy problem to solve for the given candidate system.

- What are the likely impacts of the candidate system on the organization?

  The problems of the current system of Rupali Bank have been found out. As an analyst we proposed a new system which is supposed to be an effective system by ensuring the solution of the problems of existing system. This new system can cooperate with the customers in a more effective and friendly way.
  People will be more encouraged to follow this system. An outline of the method sand procedures undertaken by the existing system, followed by coverage of the objectives and procedures of the candidate system. As an analyst we can say that the impact of the candidate system on the organization will be better more than the previous condition.

2.2.3 Summary of findings and recommendations

- Low interest rate – It ca be solved by increasing some interest rate like other non-government bank is doing now.

- Mobile Banking system facilities are limited – Mobile banking system should be improved and developed. Because, now adays people feels troublesome withdraw money from bank when they immediately need it. People also don't want to spend money for atm card services.

- Trust issues – Savings and banking system also have some trust issues among lower and middle-class people. This issue may be solved by creating a method. Where a target amount will be provided to the users. Submission of this target amount of money, user can get small exciting gifts from bank. After fulfilling this target user can have his/her new target for exciting gifts. This method may be motivate peoples to open a savings account and saves money also remove trust issues.

2.3 Conclusion

We have tried to portrait the system of saving account sections of Rupali Bank Ltd Motijheel branch and discuss different problems in this system from our point of view. Also tried to give some recommendation for its improvement.

Chapter 3

Information Analysis

System analysis totally depends on the analysis of information about the existing system so that we can find out the problems and the procedure to manage the solution. As an analyst, the information we need are about the organizations, user staff and the workflow. It will help us to identify its goals, purposes and create systems and procedure that will achieve them in an efficient way. To start the process of information analysis , we need to gather the information from different aspects.

3.1 Information gathering

Information can be gathered in several phases. For example, information can be gathered through available documentation, such as procedures manual, documents and their flow, interviews of the user staff and on-site observation.

3.1.1 Information Gathering Tools:

We believe, information gathering tools help the analysts to assess the effectiveness and disadvantages of the current system and provide the groundwork for recommending a candidate system. Also the proper use of tools for gathering information is the key to successful analysis. There are several tools for gathering information like Review of literature, procedures and forms, Onsite observation, Interviews and questionaries.

Review of literature, procedures and forms -

Procedure manuals and forms are useful sources for the analyst. They can describe the format and functions of the present system. The manual always describe how well the system is designed. Up-to-date manuals save hours of information gathering. For getting information of Rupali Bank, we have checked the website, searched the services they provide and check the reviews of their services.

According to thei debit card service they said, “A customer having a deposit account with the designated branch of Rupali Bank Limited can get a ATM card.

Instead customer is welcome to apply for an ATM card to the branch where he/she is maintaining an account. Issuing charge (one time) is Tk. 300 only and yearly charge is Tk. 200 only.

Ther customer will be provided with ATM card and PIN within 7 (seven) days from the date of application. Customer can use his/her card at any ATM of Rupali Bank – BRAC Bank booths or with logo `Omnibus' and 'Q-Cash'.

Customer can withdraw any amount multiplied by Tk. 500 per instance subject to fulfillment of the above conditions i.e. Tk. 500 (Taka Five hundred), Tk. 1000 (Taka One thousand) Tk. 2000 (Taka Two thousand), Tk. 3000 (Taka Three thousand) and maximum Tk. 20,000 (Taka Twenty thousand) per instance and maximum withdrawl limit Tk. 50,000 (Taka Fifty thousand) per day."

Beside this, customer can have Mobile Financial Service (MFS) using a app named SureCash. SureCash is a Mobile Financial Service (MFS) network offering a hosted mobile banking and payment services involving banks, NGOs, mobile network operators and payment affiliates such as utility companies, merchants/retailers, employers, insurance organizations and government departments. Besides making sure that customer's cash stays safe, and they get convenient payment and mobile recharge options, the primary advantage of SureCash is that the platform is multi-network and inter-bank. This gives customers the flexibility to use any mobile operator to use the services of any bank that has signed up on the SureCash network.

But unfortunately the customer reviews on this app are much worse. In most cases, this app is much faultier and buggier. There are many issues in this app such as;

- Authentication lagging,
- Self registration is not user friendly,
- Account activation process is too slow,
- OTP matching problem,
- Network Connection issues
- Recharginh issues
- Unneccessary options
- UI is not good as customer desired
- Not user friendly etc

We collect some of this customer review from google play store. Three screenshots about app review and ratings are given below.

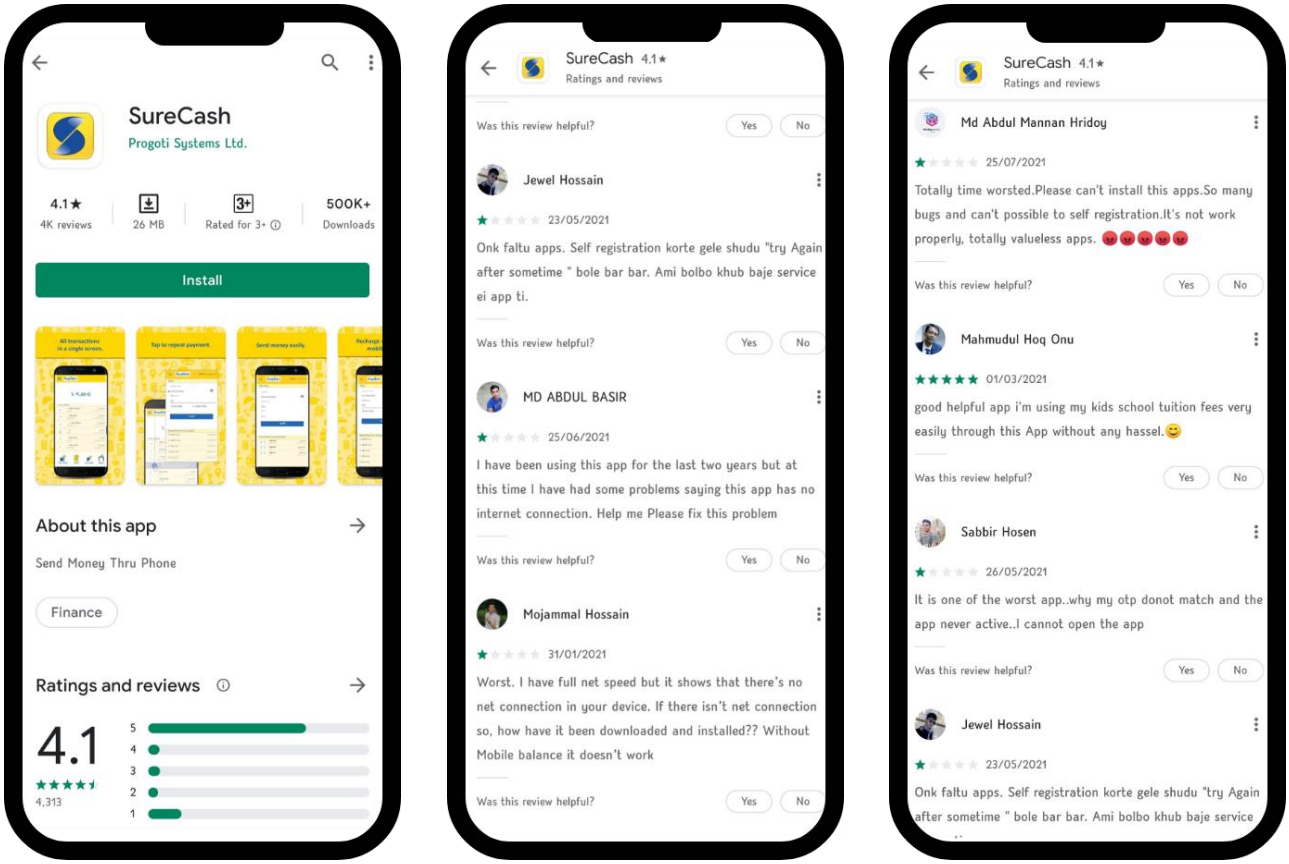

Figure 3.1: Screenshots about SureCash Application and user's poor reviews.

Interviews and Questionnaires -

At first we thought we would collect information from the branch manager in person at the bank. But we couldn't do it because of Covid Pandemic. Later, we were able to arrange an online meeting with Assistant General Manager Hasina Sultana. But due to his illness we can't continue our interview for a long time. Our official interview conversation with the Assistant General Manager is given below

To, Hasina Sultana Assistant General manager

Question: Mam, account always reminds us about interest rate first. Would you kindly inform us what is the average interest rate on savings accounts in Rupali Bank?

Answer: 4%

Question: How much money should one have to open a savings account in this bank?

Answer: Minimum 1000 Tk.

Question: Do you use bKash transaction?

Answer: No, we don't.

Question: Do you have any online banking system? Do you have any app for this?

Answer: We have an app named 'Rupali Bank SureCash and for every branch online/web banking system are available now.

Question: Would you please tell us how many users are using online service? How many people are known to this service? Do you check the feedback?

Answer: We try to provide the service to 100% users but we don't have the exact information about how many are using them actually.

Question: Do you have any transaction limit on particular period for savings account?

Answer: For Savings account transaction are limited to 2 times per week. But for regular account it's unlimited. If the amount is above 10 Lakhs you have to submit a report to Bangladesh Bank for further procedures.

Question: What is the charge for an ATM Card on Rupali Bank? Do you provide lifetime ATM Card? What is the minimum and maximum Withdrawal limit?

Answer: No, you have to pay for ATM Card if you want to keep it. The issuing charge for an ATM card is 300Tk only and yearly charge is 200Tk only. By using this card you can withdraw minimum 500Tk and maximum 50000Tk per day.

Question: Would you please tell us what are the withdrawal procedures from this bank?

Answer: Using an ATM Card one can easily withdraw money from any ATM Booth of any Bank at all the time — 24/7. But the withdrawal charge varies based on the amount.

3.1.2 Information Summary:

It was not easy for us to collect information because of Covid Pandemic but we have collected some information about the savings account to the best of our ability Most of the time we have to face various privacy issues while collecting information. So that we could not collect most of the information related to the savings account money flow investment percentage and investment place. Much of our collected information covers how a customer deals with a savings account and what his experiences are like. However, a summary of the information we have collected is given below

- Rupali Bank gives 3% interest rate to savings account and 1000tk is minimum to have an account.
- Rupali Bank doesn't use bkash transaction for deposit or withdraw money.
- Rupali Bank System has an app named 'SureCash' but we have checked out the reviews. The feedback is too poor to consider.
- Web banking system is open but this is neither well-known nor user friendly.
- ATM Card is not for lifetime. One should pay to keep it and withdrawal process also have charges on amount of money.
- On the other hand, without ATM card, one should go to the Rupali bank branches for withdrawing money.

3.2 Structured Analysis

To make a system understandable to the users, structured analysis is followed. It's a set of techniques and graphical tools that allow the analyst to develop an understandable system specifications. The traditional approaches have many drawbacks, and so the analyst needs something analogous to the architect's blueprint as a starting point for system design. It is the way to focus on the functions, not on the physical implementation. There are so many tools for it like- Data Flow Diagram, Data Dictionary, Structured English, Decision Trees and Decision Tables, but as an analyst we will focus on the Data Flow Diagram (DFD) first and then with the help of the table we will then explain the data flow diagram of the existence system.

