American International University-Bangladesh (AIUB)

Faculty of Science and Technology (FST)
Department of Computer Science (CS)

SDPM Group Project, Fall 2022

Project Title: Fingerprint Verification System for ATMs Using Biometrics

Section: A

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1.0 Introduction:

There is a myth in the development world that all that has to be documented for a product to be given to a client is the source code. Teams working on software development projects could quickly stray from their goals without objective documentation. By laying down a clear set of goals for the upcoming sprint, developers will be able to concentrate on what matters, learn from their mistakes, and work more efficiently. To monitor progress, allocate resources, and schedule next development, developers are employed. By keeping track of how they are put into practice, they can be improved even further. When dealing with challenges, software developers must think creatively and unconventionally. It could be helpful for resolving future problems to provide documentation on how a project was resolved.

Each project is distinct and may call for the establishment of a team with a diverse range of skills. Developers may also leave their projects to work on another, which would need management hiring or training new staff to carry on with their projects. These conditions make it obvious how important documentation is to the development of software. It helps new team members grasp the various aspects of the project, as well as what is expected of them and how they may improve its operation. When working on projects, developers are rarely involved with the diverse stakeholders. They concentrate mostly on problem solving and the interpretation of data. Even though it lessens the possibility of misunderstanding, documentation could help it even more.

In addition to reducing misunderstanding among project stakeholders and improving customer satisfaction metrics, strong documentation abilities may also help developers do their duties more effectively. Before it is prepared, the client also audits business documents. It is possible to move on to the next stage only once the previous one has been finished and approved, thus all phases are recorded along with the sequence. In addition to producing better-quality code and a platform with thorough documentation, working in this way has allowed us to accelerate the onboarding of new team members and take over tasks from colleagues.

2.0 Project Title: Fingerprint Verification System for ATMs Using Biometrics.

3.0 Objectives:

By offering validation and confirmation steps for the current ATM machine, the objective is to make an exchange successful and secure. The major goals of this project are to construct a safer ATM framework and a distinctive logo that serves as an approved character. The client places his or her finger on the ATM's biometric scanner, and if the finger match is made, the client's name is displayed on the ATM. If, by chance, that Fingerprint coordinate is not discovered, any transaction is forbidden.

Sub-Objective:

- Develop a distinctive brand that serves as an accepted persona and a safer ATM framework.
- Develop a high level of security for ATM transaction procedures.
- Creating a simple and faster user experience.
- Creating a simple and faster user experience.

4.0 Justification:

Using biometric information, a fingerprint-based ATM system can approve users. Users can be uniquely identified because every person's fingerprint has unique minute details. In comparison to ATM cards, fingerprint-based ATMs are more secure and safe. It is unnecessary to keep an ATM card in one's wallet or to be concerned about losing it. Users need only utilize their fingerprint to carry out any banking transaction.

Advantages:

- Compared to ATM cards, fingerprint-based ATM systems are more secure.
- There is no longer a need to carry an ATM card because the user can make purchases using his fingerprint whenever and wherever he pleases.

All those who work at the bank, use the ATMs simultaneously, and conduct business there will benefit from this arrangement. In general, we can argue that those with a stake in or an interest in the ATM booth are the beneficiaries.

5.0 Systems Overview:

Use Case Diagram:

In the Use Case diagram, there are four actors. Admin, User, Banking Database, and ATM The administrator of this system must collect the user's data, which includes their name, address, NID number, contact information, passport-size photograph, nominee information, and fingerprint. The user's information should then be added to the banking database, along with their fingerprint data, which is crucial. The administrator can also modify user data, but only after getting new data from the user. The system enables the user to insert a fingerprint that displays their name once the ATM has verified the user's fingerprint against their database. The user then keyed in the pin code to the ATM. The ATM machine can be used for transaction purposes. If the user has sufficient accessible balance in their ATM, they can withdraw money. Users may also use the ATM to check their balance.

