WOLKITE UNIVERSITY
COLLEGE OF COMPUTING AND INFORMATICS
DEPARTMENT OF SOFTWARE ENGINEERING

ETHIOCAPITAL CONNECT: A WEB-BASED PLATFORM TO EMPOWER ENTREPRENEURS AND ATTRACT

COMP SEng9251: PROJECT CAPSTONE I

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Ethiocapital Connect: A Web-Based Platform To Empower Entrepreneurs and Attract

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DECLARATION

This is to declare that this project work which is done under the supervision of Seifu Detso and having the title ETHIOCAPITAL CONNECT: A WEB-BASED PLATFORM TO EMPOWER ENTERPRENEURS AND ATTRACT is the sole contribution of:

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APPROVAL FORM

This is to confirm that the project report entitled **Ethiocapital Connect: A Web-Based Platform To Empower Enterpreneurs and Attract** submitted to **Wolkite University, College of Computing and Informatics Department of Software Engineering** by: Temesgen Moges, Tigistu Shewangzaw and Selahadin Nasir, is approved for submission.

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Table Of Contents

DECLARATION iii
APPROVAL FORM iv
ACKNOWLEDGEMENTS v
LIST OF TABLES ix
LIST OF FIGURES x
LIST OF ABBREVIATION xi
EXECUTIVE SUMMARY xii
CHAPTER ONE 1
1 INTRODUCTION 1
1.1 Statement of the problem 2
1.2 Objectives of the project 4
1.2.1 General Objective 4
1.2.2 Specific Objectives 4
1.3 Feasibility Analysis 5
1.3.1 Technical Feasibility 5
1.3.2 Operational Feasibility 5
1.3.3 Economic Feasibility 6
1.4 Scope and Limitation of the Project 7
1.4.1 Scope of the Project 7
1.4.2 Limitations 8
1.5 Significance of the Project 8
1.5.1 Societal Significance 8
1.5.2 Technological Significance 9
1.6 Beneficiary of the Project 10
1.7 Methodology of the Project 12
1.7.1 Data Collection Tools/Techniques 12
1.7.2 System Analysis and Design 13
1.7.3 System Development Model 13
1.7.4 System Testing Technology 14
1.7.5 Development Tools and Technologies 14
1.8 Document Organization 15

CHAPTER TWO 17
2 Description of the Existing System 17
2.1 Introduction of the Existing System 17
2.2 Users of the Existing System 18
2.3 Major Functions of the Existing System 19
2.4 Forms and Other Documents of the Existing System (If Any) 19
2.5 Drawbacks of the Existing System 20
2.6 Business Rules of the Existing System 21
CHAPTER THREE 23
3 PROPOSED SYSTEM 23
3.1 Functional Requirements 23
3.2 Non-Functional Requirements 26
3.2.1 User Interface and Human Factors 26
3.2.2 Hardware Considerations 27
3.2.3 Security Issues 27
3.2.4 Performance Considerations 28
3.2.5 Error Handling and Validation 29
3.2.6 Quality Issues 30
3.2.7 Backup and Recovery 30
3.2.8 Physical Environment 31
3.2.9 Resource Issues 32
3.2.10 Documentation 32
CHAPTER FOUR 34
4 System Analysis 34
4.1 System Model 34
4.1.1 Use case Model 34
4.1.2 OBJECT MODEL 41
4.1.3 DYNAMIC MODEL 45
CHAPTER FIVE 51
5 SYSTEM DESIGN 51
5.1 Design Goals 51
5.2 Current System Architecture (If Any) 52
5.3 Proposed System Architecture 52

5.3.1 Subsystem Decomposition and Description 53
5.3.2 Hardware/Software Mapping 55
5.4.3 Detailed Class Diagram 56
5.4.4 Persistent Data Management 57
5.4.5 Access Control and Security 58
5.5 Packages 60
5.6 Algorithm Design 60
5.7 User Interface Design 62