3.2.1 Data Flow Diagram of existing Savings Account System

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, short text labels- to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. A DFD methodology is quite effective and it is easy to understand after a brief orientation. The diagram gives analysts practical scope to work efficiently at time of the specification and analysis of requirements

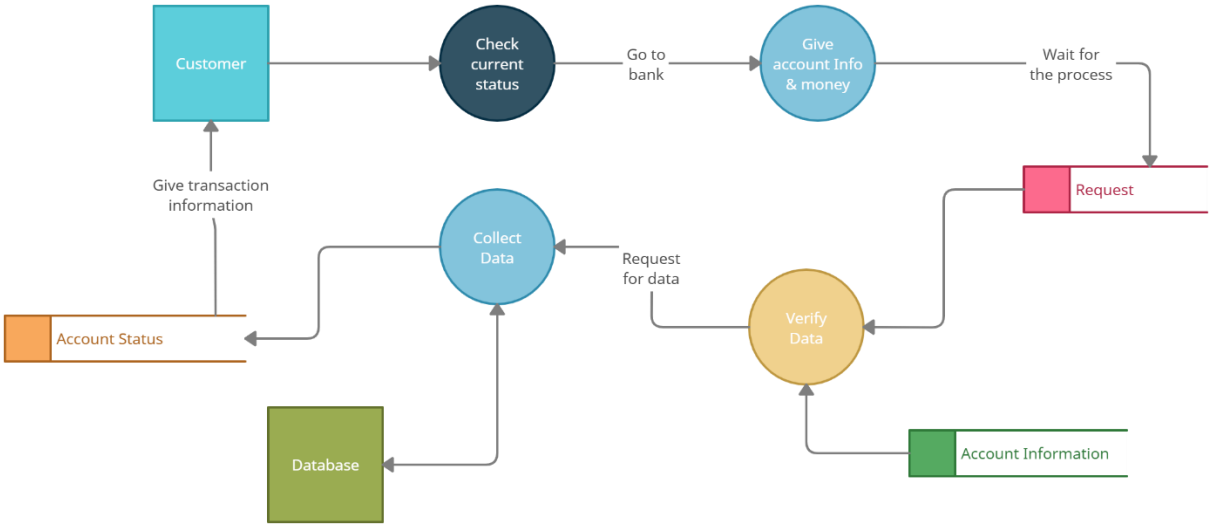

Figure 3.2: Data flow diagram for knowing current account status

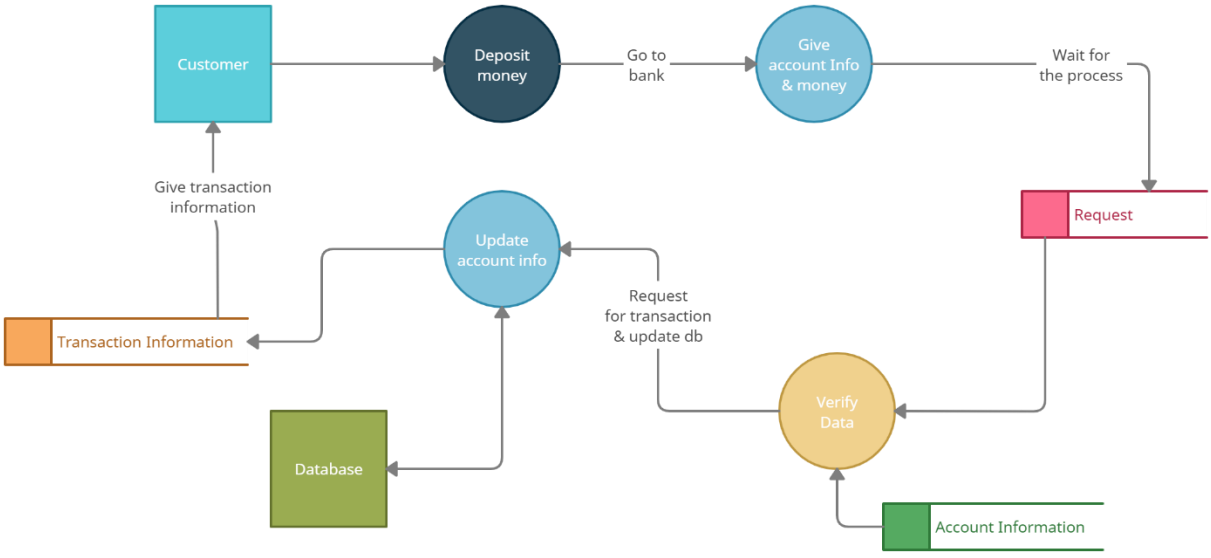

Figure 3.3: Data flow diagram for deposit money

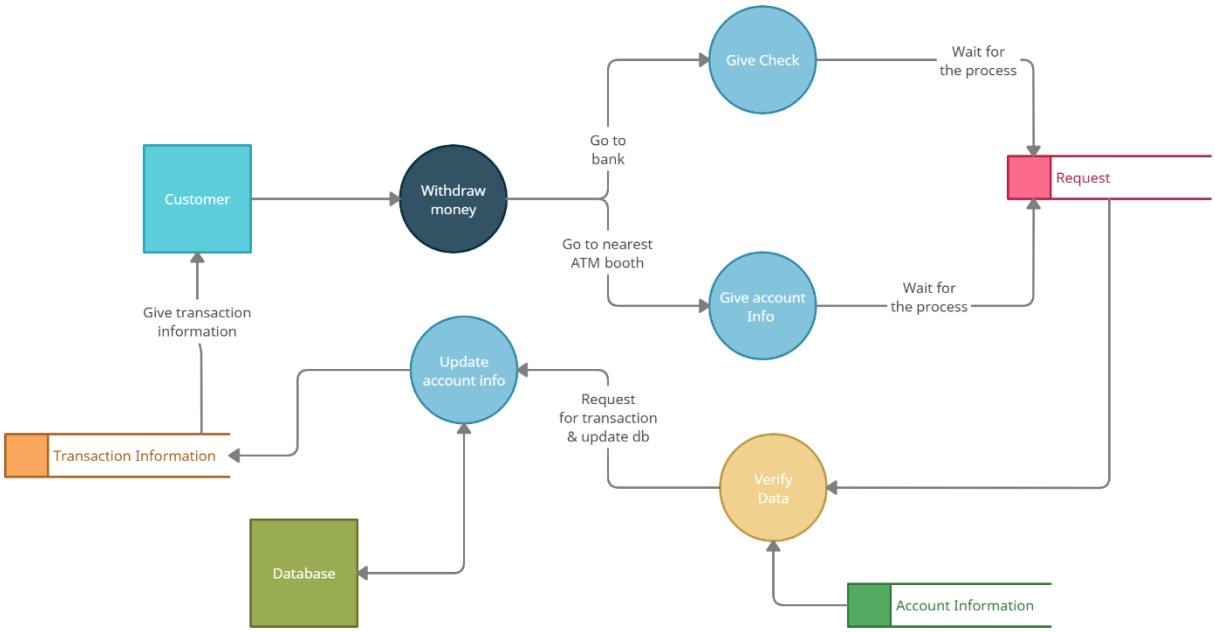

Figure 3.4: Data flow diagram for withdraw money

Description of the DFD of the existing system -

The Data Flow Diagram shows us the three main activities related to saving's account system of Rupali Bank. Here below are the used symbols meaning for our diagram:

1. **Squares** define the source and destinations: Customers and their accounts.
2. **Arrows** identify the data flow- data in motion. It's the pipeline through which information flows. It describes how a process goes on to meet the goal.
3. **Circle** represent a process that transform incoming data flows into outgoing data flows. The three major process are: Check Current Status, Deposit Money and Withdraw Money and all the process are used to complete this major activities.
4. **Rectangle** is a data store- data at rest or a temporary repository of data. Here we have used four rectangles to represent data storage: Account Information, All Transaction Information, All requests for Deposit process and All requests for Withdrawal process.

3.2.2 DFD Elaboration

This data flow diagram mainly denotes how a customer goes through any system for his three main essential tasks. In this section, we will elaborate Data Flow Diagram described above by the process, storage and data flow that we have used and find out problems.

1. Check Current Status:

Users must need to check the current status of their account such as how much money the account has, what were the last transactions etc. To accomplish this, the process will be like,

Name of Process : Give Required Information
Short Description: User have to go to a branch of Rupali Bank and give the proper information about the account so that it can be identified.

Inputs	Logics	Outputs
Go to a branch	It's the usual way of this system.	N/A
Give Enough Information	To know the current status user have to provide information about that account.	Wait for reply.

Name of Process : Verify Data
Short Description: The given information by customer is verified in this process for further procedure.

Inputs	Logics	Outputs
Given Information by Customer.	Check whether the information/account is valid or not.	If Ok, go to collect data.

Name of Process : Collect Required Data
Short Description: Service providers collect the data asked by the user and end this activity.

Inputs	Logics	Outputs
Validation –Ok Which questions to be answered.	Collects information from Customer's account and All Transaction repository.	Customers get their information.

Problem: The Data Flow is from 'Go to Branch' to 'Reply to customers' also reminds that if it's a busy day, a user may have to wait just for having a chance to meet the service providers.

2. Deposit Money:

Users of a savings account definitely face this process. For this process anyone (not necessary the account holder) follow:

Name of Process: Submit a form and Money

Short Description: Depositor goes to a branch and collects a form, filling up the form submit it, and the amount of money to be stored and waits for the update.

Inputs	Logics	Outputs
Go to a branch	It's the only way to deposit money in this system.	Now the process is assembled into 'All Requests for Deposit' temporary repository. Depositor have to wait for his call.
Submit a form and money	Depositor should collect a form and fill the form up giving all the information like account no, deposit amount etc. and then submit it to the officers.	

Name of Process: Verify Data

Short Description: All the information according to the form given by depositor are checked at this stage and if everything is okay, the transaction process will be done.

Inputs	Logics	Outputs
Form and money – information from the 'All Requests for Deposit' repository is picked up.	Check whether the information/account is valid or not.	If Ok, transaction procedures is placed. Account will be updated.
Account Information storage		Customers will be informed.

Problem: Here the data flow mentions that depositors have to wait for proceed while the customers in front of them are being serviced. The waiting state is lengthy when it's a busy day.

3. Withdraw Money:

Users of a savings account often need to withdraw money from account. It can be done from a branch or from an ATM Booth. For this process users follow :

Name of Process: Submit a form and Money and Give Information.

Short Description: Withdrawer goes to a branch and collects a form, filling up the form submit it, and the amount of money to be withdraw and waits for the update.

Inputs	Logics	Outputs
Go to a branch And Submit a form and money.	Withdrawer should collect a form and fill the form up giving all the information like account no, deposit amount etc. and then submit it to the officers.	Now the process is assembled into 'All Requests for Withdraw' temporary repository. If it's from a branch withdrawer have to wait for his turn.

Go to an ATM and enter the information.	If it's from an ATM Booth, then ATM Machine will show the user what information should be given and user have to enter those.	If it's from an ATM , waiting state will be just some seconds.

Name of Process: Verify Data

Short Description: All the information according to the form or from an ATM input given by withdrawer are checked at this stage and if everything is okay, the transaction process will be done.

Inputs	Logics	Outputs
Information from the 'All Requests for Deposit' repository is picked up.	Check whether the information/account is valid or not using account information.	If Ok, transaction procedures is placed. Account will be updated..
Account Information storage	storage.	Customers will get their money and be informed

Problem: Here the data flow mentions that ATM booth service is easy to use, user don't need to handwrite the information and also don't need to wait to proceed. But users who go to the bank have to wait for proceed while the customers in front of them are being serviced.

3.3 Cost and Benefit analysis

We know, cost and benefits analysis is a process by which organizations can estimate the cost and benefits of decisions, systems or projects in order to find the most effective alternatives. By providing a clear view of the results of an action, cost benefit analysis is an extremely useful tool in developing business strategy, evaluating a new hire, or making resource allocation or purchase decisions. So, we developed a cost

and benefit analysis model in this report. Our model is developed by defining the benefits of a decision as well as the associated costs and subtracting the costs from benefits.

3.3.1 Costs and Benefits Identification

Costs and benefits identification is important to construct the most cost-effective model from the data. Some costs were easily identified or quantified while others were hard to determine. The cost for the bank related to Interest Expense on Bank Deposits, Interest Expense on Debt, Labor related Expense, Equipment Expense, Operating Provisions, Taxes, Depreciation & Amortization etc. Benefit includes Interest and Fees on Loans, Interest on Bank Deposits, Other Interest or Dividend Income, Securities Gain, Foreign Exchange Gains, Trust Income, Commissions & Fees, Commission & Fee Income. We will discuss all parts in next section about costs and benefits categories of Rupali Bank Limited.

3.3.2 Categorization of Costs and Benefits

We have divided cost or expense part into two main categories, such that;

(i) Interest Expense &
(ii) Non-interest Expense.

Interest Express mainly expenses that is related to bank loan, debt from other organizations. Sometimes, the bank has to invest more money than the bank's investment capacity for more benefits. For which, the bank has to take a loan from other organizations. In that case the bank has to repay the loan with a profit to all those organizations. So the Interest Expenses includes: Interest Expense on Bank Deposits, Interest Expense on Debt. And the Non-interest expenses is related to maintaining cost, income tax, pre tax etc.

In terms of benefits, we have divided into two categories also like cost. such that;

(i) Interest Benefits
(ii) Non-interest Benefits.

All interest benefits are comes from loan interest, bank deposits and non-interest benefits include Securities Gain, Foreign Exchange Gains, Trust Income, Commissions & Fees, Commission & Fee Income.