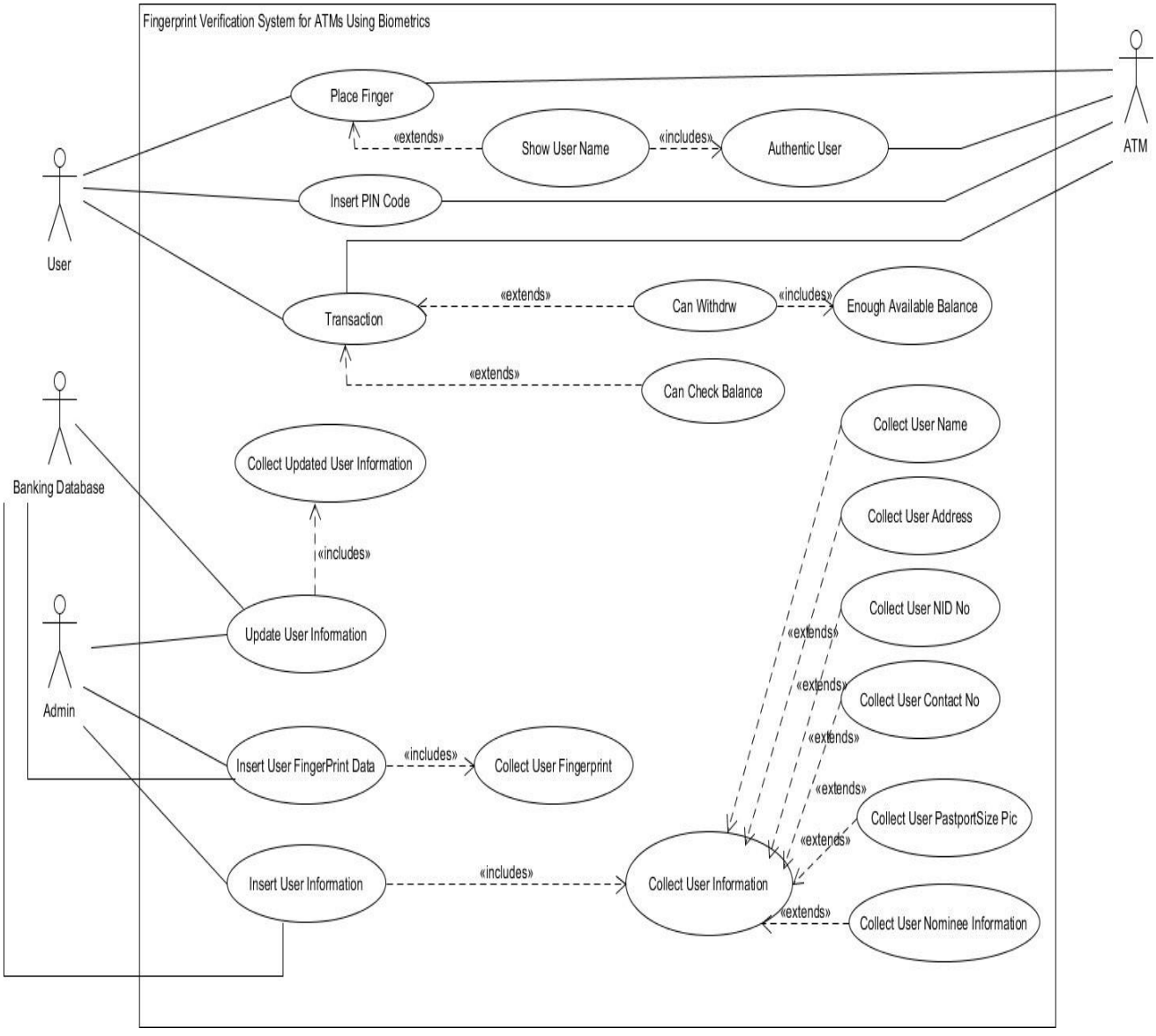


Figure 5.1: Use Case Diagram of Finger Print based ATM Verification System

6.0 Stakeholders analysis:

A stakeholder is any person, group, or organization whose interests are affected by the success or failure of a project or business venture. Stakeholders can be inside or outside the company funding the project, and they all have a vested stake in the project's success. Stakeholders are significant because their choices can positively or negatively affect the project. There are additional crucial or important stakeholders, whose backing is necessary for the project to proceed. All stakeholders can be broken into two groups: internal stakeholders and external stakeholders.

Internal Stakeholder to the project.

1. Account User
2. Programmer
3. Bank’s staff
4. Bank’s shareholder
5. Shopping mall’s owner & staffs

External Stakeholder to the project.