LIST OF TABLES

TABLE 2-1: BUSINESS RULE 1 - FACE-TO-FACE MEETING 22
TABLE 2-2: BUSINESS RULE 2 - ENTREPRENEURS DO EVERYTHING 22
TABLE 2-3: BUSINESS RULE 3 - INVESTORS HOLD POWER 22
TABLE 2-4: BUSINESS RULE 4 - NO LEGAL PROTECTIONS 22
TABLE 2-5:BUSINESS RULE 5 - CONFIDENTIALITY IS ASSUMEDIS 22
TABLE 2-6:BUSINESS RULE 5 - DELAYED FEEDBACK 22
TABLE 2-7:BUSINESS RULE 5 - UNCLEAR COMMUNICATION 22
TABLE 4-1:USE CASE DESCRIPTION FOR REGISTER ENTREPRENEUR ACCOUNT 36
TABLE 4-2: USE CASE DESCRIPTION FOR APPROVE INVESTOR REGISTRATION 37
TABLE 4-3: USE CASE DESCRIPTION FOR LOGIN 38
TABLE 4-4: USE CASE DESCRIPTION FOR UPLOAD BUSINESS IDEA 38
TABLE 4-5: USE CASE DESCRIPTION FOR BROWSE AND FILTER OPPORTUNITIES 39
TABLE 4-6: USE CASE DESCRIPTION FOR INVEST IN A BUSINESS 40
TABLE 4-7: USE CASE DESCRIPTION FOR MANAGE BOARD ACTIVITIES 40
TABLE 4-8: ATTRIBUTE DESCRIPTION FOR ENTREPRENEURS CLASS 43
TABLE 4-9: ATTRIBUTE DESCRIPTION FOR PROJECT CLASS 43
TABLE 4-10: ATTRIBUTE DESCRIPTION FOR FUNDING CLASS 43
TABLE 4-11: ATTRIBUTE DESCRIPTION FOR MESSAGE CLASS 44
TABLE 4-12: ATTRIBUTE DESCRIPTION FOR NOTIFICATION CLASS 44
TABLE 4-13:ATTRIBUTE DESCRIPTION FOR INVESTOR CLASS 44
TABLE 4-14:ATTRIBUTE DESCRIPTION FOR USER CLASS 44
TABLE 4-15:ATTRIBUTE DESCRIPTION FOR ADMIN CLASS 45
TABLE 4-16:ATTRIBUTE DESCRIPTION FOR STUDENT CLASS 45
TABLE 4-17: ATTRIBUTE DESCRIPTION FOR FEEDBACK CLASS 45
TABLE 5-1: SUBSYSTEM DECOMPOSITION AND DESCRIPTION 53
TABLE 5-2: ACCESS CONTROL LIST 58

LIST OF FIGURES

FIGURE 4-1: USECASE DIAGRAM FOR PROPOSED SYSTEM 36
FIGURE 4-2: CLASS DIAGRAM FOR PROPOSED SYSSTEM.....42
FIGURE 4-3: SEQUENCE DIAGRAM FOR LOGIN 46
FIGURE 4-4: SEQUENCE DIAGRAM FOR PLEDGE FUNDS 46
FIGURE 4-5: SEQUENCE DIAGRAM FOR BUSINESS IDEA 47
FIGURE 4-6: ACTIVITY DIAGRAM FOR LOGIN 48
FIGURE 4-7: ACTIVITY DIAGRAM FOR FUNDING PROJECTS 48
FIGURE 4-8: ACTIVITY DIAGRAM FOR SUBMITTING PROJECTS 49
FIGURE 4-9: STATE CHART DIAGRAM FOR CREATE IDEA 49
FIGURE 4-10: STATE CHART DIAGRAM FOR PLEDGE FUNDS.....50
FIGURE 5-1: PROPOSED SYSTEM ARCHITECTURE.....53
FIGURE 5-2: COMPONENT DIAGRAM FOR DECOMPOSED SYSTEM 55
FIGURE 5-3: DEPOLYMENT DIAGRAM FOR HARDWARE/SOFTWARE MAPPING.....56
FIGURE 5-4: DETAILED CLASS DIAGRAM FOR DATA MANAGEMENT 57
FIGURE 5-5: PERSISTENT DATA MANAGEMENT DIAGRAM FOR STORAGE.....58
FIGURE 5-6: PACKAGE DIAGRAM FOR MODULE ORGANIZATION 60
FIGURE 5-7: LANDING PAGE OF PROPOSED SYSTEM 62
FIGURE 5-8: LOGING PAGE INTEFACE DESIGN MOACKUPS.....63