Interest Incomes & Expenses

(Fiscal year is January-December. All values BDT Millions.)

	2019	2018	2017	2016	2015
Interest Income	26,523	23,882	23,358	19,575	22,115
Interest Expense	18,705	15,301	13,290	15,263	17,056
Net Interest Income	7,819	8,581	10,068	4,311	5,059
Loan loss provision	839	1,581	2,991	-	654
Net Interest after provision	6,980	7,000	7,077	4,311	4,405

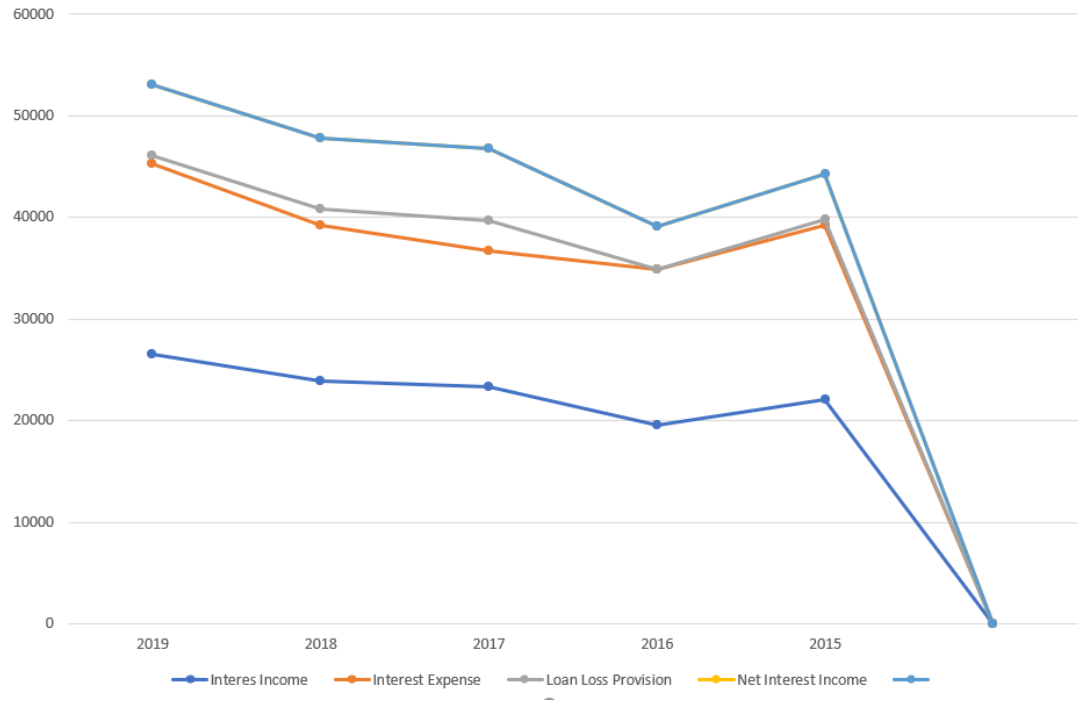

Figure 3.5: Interest Income & Expenses

Non-Interest Incomes

(Fiscal year is January-December. All values BDT Millions.)

	2019	2018	2017	2016	2015
Securities Gain	1,033	479	-	-	-
Foreign Exchange Gains	1,177	970	1,548	1,481	1,419
Trust Income, Commissions & Fees	623	677	455	485	532
Commission & Fee Income	623	677	455	485	532
Other Operating Income	776	669	449	202	188
Net Non-Interest Income	3,608	2,796	2,452	2,168	2,138

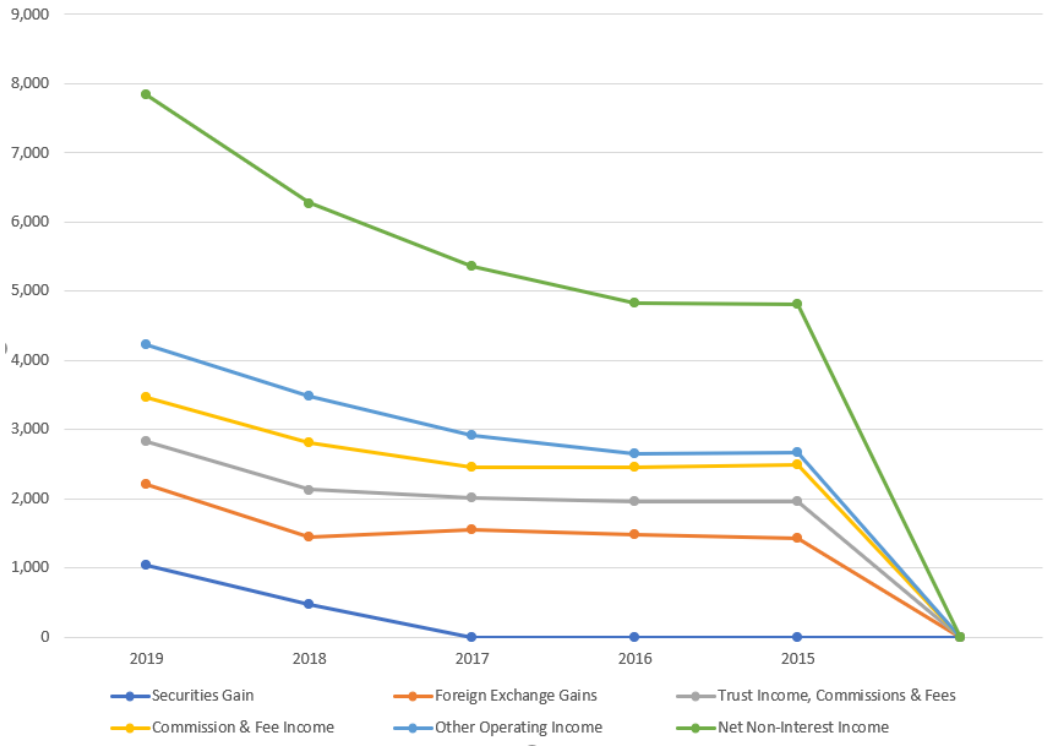

Figure 3.6: Non-Interest Income

Non-interest Expenses

(Fiscal year is January-December. All values BDT Millions.)

Labor & Related Expense	4,818	4,687	3,958	4,200	2,445
Equipment Expense	580	537	485	451	426
Operating Provisions	145	198	1,546	870	1,071
Taxes Other than Income Taxes	-	-	41	27	19
Depreciation & Amortization	438	600	322	363	275
Other Operating Expense	2,051	1,464	1,816	1,357	1,236
Net Non-Interest Expense	8,032	7,486	21,502	7,268	5,471

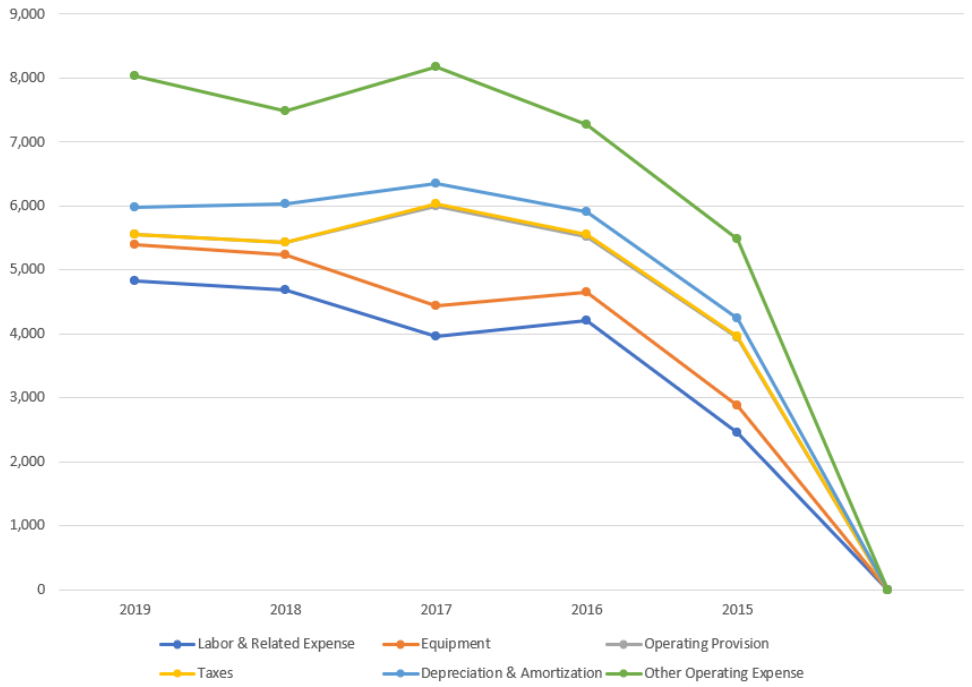

Figure 3.7: Non-Interest Income

3.3.3 Evaluation of Cost and Benefit

The cost and benefit aspect of Rupali Bank is much more complicated and has a lot more privacy. They basically keep an annual report of their income and expenses. Where they show total expenditure and total income in different sectors. Here we have not worked with their whole system, but only a specific account (Savings Account) system. But, we have come to know that they use the money deposited in their savings account for various loans and invest in other important sectors to gain some interest and then the part of this interest is given to savings account holder. So there is a relationship between the savings account and other accounts and sectors. Also, according to privacy issues we can't gather necessary information to develop a model.

Due to privacy issues and lack of necessary information here we've only discuss their annual expenses and Income report where both interest and non-interest income and expense shown.

If they use our software based model for the savings account related work (current status, deposit money and withdraw money procedure), then it will add some new cost to their system like :

Tangible cost: It's a quantifiable cost related to an identifiable source or asset. It can be directly connected to a material item used to conduct operations or run your business.

Tangible costs represent expenses arising from such things as purchasing materials, paying employees or renting equipment.

1. Development Cost: The cost is for the first time only when the website/app will be built. This cost is dedicated to the developers of the software. This is a onetime investment and then its needed.
2. Online-system Management Group: This includes the cost for a management team building who will work in this online based procedure.
3. Other Cost: This includes various types of office equipment, Hardware costs, etc.

Intangible cost: Fault in digital system like database server down, transaction error, data transmission error these are intangible cost. If the machinery's will stop working due to some known or unknown reason it will cost and this is also an intangible cost.

Intangible benefit: Subjective benefits that cannot be measured in monetary terms. Intangible benefits, also called soft benefits, are the gains attributable to your

improvement project that are not re portable for formal accounting purposes. These benefits are not included in the financial calculations because they are nonmonetary or are difficult to measure.

In our proposal there are some intangible benefits.

1. Computerized system will increase the speed of the work. This is unmeasurable benefit.
2. There are many information which is shared with customer through website. Any customer can know about current information, can easily withdraw money and deposit money to their account without facing the whole lengthy and time-consuming process. This is a huge benefit for the organization but immeasurable.

3.4 Conclusion

In the first section we of this chapter, we discuss various information gathering tools we got information from these tools and forms. Here we have discussed about all the service systems of the bank where debit card service and online service Sure Cash have been mentioned. We have also mentioned the customer reviews about the online service that we collect from Google Play Store. We then mentioned our official conversation with the Assistant General Manager of Motijheel branch and tried to gather all information that we need. After that, we showed a summary of the data that we received through online and interviews. Finally we develop a Data Flow Diagram on existing dealing system where, we have mentioned the various steps as well as its various problems. For cost and benefit analysis we separate costs and benefits that are related to savings account from annual cost-benefit report. Unfortunately the cost section was too sensitive and private so we could not collect all the data so we could not add any model in the evaluation part.

Chapter 4

Design

4.1 Introduction

System Design is the pivotal point of a System Development Life Cycle that depicts how the assembly of a System is done using different Components. System Design proposes the summarization of the findings and recommends a candidate system for the user.
It proposes a new effective system over the current loosely effective system. The focus of the system design phase is on the detailed implementation of the system so that it makes betterment on the overall performance of the existing system. While designing a System, the system design process goes through two phases of development. Which is Logical design & Physical design. Logical design reviews the current physical system, produces specification for the outputs, produces specification for the inputs, specifies implementation plan, reviews cost-benefits. Physical design is nothing but following the Logical design. It produces a working system by creating definition of the design specifications.