1. Fingerprint Scanner supplier in Bank
2. ATM Machine makers
3. Atm card printing machine companies.

7.0 Feasibility study:

A feasibility study's primary objective is to determine whether creating a system is technically, socially, economically, and operationally feasible. By making use of the existing system in the study domain and developing thoughts for a new system, this is achieved. Through a feasibility study, the required data was acquired. The process of gathering information necessitates education, experience, and common sense. Data was gathered and checked for completeness and accuracy. The data analysis method included identifying the system's components, their relationships, and the system's assets and liabilities.

Technical Feasibility study

The system's current architecture is being expanded with a fingerprint scanning pad in place of an ATM card reader. As a result, the developer won't experience any issues if they switch to a fingerprint pad from the ATM card reader. All that will be needed is for the fingerprint scanning pad to be integrated with the database and system.

Social Feasibility study

We may conclude that the system is socially feasible because of the system's greater security, flexibility, and user-friendliness, which will also fix some problems that staff members and users may have had with the current system.

Financial Feasibility study

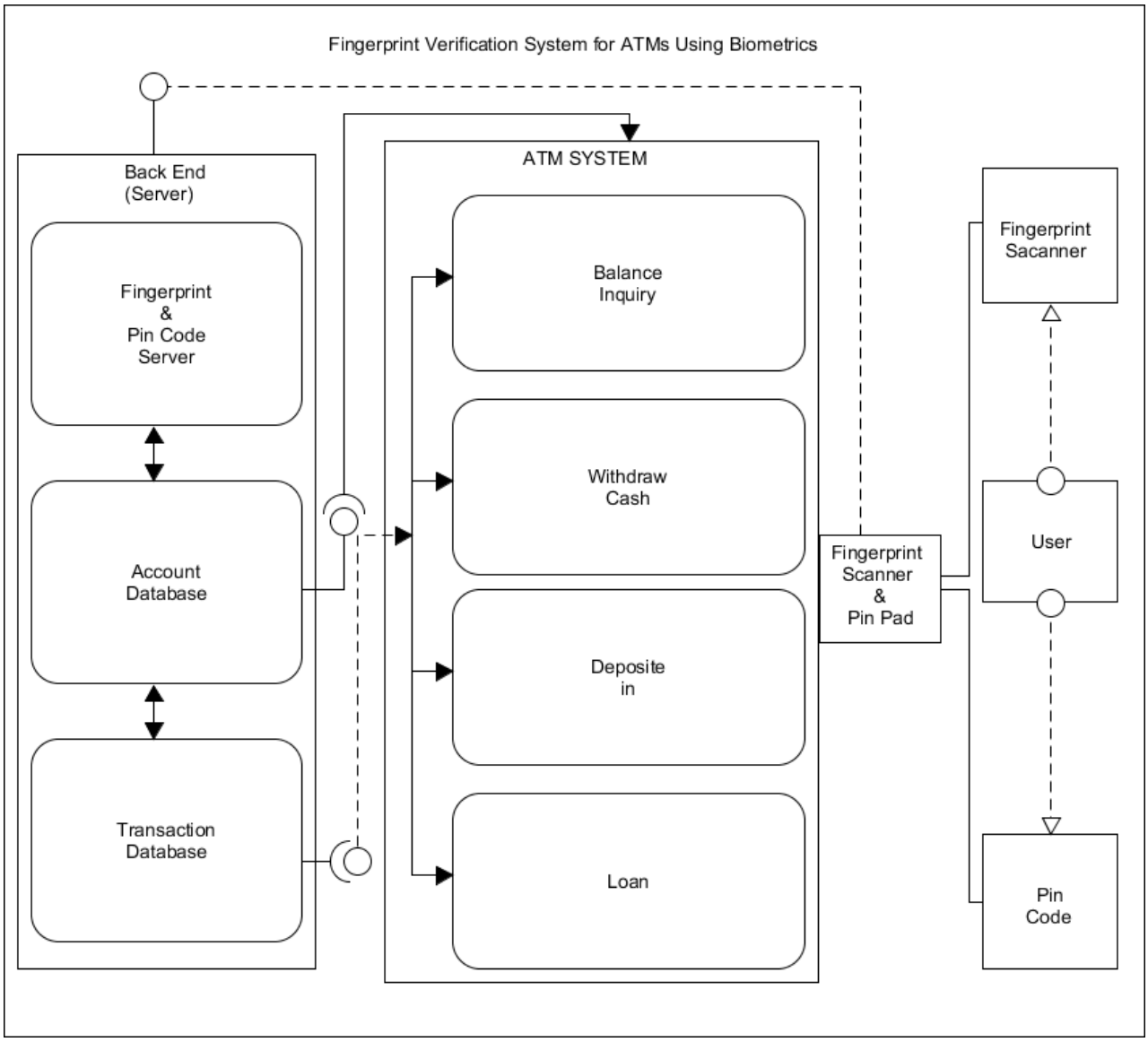
The cost of switching from the existing system to the new biometric system won't probably increase. A fingerprint scanning pad was all that was required to boost security without increasing costs during the development of the new system in place of an ATM card reader. The cost of the system will not rise by substituting an ATM card reader for a fingerprint scanner because the complete system already has all of its components. Additionally, it will do away with the cost of making an ATMcard.