LIST OF ABBREVIATION

AES……..Advanced Encryption Standard

AI……Artificial Intelligence

API……Application Programming Interface

FR……Functional Requirement

HTML……..Hyper Text Markup Langauge

HTTPS:……Hyper Text Transfer Protocol

ID……Identifier

JS……JavaScript

MERN…… Mongo,Express,React,Node

MFA……Multi Factor Authentication

OOSAD …… Object-Oriented System Analysis and Design

RBAC…… Role Based Access Control

REST…… Representational State Transfer

SQL…… Structured Query Language

UAT …… User Acceptance Testing

UC……..Usecase

UI/UX…. …… User Interface/User Experince

UML …… Unified Modeling Language

VS code……Visual studio code

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EXECUTIVE SUMMARY

Ethio Capital is a digital platform that will be developed to address the challenges Ethiopian entrepreneurs face in accessing capital and building meaningful connections with potential investors. While there is no shortage of innovative business ideas across Ethiopia, entrepreneurs often struggle to secure funding due to the lack of a streamlined, reliable, and accessible platform. With the Ethiopian capital market still emerging, Ethio Capital aims to bridge this gap by creating an ecosystem that connects entrepreneurs, investors, and students in a manner that fosters innovation, networking, and economic growth.

The primary goal of this project is to develop a secure, scalable, and user-friendly platform that enables entrepreneurs to effectively showcase their business ideas, gain access to capital, and build valuable connections with investors. The platform will also provide students with opportunities to receive funding for their educational endeavors. By bringing together key stakeholders—entrepreneurs, investors, and students—the platform will contribute to the growth and development of the entrepreneurial ecosystem in Ethiopia. The development of Ethio Capital follows a thorough methodology, incorporating qualitative and quantitative research techniques such as surveys, interviews, and focus group discussions with potential users to understand their specific needs, challenges, and expectations. Additionally, market research will be conducted to identify emerging trends and gaps within the Ethiopian entrepreneurial landscape. This research will inform the design and functionality of the platform, ensuring that it meets the needs of its users.

The Ethio Capital platform will include features such as investor matching, business idea showcasing, networking tools, and secure financial transactions. These features will address the current challenges faced by Ethiopian entrepreneurs in finding funding and creating lasting business relationships. As the project advances, comprehensive testing and evaluations will be carried out to assess the platform's performance, scalability, and impact, leading to recommendations for future improvements. In general, EthioCapital aims to play a pivotal role in transforming the entrepreneurial landscape of Ethiopia by providing a centralized platform where entrepreneurs, investors, and students can collaborate, connect, and contribute to the growth of the economy. Through its user-centric approach and innovative features, the platform has the potential to create lasting value for its users and the broader Ethiopian economy.

CHAPTER ONE

1 INTRODUCTION

In today's rapidly evolving digital world, technology has become a key enabler for business growth and economic development. Across the globe, businesses are leveraging digital platforms to streamline operations, expand market reach, and connect with potential customers, partners, and investors. The rise of web-based solutions has revolutionized how entrepreneurs access funding, network with investors, and grow their businesses. However, in many developing regions, including Ethiopia, these opportunities are not fully realized due to several key challenges.

In Ethiopia, the entrepreneurial ecosystem is teeming with potential. A significant portion of the population, particularly among the youth, demonstrates a strong entrepreneurial spirit, with many possessing innovative ideas or small-scale businesses. According to United Nations data from 2022, Ethiopia has approximately 23 million young people, a large segment of whom are eager to launch and grow their own businesses (UNFPA, 2022). Despite the abundance of innovative ideas, these aspiring entrepreneurs face substantial barriers, the most pressing of which is access to capital.