Logical Design works in the below manner:

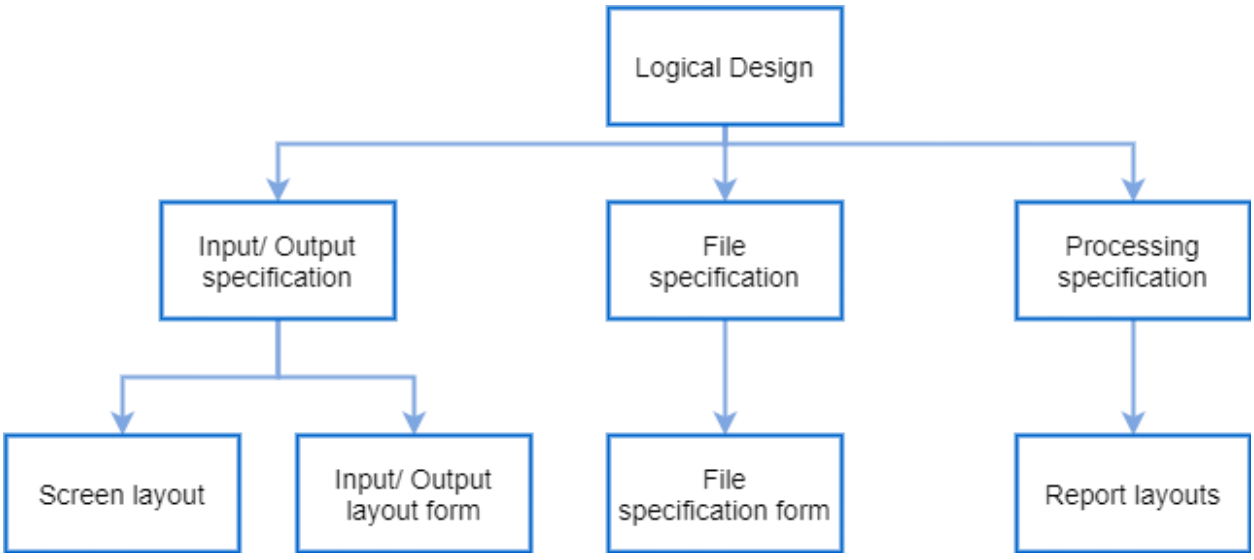

Figure 4.1: Logical Design Diagram

Physical Design works in below manner:

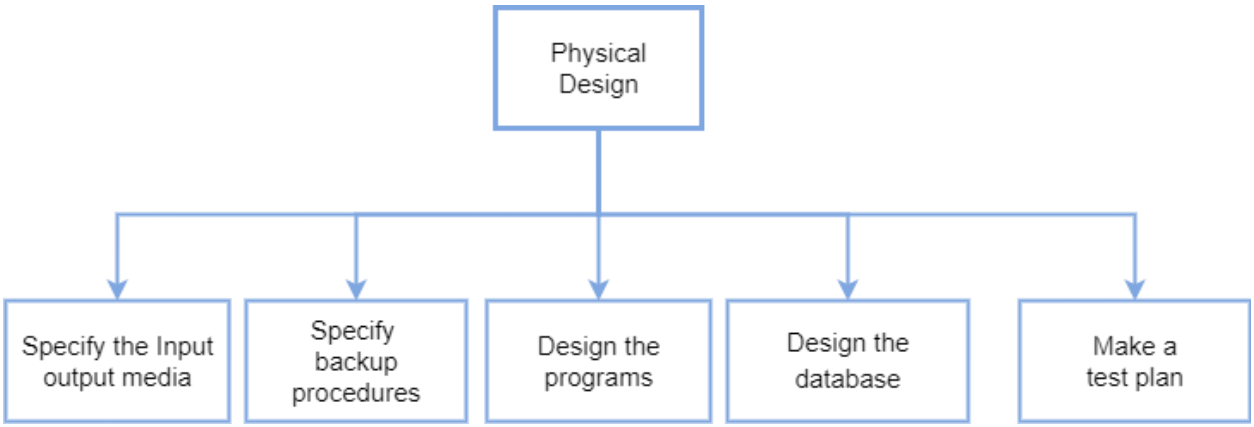

Figure 4.2: Physical design diagram

The Design phase covers the following:

- It reviews the current physical system
- Prepares the input & output specifications
- Prepares logical design walkthrough
- Specifies the implementation plan
- Reviews the cost, benefits, system targets and the constraints.

4.2 Objectives

A system design should have the following properties:

1. **Practicality**: The system design must hold practical value. The System has to be stable and must have the feature to be used by the people with average intelligence.
2. **Correctness** : The system design should be correct following the requirements
3. **Completeness**: The design should be a complete design and have all the components derived from the previous valid system design.
4. **Efficiency**: The design should be efficient for the overall betterment of the system and the resources should be handled efficiently.
5. **Flexibility**: The design should have the window for modifiability as per the need of the user.

System Design Objectives are shown on the following Diagram:

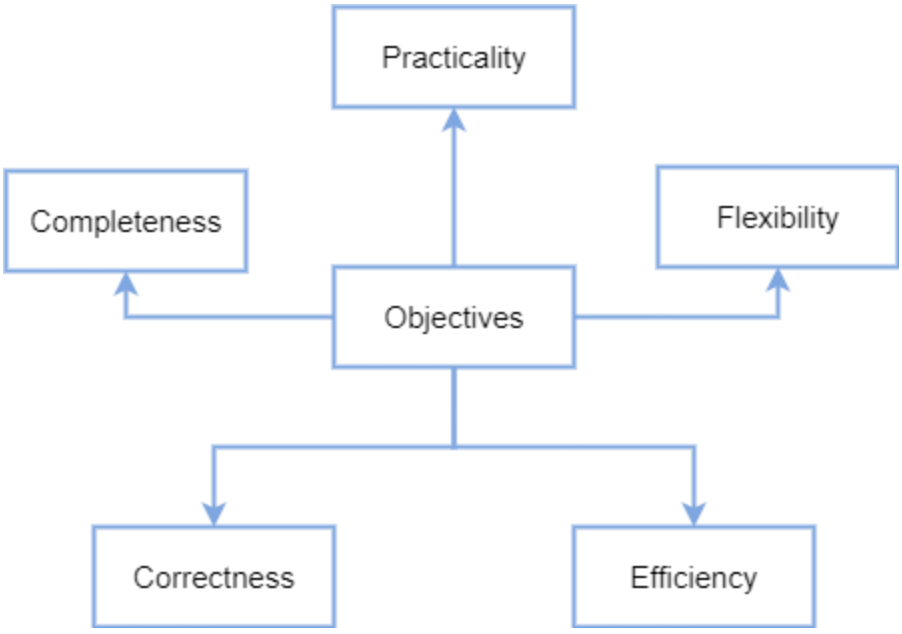

Figure 4.3: System Design Objectives

4.3 Structured Design

Structured Design is a methodology which sits on the basis of the data-flow of the system. It defines the input-output specification for the developing system. It has the describe ability of the functional aspects of the system. The specifications of the system acts as the base for the graphical representation of the data flows and processes which is also called data flow diagram (DFD).
Structured Design introduces modularity. It is an attempt to minimize the complexity and make a problem manageable by making the system more modular which is achieved by subdividing the problem into smaller segments. It minimizes the intuitive reasoning and promotes maintainability.

4.3.1 Data Flow Diagram (DFD)

Data flow diagram is the representations of the data processed by the system, in terms of inputs and outputs. As per the name suggests, it's area of focus is on the flow of the information. It deals with, from where the data comes from, and where it is headed and how it gets sorted in the way. Rupali bank is a Government Bank. So, there is a banking system runs in the company. It deals with the data when does an user

opens the account, the type of account is created, the amount of money is deposited for how long the amount of money is deposited, when the money will be withdrawn, the amount of money is withdrawn. There is a deposit and withdrawal system present in the bank.

For Money Withdraw, it's efficient to follow ATM Booth option. For other situation, like current status checking and deposit money our proposed system will be like below:

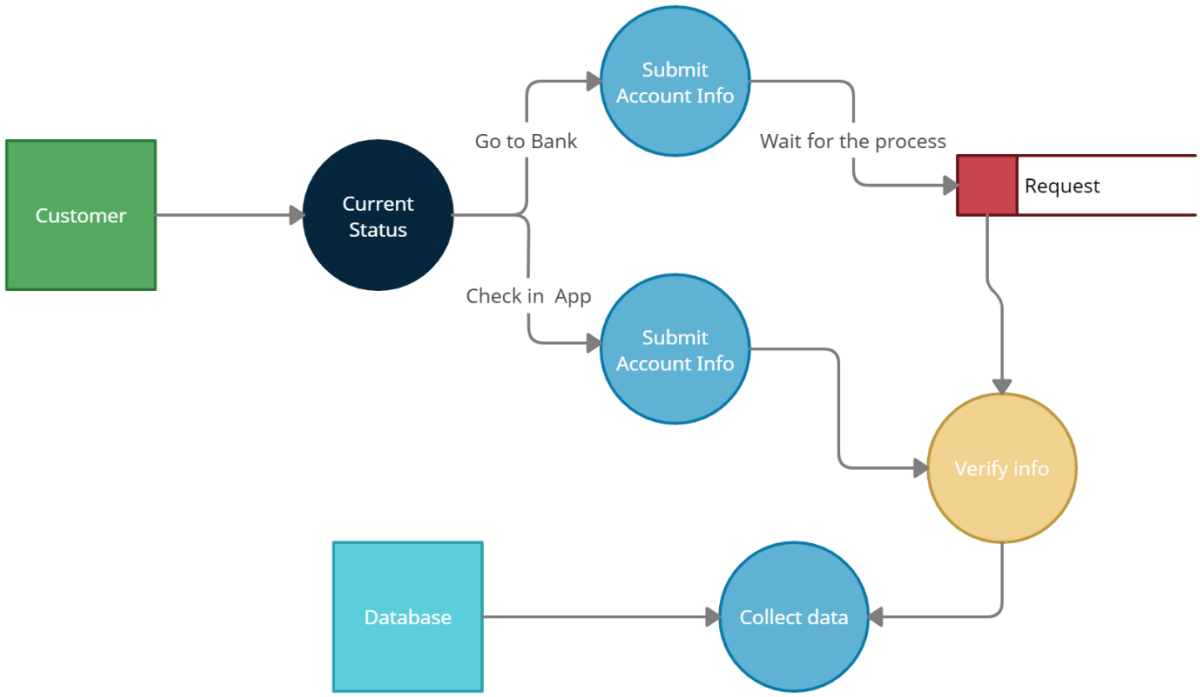

Figure 4.4: DFD for proposed systems current status check

Description : Our proposed system will have 2 options for current status check. One is the old or active way and another is our new way. In a new way, a customer will be able to know the current status of his account instantly by submitting the required information through his mobile app. As soon as the required information is submitted, a request will go to the server and after verifying the information, collect the required data from the database and give it to the customer.

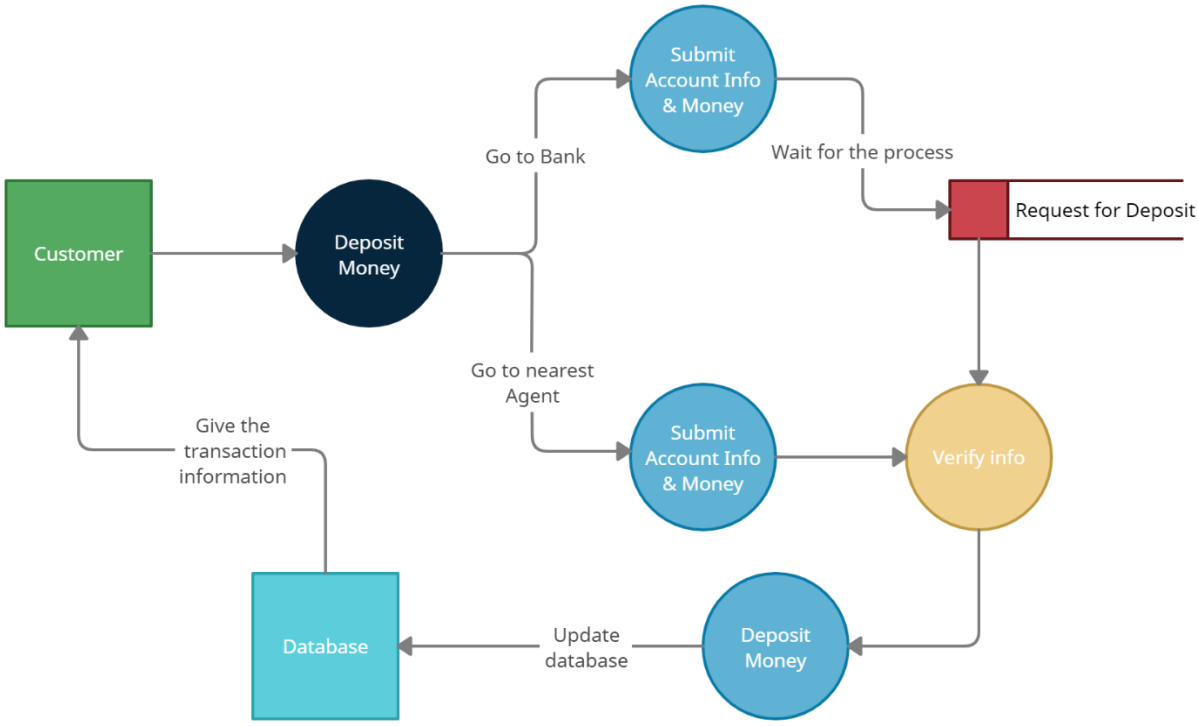

Figure 4.5: DFD for proposed systems money deposit

Description : Proposed system will have two options for money deposit. One is the old or active way and another is our new way. In the new system, a customer can go to the nearest agent to deposit money in his account where he will give his account information and money. The agent will make a request to the server with the information. The server will send a PIN to the customer. He will give the pin to the agent. The agent will finish the deposit with the PIN. To reduce the complexity of the diagram, the PIN exchange and its usage parts are included in the verifying data