Operational Feasibility study

The only change required of the customer is to place their fingerprint instead of their ATM card; otherwise, the process will remain intact. Additionally, it will eliminate the inconvenience of constantly carrying an ATM card, and new users can get the full experience of it in a short period of time.

8.0 Systems component:

The Fingerprint Based ATM System's component diagram is used to demonstrate how the system's components interact with one another to ensure that the ATM functions properly. A component diagram demonstrates the arrangement and interdependence of the software's component pieces. The components of a system are depicted in this diagram at a high level. A fingerprint-based ATM component diagram may include hardware or software components. They could be a user interface, a database, or another component that supports the operation of the ATM system.



9.0 Process Model to be followed:

Our system will employ the Waterfall Process Model, commonly known as the "one shot" or "once through" model. The "Waterfall Model" is a sequential framework that splits software development into preset phases. There cannot be any overlap between phases; one must be finished before starting the next. Each stage of the SDLC is created to finish a certain task. The projects that fit this paradigm the best have clear needs, a manageable scope of work, and are not overly complex. Usually, these projects are utilized to automate a certain internal process or resolve a secondary business issue. We use this paradigm for projects when we wish to prevent task redos and systems with clearly stated requirements. The only thing that has to be changed is the fingerprint scanner for the ATM card reader, which makes the requirements for our project quite simple. The system and financial databases must now be integrated with the fingerprint scanning equipment.

10.0 Efforts estimation:

Based on LOC, or the number of lines of code, is a regression model known as Cocomo (Constructive Cost Model). It is often used as a technique for accurately anticipating the different project-related characteristics, including size, effort, cost, time, and quality. It serves as a procedural cost estimation model for software projects. Because it is based on the analysis of 63 projects, it was proposed by Barry Boehm in 1981 and is among the best-documented models. As a result of the Cocomo, effort and schedule are the two main components that determine the quality of any software product.

- Effort: The quantity of labor necessary to complete a task. Units of measurement are person-months.
- Schedule: This term simply refers to how long it will take to complete a task, which is, of course, inversely proportional to the amount of effort made. It is measured in terms of time-based units like weeks and months.