One of the primary reasons for this funding gap is the lack of a centralized and accessible platform where entrepreneurs can connect with potential investors. Without such a platform, entrepreneurs often struggle to find reliable funding sources, and investors face difficulty discovering promising opportunities. According to a World Bank report on Ethiopia's investment climate, limited access to finance remains one of the biggest constraints for small and medium-sized enterprises (World Bank, 2022). This disconnect hampers the potential for growth and innovation in Ethiopia's entrepreneurial landscape.

The emergence of a new educational model in Ethiopia, where universities operate independently from government funding, further complicates the situation. With students now required to finance their education, many bright individuals who cannot afford the costs risk missing out on higher education despite their academic excellence. This financial barrier limits access to opportunities for the next generation of Ethiopian leaders.

To address these challenges, Ethio Capital introduces a web-based platform designed to bridge the gap between entrepreneurs, students, and investors. This initiative will serve as

a solution to two critical issues: providing entrepreneurs with a mechanism to showcase their business ideas and secure funding, and enabling students to attract financial support for their education.

The platform will facilitate connections, allowing users to interact, discuss opportunities, and fund businesses or education. It also offers tools such as investor matching, meeting scheduling, and networking capabilities to foster collaboration and innovation. By providing a centralized and secure system, the project aims to create an environment conducive to growth, investment, and development in Ethiopia.

As the country's capital market continues to evolve, this initiative seeks to act as a catalyst for economic growth and empower the next generation of business leaders. It will address barriers to accessing capital and educational funding, bridging the gap between opportunity and innovation in Ethiopia's emerging market. Through its user-friendly features and focused mission, the platform will unlock new possibilities for entrepreneurs and students, fostering a thriving ecosystem of business and education.

1.1 Statement of the problem

In Ethiopia, despite the abundance of young entrepreneurs with innovative business ideas, a significant challenge exists in their ability to access the capital necessary for growth. The country's emerging capital market offers potential, but the current environment lacks a streamlined platform that effectively connects aspiring entrepreneurs with potential investors. According to the World Bank's 2022 Ethiopia Economic Update, access to finance remains one of the biggest obstacles for small businesses and startups, with limited formal funding channels available to entrepreneurs (World Bank, 2022). Our assessment of the existing entrepreneurial ecosystem and capital-seeking platforms has identified several key challenges that EthioCapital Connect aims to address.

- **Limited Access to Investors**: Fund seekers, including students and small business owners, often struggle to find and connect with investors willing to fund early-stage ideas or ventures. The absence of a dedicated platform for this connection significantly hinders the ability of promising startups to secure the capital they need to grow.
- **Lack of Visibility for Innovative Ideas:** Many entrepreneurs lack the resources or networks to effectively showcase their innovative business ideas to potential

investors. EthioCapital Connect addresses this lack of visibility by providing a platform where entrepreneurs can create detailed profiles and pitch their ideas directly to investors. By facilitating these connections, we aim to enhance collaboration, increase funding opportunities, and drive innovation and economic growth