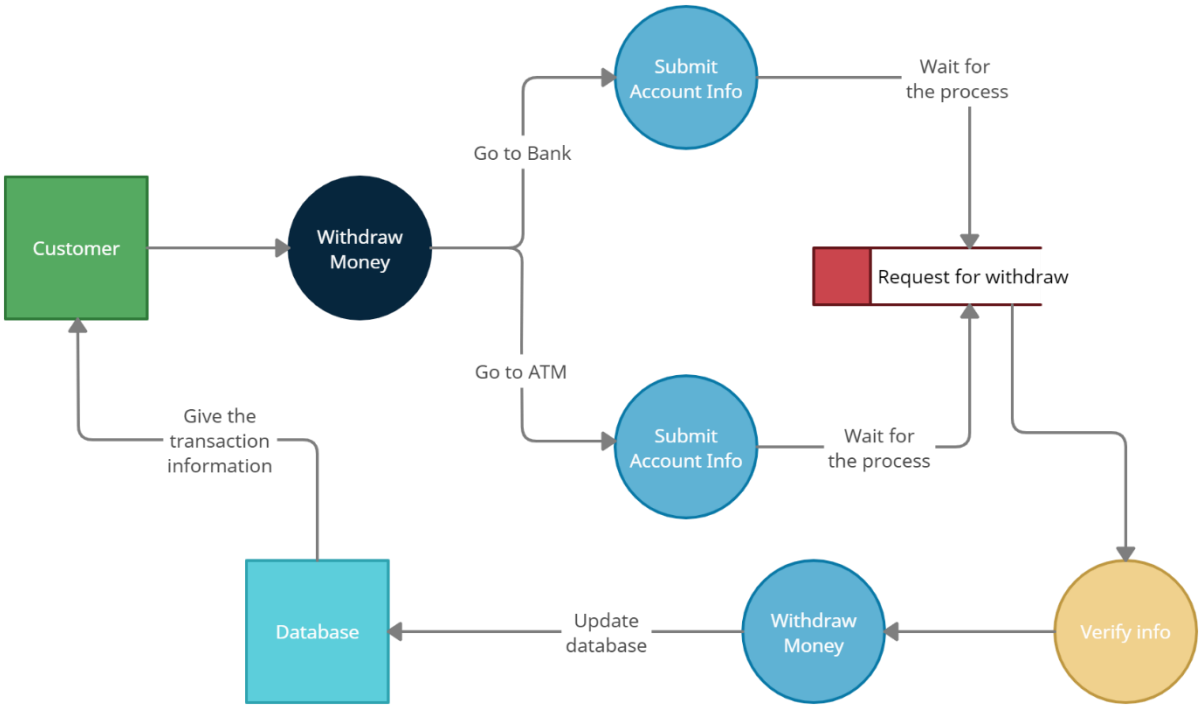

Figure 4.6: DFD for proposed systems money withdraw

Description : No changes have been made to the proposed system for withdrawals

4.3.2 Structure Chart

We know, Structure Chart is a graphical tool that illustrates hierarchical structure. It divides the entire system into some lowest functional modules, describing functions and sub-functions of each module of a system to a greater detail. Structure Chart partitions the system into black boxes. The functionality of the system is known to the users but inner details are unknown. Inputs are given to the black boxes and appropriate outputs are generated. Structure chart has three elements:

a. **Module :** Module represents the process or the task of the system. It is a contagious set of statements. It is displayed by a rectangle with a name.
b. **Connection :** The connection is represented by a vector linking one or more modules. It actually means one module has been called another module.
c. **Couple :** The couple is represented by an arrow with a circular tail. It represents data items moved from one module to another.

Module coupling is the number of connections between the module which is calling and the module which is being called and the complications of the connections. At least one connection must be connected to the calling and called module. This is module coupling in the structure chart of online payment system. It makes the structure chart easily understood and make the module as independent as possible.

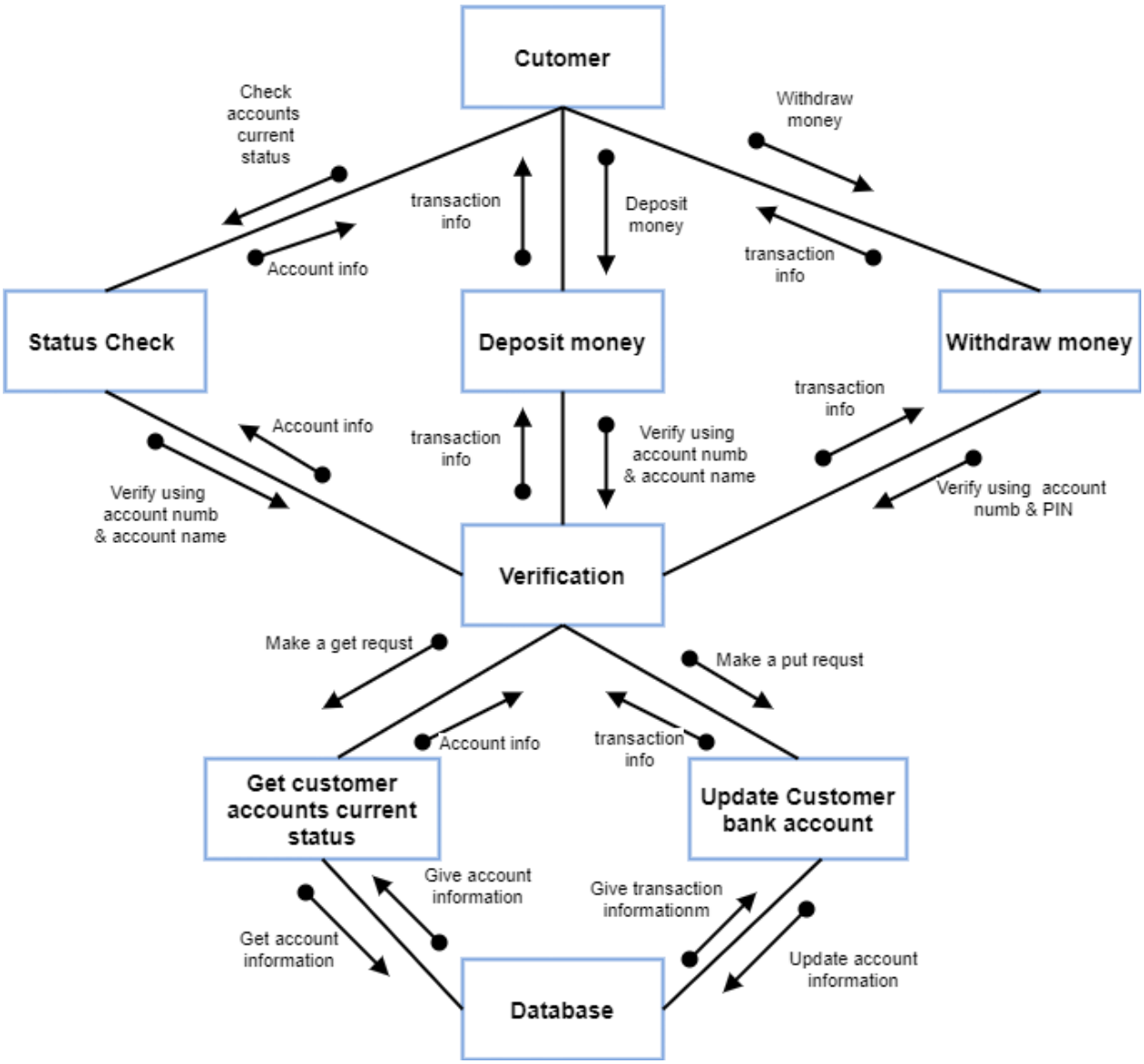

Figure 4.7: Structured chart for savings account system

and **Module cohesion** is the relationship between instructions in modules. If a module performs one task, then the module is less error-prone, meaning it is more

cohesive than other modules that perform more than one task. In the chart, the detail under the Verification module is made up of strongly cohesive modules. The module that performs more than one task, the elements of the module are said not to be bound together.

4.4 Database Design

We designing a database is to produce physical and logical models of designs for the proposed database system to represented as a summation of steps that help with designing, creating, implementing and maintaining a business's data management systems. To, overcome redundancy problem we can work with small amount of information for our database table like below:

Database table

Customer_ID	Name	NID	Date of birth			Contact		Address			Account		
			DD	MM	YY	Phone	Email	Village	Thana	District	Id	Tk	Account Type

But, then we can't track each transaction and store them for future use. Also, we subtract redundant data and add a small amount of information to a table. However, it would be costly to update all the data of a row in each transaction. We can do database normalization to make the database system cost efficient. Also, to uniquely identify each entry we can't just use one column as **primary key**. In this case we have to use **Composite key** that makes our table too complex.

In normalization technique, we break down a redundant table and create many different tables with related data to remove redundancy from database. Then we make a primary key for each table and then make necessary relation with each table.

Here, we create a relational database with three tables: User table, Account table and Transaction table. Where User table contain user information only. This table has

Customer_id, Name, Gender, Date of birth, Phone, Email, Village, Thana, Districh and account opening date. Account table contain account information including: Account Id, Account name, Account type, Account opening date, Amount. And, the transaction table contain transaction information. Basically transaction table will have data entry when each transaction made. It will store Transaction id, Transaction type: (withdraw or deposit), transaction amount and transaction time.

User table:

Customer_id (string)	Name (string)	Gender (string)	Birth (date)	Phone (number)	Email (email)	Village (string)	Thana (string)	District (string)	Join at (date)
10FG88	Abdur Rakib	Male	21 JAN 1995	01531 709712	rakib@gmail.com	Kotuali	Singra	Natore	10 JAN 2021

Account table:

Account_id (string)	Account_name (string)	Account_type (string)	Account_Opening_Date (date)	Amount (integer)
9DFRE1	Abdur Rakib	Savings	10 JAN 2021	20,000

Transaction table:

Transaction_id (string)	Transaction_Type (string)	Amount (integer)	Time (date or timestamp)
IHAS12AG	Deposit	10,000	03:12AM 21 JUN 2021

After that, we have to select a column that contain unique value to uniquely identify each entry. For this purpose we choose **Customer_id** from customer table, **Account_id** from Account table and **Transaction_id** from Transaction table as primary key.

Now, to make relations between these tables, we have to use **Foreign key** to connect them. To make a one-to-many relation between customer and account table we use a

Customer_id column in Account table as foreign key because, a customer can have multiple account but an account have only one owner.