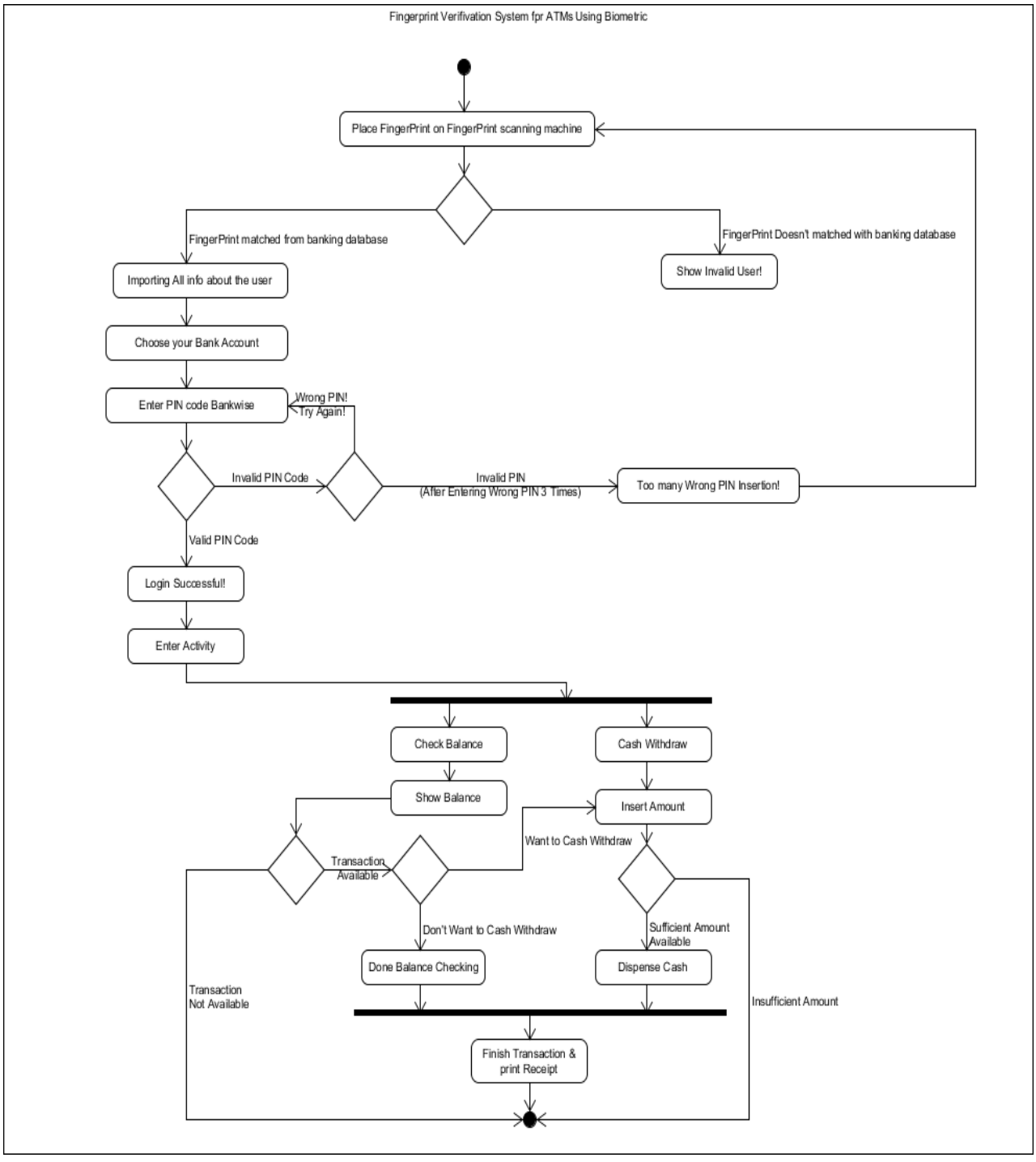
Depending on the level of accuracy and correctness needed, various Cocomo models have been put forth to predict cost estimation at various levels. These models can all be used for a variety of projects, depending on the characteristics of those projects on which the value of the constant to be used in further calculations will be based. The following lists these traits as they relate to various system types. Organic, semi-detached, and embedded systems according to Boehm:

- **Organic System:** Software projects are considered to be of the organic type if the required team size is suitably small, the problem is well understood and has previously been solved, and the team members have only a minimal amount of experience with the problem.
- **Semi-detached System**: Software projects are classified as semi-detached if important factors like team size, expertise, and familiarity with different programming environments fall somewhere between those of organic and embedded projects. Semi-detached projects require more expertise, better guidance, and creative thinking than organic projects because they are less well-known and more challenging to develop.
- **Embedded systems**: Software projects falling into this category must have a high degree of complexity, originality, and experience. In comparison to the other two models, this software needs a larger team, and the programmers must have the necessary expertise and imagination to create such intricate models.