- **Inefficient Networking and Communication Tools:** Current networking systems for entrepreneurs and investors are fragmented and inefficient. This lack of a unified platform for direct communication and relationship building between these two groups limits the potential for collaborative growth. According to the African Development Bank's 2022 report on Entrepreneurship and MSME Development in Africa, one of the key challenges for startups in emerging markets is the absence of structured networking and mentorship opportunities, making it difficult for entrepreneurs to connect with investors and industry experts (AfDB, 2022).
- **Limited Entrepreneurial Support and Guidance**: Entrepreneurs often need more than just capital; they require mentorship, guidance, and support to navigate the complex landscape of business development. Existing platforms fall short in providing these additional resources, leaving entrepreneurs underprepared and unable to fully capitalize on investment opportunities.
- **Emerging Capital Market Barriers**: As Ethiopia's capital market begins to take shape, there is no comprehensive system that enables seamless integration of this market with the entrepreneurial ecosystem, making it difficult for investors to identify viable investment opportunities and for entrepreneurs to tap into this new source of capital.
- **Lack of Trust and Transparency**: Both entrepreneurs and investors often face issues of trust when engaging in funding relationships. Entrepreneurs may be concerned about the security of their intellectual property, while investors may worry about the credibility and viability of the businesses they are funding. The absence of a transparent, trustworthy platform exacerbates these concerns, making it difficult for both parties to feel confident in their interactions. According to the World Bank's 2022 report on Business Environment Constraints in Sub-Saharan Africa, lack of transparency and weak regulatory frameworks are significant barriers to investment, leading to trust deficits between entrepreneurs and investors (World Bank, 2022).

- **Fragmented Legal and Regulatory Framework**: Ethiopia's legal and regulatory environment for startup funding and investment is still in its infancy. Entrepreneurs and investors alike face challenges navigating this complex landscape, with unclear guidelines on investment processes, business registration, and capital handling. This lack of a coherent legal framework can discourage potential investors and complicate the growth of new ventures.
- **Limited Access to Mentorship and Funding for Students:** As Ethiopia transitions to an educational model where universities, beginning with Addis Ababa University, will operate independently from government funding, students will increasingly face the burden of financing their education. This shift raises significant concerns, particularly for high-achieving students who lack the financial resources to pay for their studies. Without adequate financial support, many promising students may be forced to abandon their educational goals. EthioCapital Connect aims to address this issue by offering students a platform to showcase their academic achievements, upload relevant documents, and connect with investors interested in funding their education. This solution will empower students to continue their studies without financial obstacles, enabling them to contribute to Ethiopia's economy as educated professionals and entrepreneurs.

These challenges highlight the need for a unified, centralized platform with digital payment options that addresses the inefficiencies of manual systems and enhances the digital experience for Ethiopian entrepreneurs in accessing capital. Ethio Capital aims to bridge these gaps by providing a comprehensive, user-friendly application that enables entrepreneurs to showcase their business ideas, secure funding, and build valuable connections. The platform will also empower students to access the financial support they need to pursue their education, creating an ecosystem that fosters innovation, investment, and economic development in Ethiopia.

1.2 Objectives of the project

1.2.1 General Objective

The general objective of this project is to develop a web-based platform that bridges the gap between aspiring entrepreneurs and potential investors in Ethiopia.

1.2.2 Specific Objectives

The specific objectives of this project are as follows:

- ↘ Design and implement a centralized platform to connect entrepreneurs, and investors.
- ↘ Identify functional and nonfunctional requirements for platform development.
- ↘ Integrate secure payment gateways for seamless funding transactions.
- ↘ Develop investor matching and networking features to foster collaboration.
- ↘ Incorporate real-time communication and scheduling tools for user interaction.
- ↘ Provide educational resources to help students fund their education.
- ↘ Ensure compliance with capital market regulations for secure transactions.

1.3 Feasibility Analysis

A feasibility study is an in-depth assessment that evaluates all essential factors of project to gauge its potential for success. Some key components of this feasibility analysis include:

- ↦ Technical feasibility
- ↦ Operational feasibility
- ↦ Economic feasibility

1.3.1 Technical Feasibility

This aspect assesses the technical aspects of the project, such as the system architecture, technology stack, and infrastructure requirements. Ethio Capital will be built using modern web technologies that are scalable, secure, and capable of supporting a large number of users. The platform will rely on cloud services for hosting and data storage, ensuring scalability and security. The technology stack chosen (e.g., web development frameworks, databases, payment gateways) is suitable for the platform's needs, providing a stable and efficient environment for development and deployment. Furthermore, the platform will be designed to be mobile-responsive, considering the increasing use of smartphones in Ethiopia, to ensure accessibility for users across different devices.