Account table:

Account_id (string)	Customer_id (string)	Account_name (string)	Account_type (string)	Account_Opening_Date (date)	Amount (integer)
9DFRE1	10FG88	Abdur Rakib	Savings	10 JAN 2021	20,000

Table: Account table after including foreign key

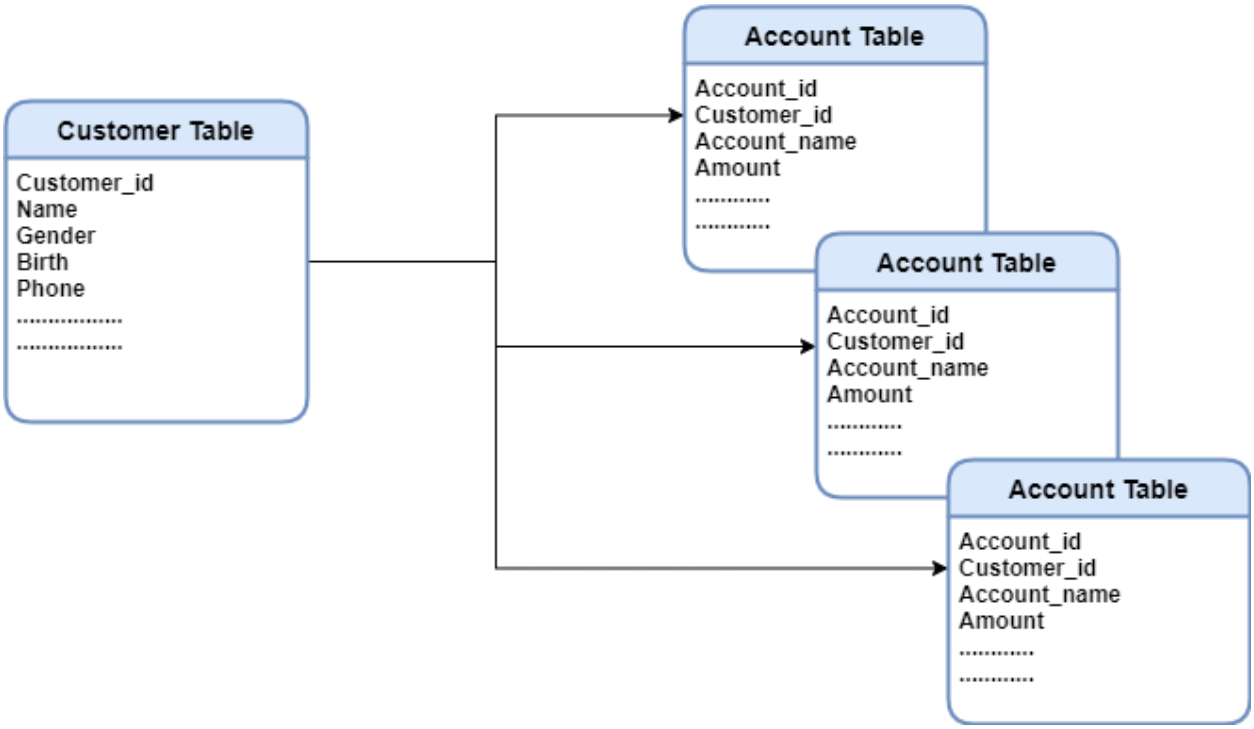

Figure 4.8: Relation between Customer and Account table (One-to-many)

Now, to track all transaction we create relationship between Account and transaction table. We don't have to create separate relationships between user and transaction tables. Because, we have already created a relationship between the user and the account table. Again, we create a One-to-many relationship between Account and Transaction table because there can be many transactions in one account but, a

transaction can only be made from one account. To achieve this again we use Account_id as foreign key in transaction table.

Transaction table:

Transaction_id (string)	Account_id (string)	Transaction_Type (string)	Amount (integer)	Time (date or timestamp)
IHAS12AG	9DFRE1	Deposit	10,000	03:12AM 21 JUN 2021
IHAS12AG	9DFRE1	Deposit	7,000	10:12AM 27 JUN 2021
IHAS12AG	9DFRE1	Withdraw	8,200	12:51PM 13 JUL 2021

Table: Transaction table after including foreign key

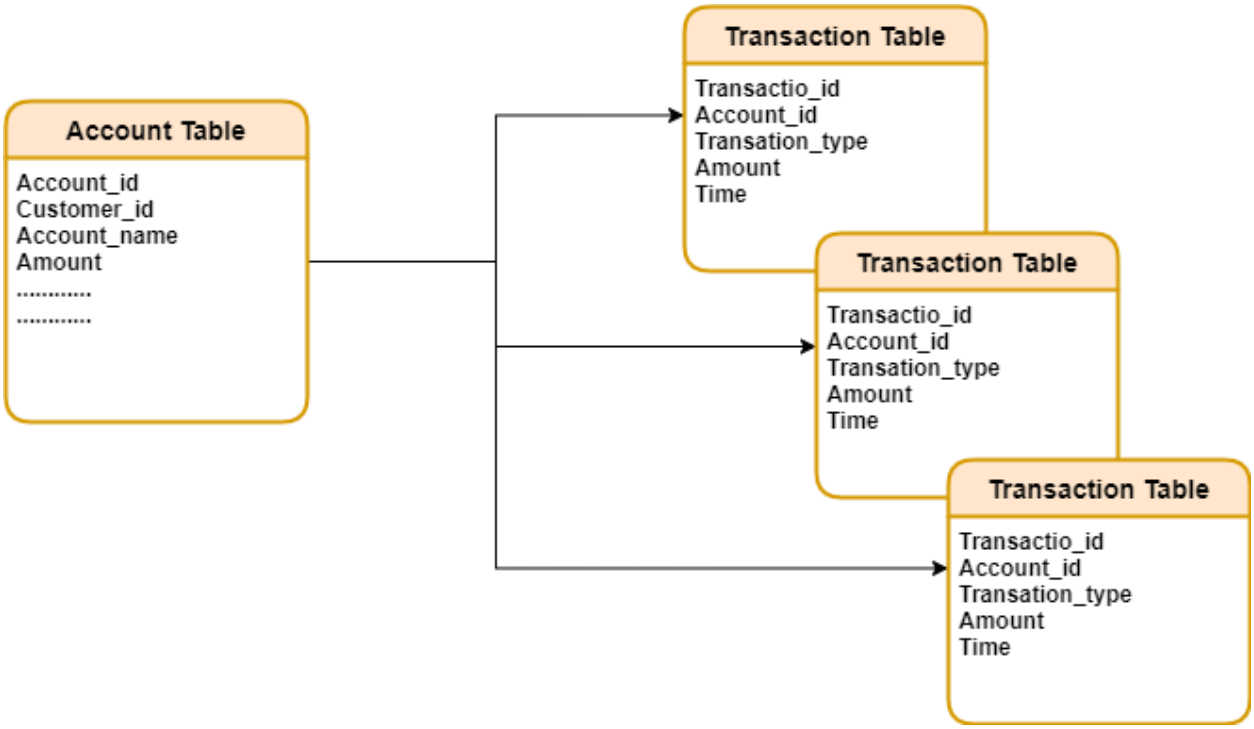

Figure 4.9: Relation between Account and Transaction table (One-to-many)

ER Diagram of savings account tables after normalization :

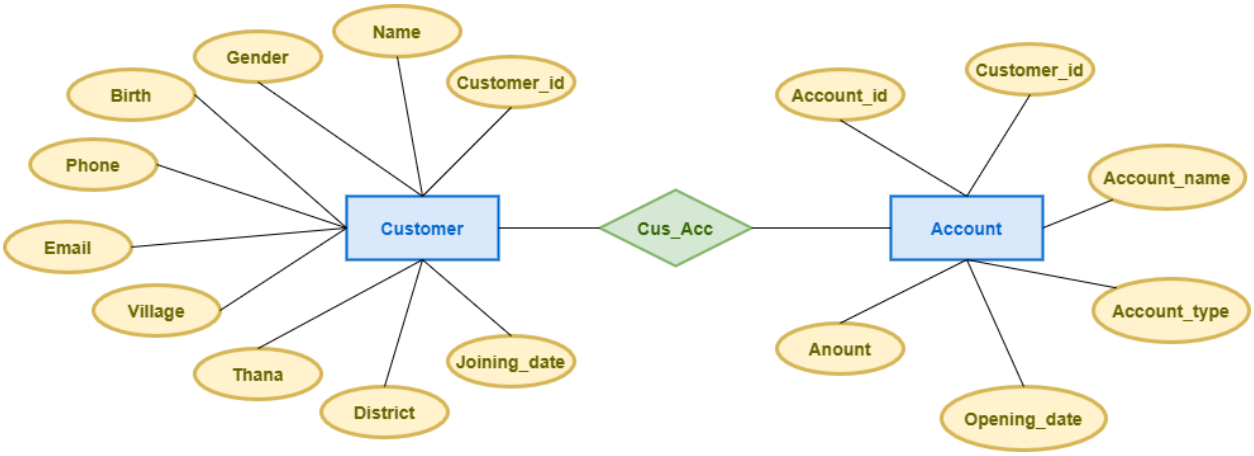

Figure 4.10: ER diagram for Customer-Account relationship

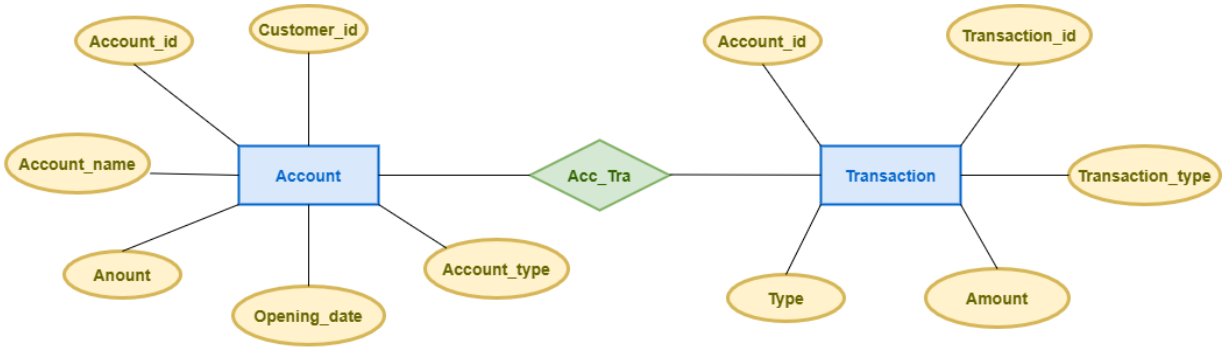

Figure 4.10: ER diagram for Account-Transaction relationship

4.5 Conclusion:

Graphical or textual modelling tools are mainly used to develop model for a system. We used graphical languages because it can describe so easily than textual tools. After we developed the system, we showed separate data flow diagrams for the three cases of knowing current status, depositing money and withdrawing. To make a well-formed database design for our system we ensure consistent data, elimination of data redundancy, efficient execution of queries and high performance application. We are not saying that our given model is the best for any commercial organization but can be treated as better than the existing system on the basis of Rupali bank's monetary and personnel status.

Chapter 5

Project Scheduling

5.1 Introduction

Project scheduling is the listing of all kinds of activities from the start to end of every task/project. It gives the way to understand who does what by when. Project scheduling requires the definition of dependency and assignment of resources. It is one of the most essential parts of any system analysis. The primary objective of project scheduling is identifying the best time with least cost and least risk. It has some secondary objectives too. Project scheduling proposes and evaluates different scheduling alternatives, makes an effective use of resources and reduces communication overhead among resources.

5.2 Scheduling Techniques

Scheduling techniques in a project are used to align all its aspects so as to work corresponding to each other. A schedule should be proportionate with the time set for the project and all its resources should be used in an optimum manner. A schedule consists of all the activities included in the implementation and execution of a project within the pre-determined time frame of the project. A project schedule helps in prioritizing work involved in a project and finish it off in an orderly manner. It also helps in appointing the right person for the job and in the proper allocation of the available resources. Time management and adjustments with the scope of a project is only possible if there is a proper schedule prepared for the project being worked upon.

There are two types of techniques in project scheduling – (i) Network Diagram & (ii) Bar Chart.

Network Diagram: Network Diagram is a graphical representation of the tasks necessary to complete a project. So it's an important tool to get some crucial contexts like task duration, sequence, and dependency.

There are two classic formats for Networking Diagram.

a. Activity on Arrow (AOA)
b. Activity on Node (AON)

a) Activity on Arrows (AOA): In this format, arrows are used to show activities. Circles represent events such as 'start' or 'end' of a given task and the Lines represent tasks. This is also known as Arrow Diagramming Method (ADM).