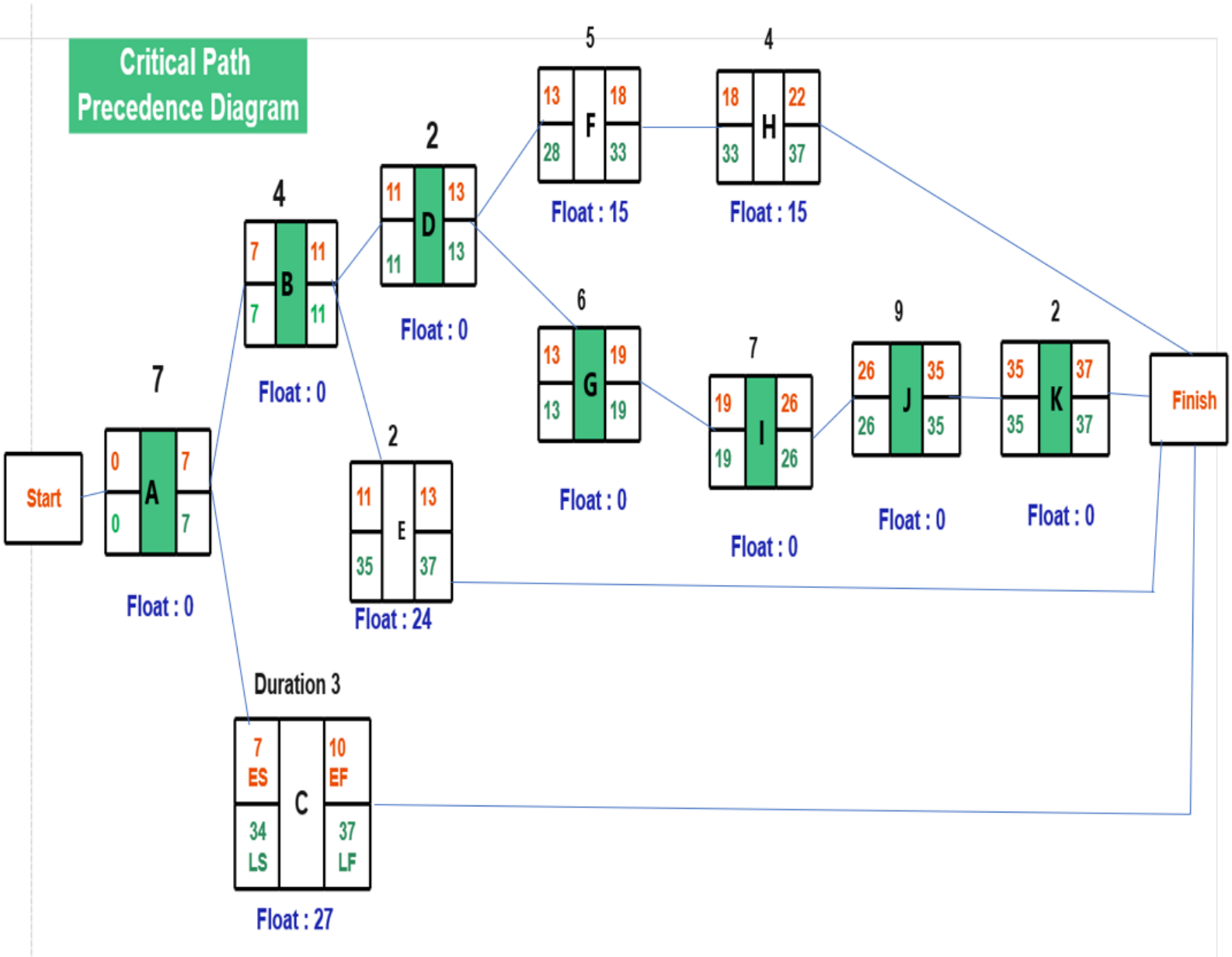
Our project is called Organic System because it only required a small team to finish it. The project's issue is to guarantee the highest level of security by integrating a fingerprint scanning pad machine with the banking and system database.

Features name	Members needed	Per member Effort/hours	Total Effort/hours
Design & Coding	4	565	2260
Testing	2	182.5	365
			2625 Hours

11. Activity Network Diagram:



Precedence Network Diagram:


Critical Path
Precedence Diagram
Start
A
7
0
0
7
7
Float : 0
B
4
7
7
11
11
Float : 0
C
Duration 3
7
ES
10
EF
34
LS
37
LF
Float : 27
D
2
11
11
13
13
Float : 0
E
2
11
35
13
37
Float : 24
F
5
13
28
18
33
Float : 15
G
6
13
13
19
19
Float : 0
H
4
18
33
22
37
Float : 15
I
7
19
19
26
26
Float : 0
J
9
26
26
35
35
Float : 0
K
2
35
35
37
37
Float : 0
Finish