1.3.2 Operational Feasibility

This aspect evaluates how practical it is to implement the platform within the operational environment. The success of Ethio Capital will depend on its ability to provide a seamless

user experience for entrepreneurs, investors, and students. The platform will be designed with an intuitive interface, ensuring that users can easily create profiles, upload documents, connect with other users, and make transactions. The operational feasibility also involves evaluating the platform's support structure, including customer service and user guidance tools. The ability to continuously update and maintain the system, ensuring security and functionality, will also be key in its long-term viability.

1.3.3 Economic Feasibility

This part examines the financial aspects of the project, including the costs of development, deployment, and ongoing maintenance. It also considers the potential revenue streams, such as premium features for users, commissions on successful investments, or partnerships with educational institutions and investors.

Tangible Benefits:

Reduced Operational Costs:: By creating a centralized digital platform, Ethio Capital can reduce the need for traditional, manual methods of matching entrepreneurs with investors. This streamlines the process and lowers the operational costs associated with intermediaries and other traditional methods.

Increased Efficiency in Matching Investors with Entrepreneurs: The automated matching system within the platform allows for faster and more accurate connections between investors and entrepreneurs based on their preferences, needs, and business profiles.

Scalability: As the platform grows, it will be able to handle an increasing number of users without a proportional increase in costs. The digital infrastructure of Ethio Capital is designed to scale, meaning that it can accommodate a larger number of entrepreneurs, investors, and students as demand increases.

Intangible Benefits:

Better User Experience: The platform's user-friendly design ensures that both entrepreneurs and investors can easily navigate the system, improving overall satisfaction. The availability of tools like investor matching, networking, and meeting scheduling will save time and enhance the efficiency of users' interactions.

Fostering Innovation and Collaboration: The platform encourages collaboration between entrepreneurs, investors, and other stakeholders, creating a vibrant ecosystem where ideas

can flourish. By facilitating direct communication and the exchange of knowledge, Ethio Capital cultivates an environment where innovative ideas can find the right partners and resources.

1.4 Scope and Limitation of the Project

1.4.1 Scope of the Project

EthioCapital Connect is designed to be a digital platform that connects Ethiopian entrepreneurs, students, and investors, facilitating collaboration and enabling capital-seeking and investment opportunities. The platform will address key challenges within Ethiopia's evolving entrepreneurial ecosystem, focusing on issues such as limited access to capital, lack of visibility for innovative ideas, and fragmented communication. The following are the key features of the platform:

- **Entrepreneur and Student Profiles:** Entrepreneurs and students will have the ability to create comprehensive profiles that showcase their business ideas, academic achievements, and financial needs. These profiles will help to attract potential investors and funding sources.
- **Investor Matching:** Investors will be matched with entrepreneurs and students based on various criteria, including industry type, business stage, funding requirements, and personal investment preferences. This matching mechanism will increase the likelihood of successful funding connections.
- **Investment Options:** Investors can choose to support businesses by purchasing shares or assist students by funding their education. The platform offers multiple pathways for investment, enabling both businesses and educational goals to receive necessary financial support.
- **Networking and Communication Tools:** The platform will feature messaging capabilities, forums, and discussion boards to facilitate interaction between entrepreneurs, students, and investors. This will enable users to ask questions, share advice, offer mentorship, and collaborate on projects.
- **Meeting Scheduling:** Users will be able to schedule meetings and virtual calls with potential investors, mentors, or business partners. This feature will promote productive, direct communication and collaboration.
- **Market Insights:** Real-time data and market insights are being made available to platform users. These insights include information on market trends, economic

conditions, and potential investment opportunities, helping entrepreneurs and investors make more informed decisions.

- **Transaction and Investment Tracking:** A basic tracking system will be included, allowing both entrepreneurs and investors to monitor the status of their investments. This feature will display transaction records and notify users of any updates related to their investments.
- **Language Support (Initially in English):** The platform will be launched in English. As it evolves, the platform will be expanded to support additional languages, including Amharic, to cater to a wider audience within Ethiopia.