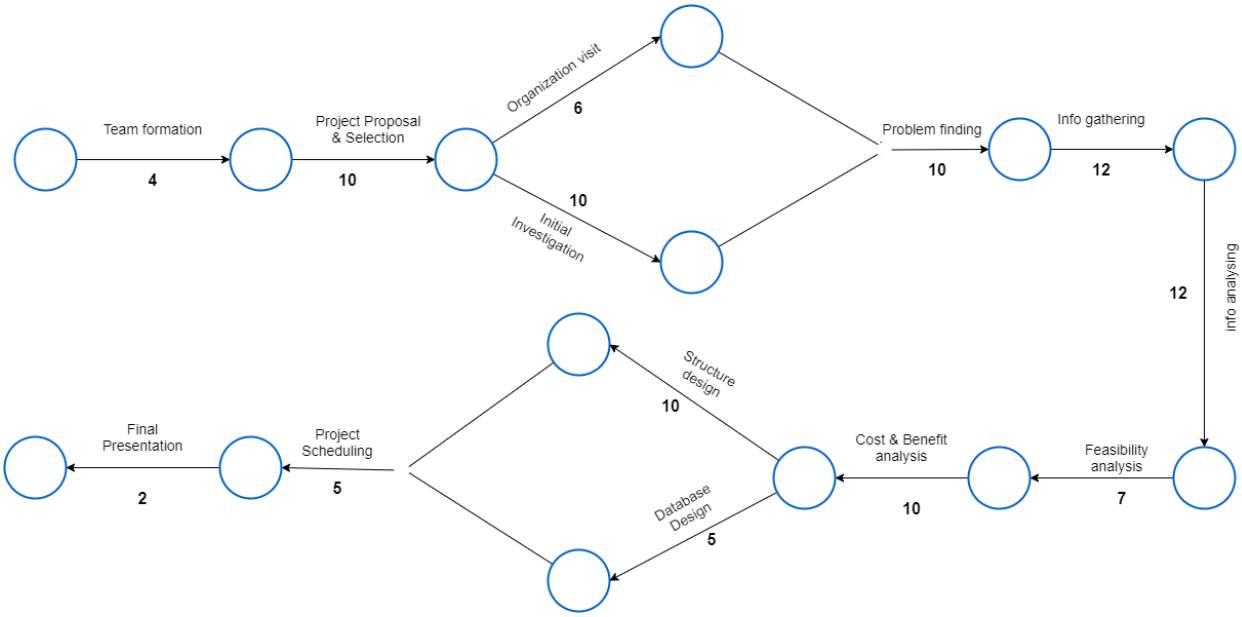

Figure 5.1: AOA Network Diagram

b) Activity on Nodes (AON): In this format, nodes are used to show activities where nodes can be circles or rectangles and all the task information are written on nodes. Arrows are used to represent the dependency on between tasks. This is also known as Precedence Diagramming Method (PDM).

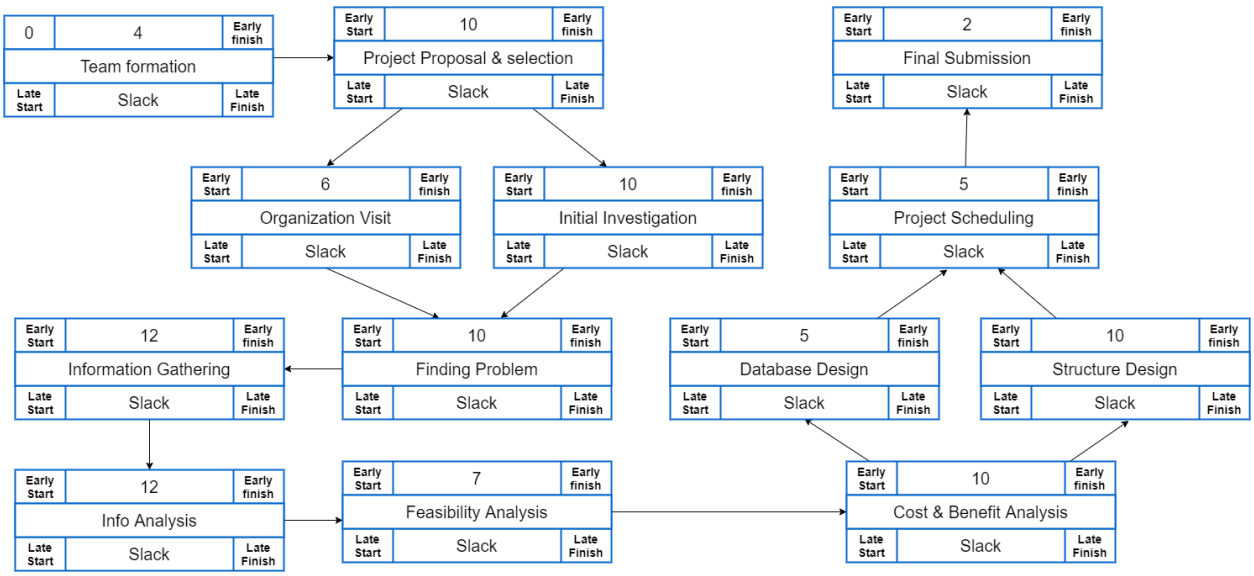

Figure 5.2: AON Network Diagram

There are two types of Network Diagram Techniques – (i) CPM and (ii) PERT

5.2.1 Critical Path Method (CPM)

A Critical Path is the longest sequence of tasks that must be completed to successfully conclude a project. It's a powerful but basically simple technique for analyzing, planning, and scheduling large, complex projects. All projects have at least one critical path. The tasks on the critical path cannot be delayed because it directly lengthens the schedule. If a task on the critical path is delayed by 1 day, then the project completion date is delayed (at least) by 1 day. Accelerating tasks not on the critical path does not change the project completion date. The process for determining and optimizing the critical path is based on 2-passes approaches - (i) Forward Pass and (ii) Backward Pass.

Forward Pass Approach: Forward Pass is used to determine the Early Start and Early Finish times for each task. It works from left to right by adding the duration time for each task to each node and each path. When several tasks converge, the Early Start for the dependent task is the largest of all preceding Early Finish times. For our system, Forward Pass Approach gives following result:

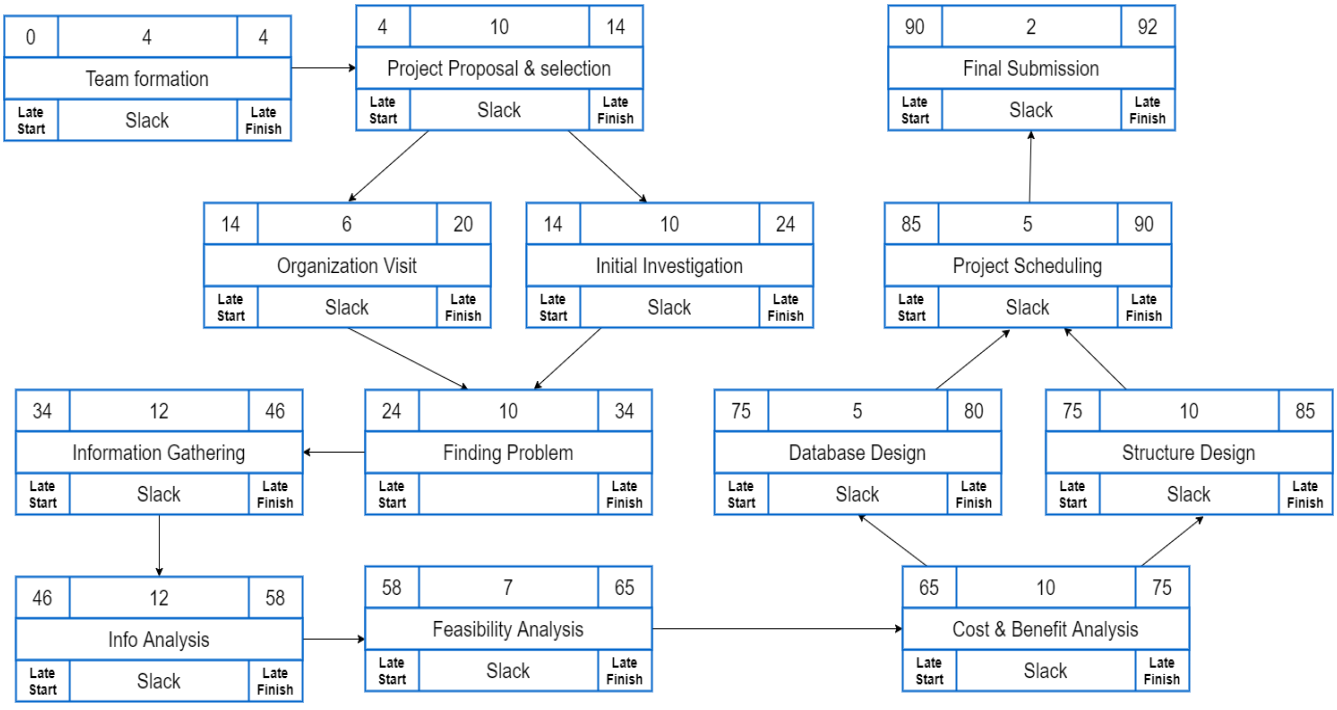

Figure 5.3: Forward Pass Approach

Backward Pass Approach: It is used to determine the Late Finish and Late Start of each node. It starts from the end node and moves backward by subtracting duration from connecting node's earliest start time. Usually Late Finish of each node will be equal to previous (depended) task's Late Start. When several tasks converge, the last finish for the previous task is the smallest of the following last start times. It calculates slack by the rule, **Slack = Late Finish – Early Finish = Late Start – Early Start.** Slack is the length of time an activity can be delayed without increasing the total project completion time.

For our system, Backward Pass Approach gives following result:

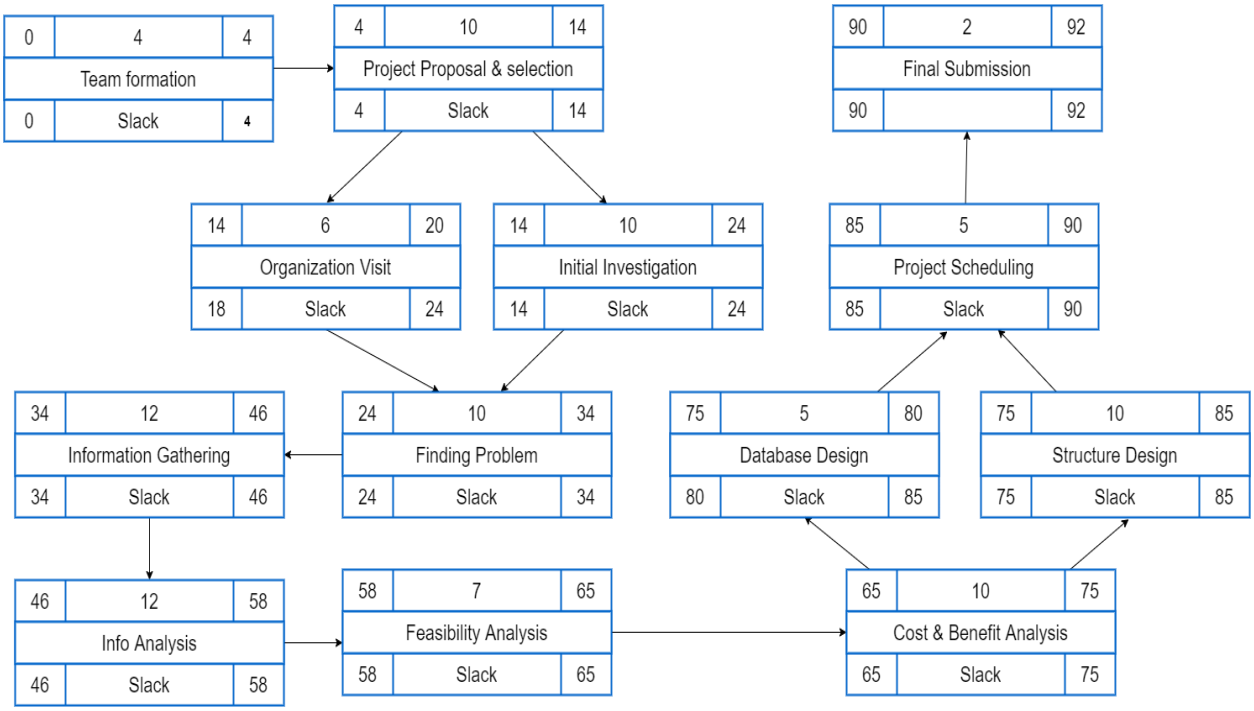

Figure 5.4: Backward Pass Approach

Critical Path is the path having all slacks equal to zero. The critical path of our system analysis project is given below. According to our scheduling time we show our critical path by drawing a red line into our AON network diagram.