12.0 Risk Analysis:

In today's world, fingerprints are one of the most crucial elements for assuring security and upholding a person's reliable identity. Among other things, voting, examinations, and the management of bank accounts all use fingerprints as security factors. They are also used to limit access to places that need to be heavily secured, like offices, equipment rooms, and control rooms. Scanners are used in biometric systems to verify the identity of a human being by detecting patterns in their behavior or physiological characteristics. In order for the user's biometric pattern to be effectively read and quantified by fingerprint verification devices, the user must make prolonged direct physical contact with the scanner. Future users may be more likely to cross-contaminate food and drink with microorganisms as a result, increasing the risk of contamination. The risk of harmful microbial infections infecting the respiratory system and spreading infectious diseases is also increased by physical contact.

Risk ID	Risk	Categories	Probability	Cost-TK	Risk Exposure	Mitigation Plan
PG-1	Lack of required skill	Programmer	40%	10,000	15,000	Swap out for a skilled worker or provide job training
PG-2	Incorrect or incomplete requirements	Programmer	60%	15,000	25,000	Dividing up the development process into brief iterations and regular displays of new functionality
User-1	Change in requirements during development	Customer	50%	60,000	1,00,000	Fixing the basic requirement in contract

Table 1: Risk Table and risk exposure.

13.0 Budget for the project

We used the COCOMO (Constructive Cost Model) model to estimate the effort in this project. This project is an organic project because a software project is considered to be of the organic type if the required team size is suitably small, the problem is well understood and has been solved in the past, and the team members also have some level of experience with the problem. Our team already has all the knowledge necessary to design the fingerprint scanning system because the ATM system has already been developed. For projects of the organic variety, we must calculate the effort as follows:

We need to implement at least 20 kilo lines of code.

Now

Effort = a (KLOC)b Person-Month

Effort = a (KLOC)b Person-Month

= 55.75 PM

Development Time = c (Effort)d Months

Development Time = 2.5 (55.75) 0.38 Months

= 11.52 Months

Average Staff Size = 55.75/ 11.52 persons

= 4.83~5 Person

Productivity = 20 / 55.75 KPM

= 0.36 kpm

Features name	**Total Effort/hours**	**Salary per hour ($)**	**Costing ($)**
Design & Coding	2260	52	1,17,520
Testing	365	50	18,250
Utility charges			5000
Software and Hardware Tools			8,500
Risk management			1,40,000
Total			1,90,270

14.0 Conclusion:

ATMs make banks more reliable by facilitating quick access to cash transactions. Without having to wait in line, we can withdraw cash at any time and from any location. ATM cards are therefore widely used, despite the fact that ATM transaction fraud still exists. We are using a biometric scanning device to identify the account holder in order to increase the security of ATM transactions. Because each person's finger serves as a distinct form of identification, using a biometric fingerprint scanner aid in preventing ATM fraud. Owner recognition's stability and dependability were increased by the security feature. The overall system's security, dependability, and utility have all been improved by using embedded system technology during construction. An ATM card does not need to be kept in a wallet and does not need to worry about being lost. Users only need to use their fingerprint to complete any financial or monetary transaction. The need for prompt and accurate user identification and verification has grown as the number of electronic transactions has expanded. PINs are frequently used in access codes for buildings, bank accounts, and computer systems for identification and security clearances. Traditional forms of identification that rely on ID cards or secret information like a social security number or password are not always trustworthy. Biometrics are inextricably tied to their owner, unlike ID cards, which can be misplaced, lost, or even faked. Passwords can also be forgotten or used fraudulently. It is difficult to borrow, steal, or counterfeit. If the PIN is entered correctly, access is granted, but the user is not verified. An unauthorized user can frequently obtain the personal codes from lost or stolen credit and ATM cards. Even after being warned, many people still use passwords and PINs that are easy to guess, such as birthdays, phone numbers, and social security numbers. Recent instances of identity theft have brought attention to the necessity of taking steps to verify that someone is who they claim to be. The use of fingerprint identifiers in biometric identification technology may help to solve this issue because a person's biometric data is unmistakably connected to their owner, is nontransferable, and is unique for each individual.