1.4.2 Limitations

While the project has a clear scope, several limitations must be acknowledged:

- **Limited Matching Algorithm Complexity**: Due to time and resource constraints, the matching algorithm will only use basic criteria (e.g., industry type, funding stage) instead of advanced data analytics or machine learning models.
- **Basic Communication Tools**: Real-time chat and video call functionalities may be limited to basic messaging and scheduling due to the technical complexity and server requirements for fully integrated live video or advanced communication features.
- **Security Features**: While essential security protocols will be implemented, some advanced security measures, such as in-depth data encryption standards or AI-driven fraud detection, may be postponed to future iterations due to budget constraints.

1.5 Significance of the Project

1.5.1 Societal Significance

The EthioCapital Connect platform aims to significantly contribute to Ethiopian society by bridging the gap between entrepreneurs, students, and investors. As Ethiopia's entrepreneurial ecosystem grows and the country moves toward a more independent education system, it becomes crucial to provide tools that facilitate access to capital, mentorship, and networking opportunities. This platform is not just about creating business

opportunities—it is about fostering a community of innovators who can drive economic and social progress. The societal impact of this project can be understood through the following categories:

Economic Growth: The platform contributes to the growth of the Ethiopian economy through increased entrepreneurial activity, job creation, and the establishment of new businesses. By empowering entrepreneurs to secure funding, EthioCapital can help scale ideas into viable businesses, boosting productivity and GDP.

Educational Advancement: By providing financial support to students who would otherwise be unable to afford higher education, the platform ensures that talented individuals have the opportunity to achieve academic success. This, in turn, contributes to the development of a highly skilled workforce that can drive innovation and progress.

Poverty Alleviation: Increased access to funding and business opportunities can improve living standards for many individuals and families, reducing poverty levels. Entrepreneurs who succeed through the platform can create ripple effects by hiring local workers and investing in their communities.

Empowerment of Youth: The platform specifically addresses the needs of Ethiopia's youth, many of whom face challenges in accessing capital and education. Furthermore, by encouraging women entrepreneurs to participate, EthioCapital can play a role in reducing gender disparities in business and education.

Innovation and Technological Progress: By fostering a culture of innovation, the platform can encourage the development of new technologies, products, and services tailored to Ethiopia's unique needs. This can also enhance the country's global competitiveness.

1.5.2 Technological Significance

The EthioCapital Connect project represents a pivotal advancement in the application of technology to address critical gaps within Ethiopia's entrepreneurial and educational ecosystems. By integrating innovative digital tools and systems, the platform aims to modernize and streamline capital access, enhance user interactions, and build trust among stakeholders. The technological significance of this project includes the following aspects:

- **Leveraging Capital Market Opportunities:**As Ethiopia's capital market develops, EthioCapital Connect is designed to align with and capitalize on these emerging opportunities. By providing a digital platform that connects investors with

entrepreneurs and students, it positions itself as a vital tool for the efficient and transparent flow of investments, supporting the growth of the capital market ecosystem.

- **Building a Sustainable Digital Ecosystem:**The platform facilitates the long-term success of businesses and educational initiatives by creating a digital environment where entrepreneurs, investors, and students can thrive. This integrated approach supports a more robust ecosystem, enabling the sustainable growth of innovative businesses and access to education.
- **Innovative Use of Matching Algorithms:**EthioCapital Connect employs advanced matching algorithms to pair investors with entrepreneurs and students based on tailored criteria such as industry type, funding stage, and investment preferences. While starting with basic criteria, future iterations of the platform will incorporate machine learning and data analytics to improve accuracy and efficiency.
- **Enhancing Digital Communication Tools:**The platform incorporates user-friendly communication features, such as messaging systems, forums, and meeting scheduling tools, to facilitate seamless collaboration. These tools ensure that users can engage meaningfully without relying on fragmented or outdated communication methods.
- **Promoting Transparency and Security:**By leveraging secure payment gateways and basic encryption protocols, the platform builds trust among users. Future enhancements will include advanced security measures such as AI-driven fraud detection and comprehensive data encryption standards, ensuring a safe environment for transactions and data sharing.
- **Integration of Market Insights and Analytics:** Real-time market data and analytics empower users to make informed decisions about their investments or business strategies. Entrepreneurs can adapt to market trends, while investors can identify promising opportunities, fostering a data-driven approach to growth.
- **Scalability and Adaptability:**Designed with scalability in mind, EthioCapital Connect can adapt to future technological advancements and user demands. This ensures the platform remains relevant as new challenges and opportunities emerge in Ethiopia's entrepreneurial and educational landscapes.