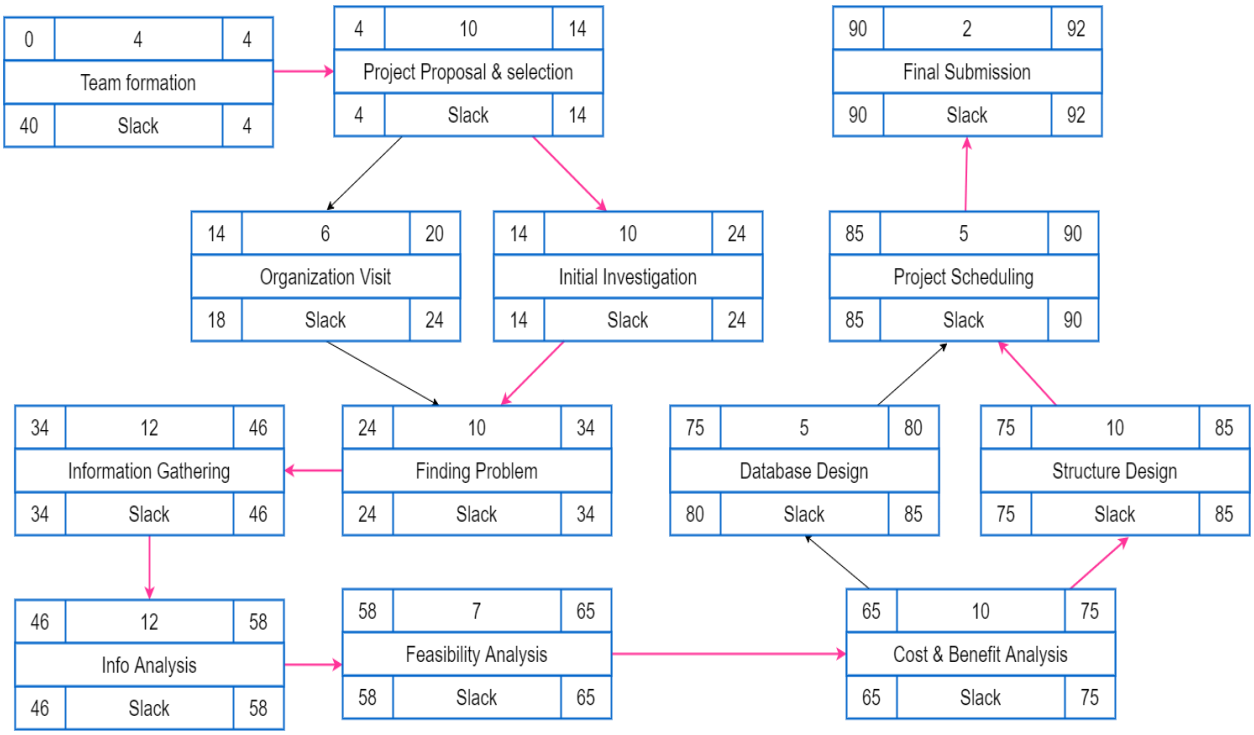

Figure 5.5: Critical Path

5.2.2 Program Evaluation & Review Technique (PERT)

PERT is used to calculate the amount of time it will take to realistically finish a project. PERT charts are used to plan tasks within a project — making it easier to schedule and coordinate team members. This method is based on the idea that estimates are uncertain. PERT method follows 3 steps for each task:

1) Starting with three different time estimates.
   - **Optimistic (t_o)** – Here all positive aspects are considered. So the time will be the shortest possible time for each task.
   - **Most Likely (t_m)** – It considers balanced situation. Here the time is the most probable amount of time.
   - **Pessimistic (t_p)** – Here all negative aspects are considered. So the time will be the longest amount of time tasks might take if things don't go as planned.

Task	Task Name	Duration(Days)	t_o	t_m	t_p
1.	Team formation	4	2	4	10
2.	Project Proposal & selection	10	8	10	25
3.	Organization Visit	6	5	10	12
4.	Initial Investigation	10	6	8	14
5.	Information Gathering	12	10	18	26
6.	Finding Problem	10	8	12	22
7.	Info Analysis	12	12	18	22
8.	Feasibility Analysis	7	7	10	15
9.	Cost & Benefit Analysis	10	5	11	15
10.	Database Design	5	5	6	11
11.	Structure Design	10	9	12	22
12.	Project Scheduling	5	6	9	15
13.	Final Presentation	2	1	4	8

2) Calculating the expected time (t_e) of each task,

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

Where,
t_e = Expected Time
t_m = Most Likely Time Estimate
t_o = Optimistic Time Estimate
t_p = Pessimistic Time Estimate

3) Calculating the standard deviation of each task,

$$s_i = \frac{t_p - t_o}{6}$$

For each task in the critical path, calculate the standard deviation of the project as:

$$s_{cp} = \sqrt{s_1^2 + s_2^2 + \cdots + s_n^2}$$

For our proposed system the expected time and standard deviation of each task are calculated like below:

For Task A,

$t_e = \frac{2+16+10}{6} = 4.67$; $s_A^2 = \left(\frac{10-2}{6}\right)^2 = \frac{64}{36} = 1.77$

For Task B,

$t_e = \frac{8+40+25}{6} = 11.67$; $s_B^2 = \left(\frac{25-5}{6}\right)^2 = \frac{289}{36} = 8.03$

For Task C,

$t_e = \frac{5+40+12}{6} = 9.5$; $s_C^2 = \left(\frac{12-5}{6}\right)^2 = \frac{49}{36} = 1.36$

For Task D,

$t_e = \frac{6+32+14}{6} = 8.67$; $s_D^2 = \left(\frac{14-6}{6}\right)^2 = \frac{64}{36} = 1.78$

For Task E,

$t_e = \frac{10+72+26}{6} = 18$; $s_E^2 = \left(\frac{26-10}{6}\right)^2 = \frac{256}{36} = 7.11$

For Task F,

$t_e = \frac{8+48+22}{6} = 13$; $s_F^2 = \left(\frac{22-8}{6}\right)^2 = \frac{196}{36} = 5.44$

For Task G,

$t_e = \frac{12+72+22}{6} = 17.67$; $s_G^2 = \left(\frac{22-12}{6}\right)^2 = \frac{100}{36} = 2.78$

For Task H,

$t_e = \frac{7+40+15}{6} = 10.33$; $s_H^2 = \left(\frac{15-7}{6}\right)^2 = \frac{64}{36} = 1.78$

For Task I,

$t_e = \frac{5+44+15}{6} = 10.66$; $s_I^2 = \left(\frac{15-5}{6}\right)^2 = \frac{100}{36} = 2.78$

For Task J,

$t_e = \frac{5+24+11}{6} = 6.67$; $s_J^2 = \left(\frac{11-5}{6}\right)^2 = \frac{36}{36} = 1$

For Task K,

$t_e = \frac{9+48+22}{6} = 7.17$; $s_K^2 = \left(\frac{22-9}{6}\right)^2 = \frac{169}{36} = 4.69$

For Task L,

$t_e = \frac{6+45+15}{6} = 13.16$; $s_L^2 = \left(\frac{15-6}{6}\right)^2 = \frac{81}{36} = 2.25$

For Task L,

$t_e = \frac{1+16+8}{6} = 4.17$; $s_L^2 = \left(\frac{8-1}{6}\right)^2 = \frac{49}{36} = 1.36$

Task	Task Name	Duration(Days)	t_o	t_m	t_p	t_e	s_L
1.	Team formation	4	2	4	10	4.67	1.77
2.	Project Proposal & selection	10	8	10	25	11.67	8.03
3.	Organization Visit	6	5	10	12	9.5	1.36
4.	Initial Investigation	10	6	8	14	8.67	1.78
5.	Information Gathering	12	10	18	26	18	7.11
6.	Finding Problem	10	8	12	22	13	5.44
7.	Info Analysis	12	12	18	22	17.67	2.78
8.	Feasibility Analysis	7	7	10	15	10.33	1.78
9.	Cost & Benefit Analysis	10	5	11	15	10.66	2.78
10.	Database Design	5	5	6	11	6.67	1
11.	Structure Design	10	9	12	22	7.17	4.69
12.	Project Scheduling	5	6	9	15	13.16	2.25
13.	Final Presentation	2	1	4	8	4.17	1.36

Critical Path : 1 −−> 2 −−> 4 −−> 5 −−> 6 −−> 7 −−> 8 −−> 9 −−> 11 −−> 12 −−> 13

Duration = 4.67 + 11.67 + 8.67 + 18 + 13 + 17.67 + 10.33 + 10.66 + 7.17 + 13.16 + 4.17 = 119.17 days.

Project Length Variance = 1.77 + 8.03 + 1.78 + 7.11 + 5.44 + 2.78 + 1.78 + 2.78 + 4.69 + 2.25 + 1.36 = 39.77

Project Length SD = $\sqrt{39.77} = 6.31$

Bar Chart: Bar Charts are the most simple and easiest way to generate schedules. It is widely used due to its simplicity and multiple adaptations to numerous events. A bar chart is formed with a list of activities, specifying the start date, duration of the activity and completion date of each activity, and then plotted on a project timescale. The detailed level of the bar chart depends on your project complexity and the intended use of the schedule. Two types of Bar chart are used-

a. Milestone Chart
b. Gantt Chart

We worked on Gantt chart only.

5.2.3 Gantt Chart

A Gantt Chart is a type of Bar chart that illustrates a project schedule by showing the temporal sequence of tasks and their duration. This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. The width of the horizontal bars in the graph shows the duration of each activity. It considers all tasks organized in groups and subgroups and presents the dependencies among tasks. It also shows the start and end dates of each task, resources involved in each task etc.

Starting from 30th July, 2021, Gantt chart for the Critical Path of our new system is drawn. The task and its subtasks are listed in vertical way and time management of each task and dependencies among them are pointed out in the horizontal way. According to the prediction from our Gantt Chart, all task related to our new system will be completed on 11th September, 2021.

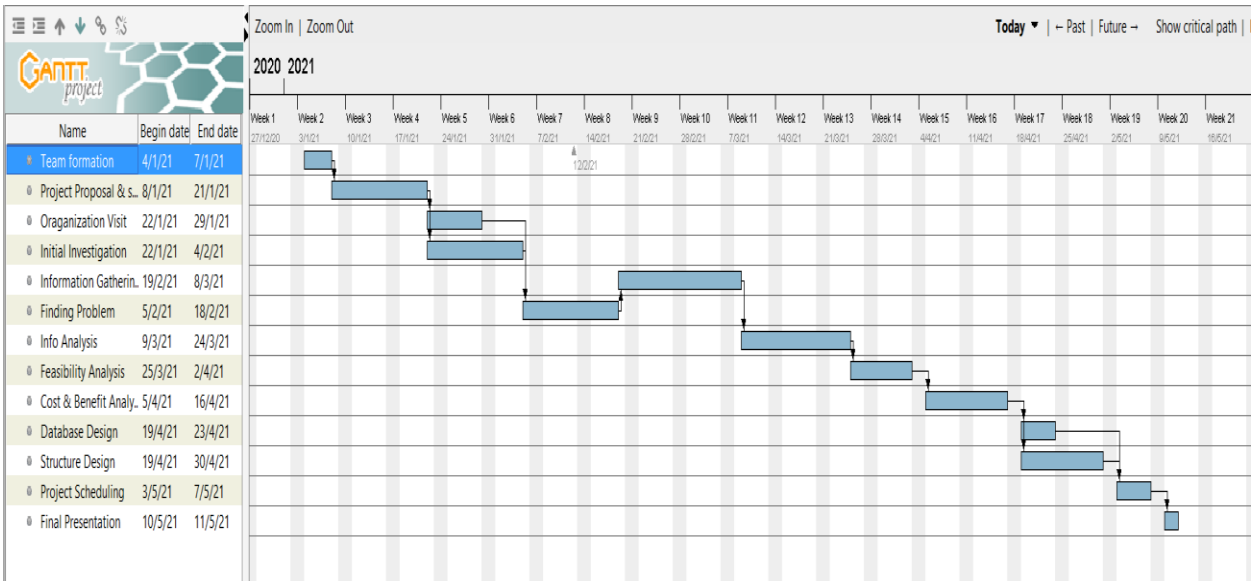

Fig: Gantt Chart for this project

5.3 Conclusion

To organize and complete projects in a timely, quality and financially responsible manner, we need to schedule projects carefully. Effective project scheduling plays a crucial role in ensuring project success. CPM, PERT and finally Gantt Chart helps to keep projects on track, set realistic time frames, assign resources appropriately and manage quality to decrease product errors. This typically results in reduced costs and increased customer satisfaction. Important factors include financial, documentation, management and quality assurance.