1.6 Beneficiary of the Project

The EthioCapital Connect platform is designed to create a transformative impact by addressing the challenges faced by key stakeholders in Ethiopia's entrepreneurial and educational sectors. The project identifies several primary beneficiaries—individuals, organizations, and groups—who stand to gain direct or indirect advantages from the platform's development and implementation. These beneficiaries are as follows:

- **Entrepreneurs:** Entrepreneurs, particularly small business owners and startups, are central beneficiaries of the platform. By providing a digital space to showcase their business ideas, secure investments, and connect with mentors and investors, EthioCapital Connect empowers entrepreneurs to overcome financial and networking barriers. This increased access to resources fosters growth, innovation, and sustainability in their ventures.
- **Students:** High-achieving students who face financial constraints in pursuing higher education are another key beneficiary group. The platform enables students to create profiles, highlight their academic achievements, and attract sponsorship from investors who believe in supporting education. This ensures that talented individuals can continue their studies without the burden of financial obstacles.
- **Investors:** Local and international investors benefit from a structured and centralized platform that provides access to vetted opportunities in both entrepreneurial ventures and student sponsorships. By facilitating direct connections, EthioCapital Connect helps investors identify innovative businesses and promising talents, ensuring their resources are effectively allocated to impactful initiatives.
- **Educational Institutions:** Universities and colleges, particularly as they transition to independent financial models, stand to gain significantly. By assisting students in securing funding for their education, the platform reduces the financial strain on institutions and promotes higher enrollment rates, contributing to the stability and growth of the academic sector.
- **Government and Policy Makers:** The Ethiopian government and policymakers benefit indirectly from the project through enhanced entrepreneurial activity and improved access to education. By fostering an ecosystem that supports innovation and economic growth, the platform aligns with national goals for job creation, poverty alleviation, and sustainable development.

- **Business Development Organizations:** Organizations that support business development and entrepreneurship, such as incubators, accelerators, and non-profits, can utilize EthioCapital Connect to identify and assist promising entrepreneurs and ventures. The platform serves as a valuable tool for these organizations to expand their reach and effectiveness.
- **Financial Institutions:** Banks and microfinance institutions can benefit by integrating their services with the platform, such as offering loans, managing transactions, or providing financial advice. This creates opportunities for collaboration and growth in the financial sector.
- **The Ethiopian Economy:** At a macro level, the Ethiopian economy benefits from the platform's ability to stimulate entrepreneurial activity, create jobs, and encourage innovation. By bridging the gap between ideas and capital, EthioCapital Connect contributes to economic diversification and resilience.

1.7 Methodology of the Project

1.7.1 Data Collection Tools/Techniques

The project will begin with a requirement gathering phase, to ensure a comprehensive understanding of the requirements by assessing the needs of stakeholders such as entrepreneurs, students, investors and others in Platform a combination of data collection techniques will be employed. To do this, we used different fact-finding techniques to gather information about the current system and to collect the necessary information that is needed to develop the project. In order to know how the existing system work and what problem are there we used the following fact-finding techniques:

- **Surveys:** We Distributed online surveys to entrepreneurs, students, and investors to gather information on their needs, expectations, and experiences.
- **Observations:** We observed how entrepreneurs do their work, how they handle tasks, communicate with investors, and how the project is managed, including agreements, and legal paperwork. We also observed how they find potential investor for their ideas.
- **Document Analysis:** to get more information related to our project we analyzed different documents to understand the current system and make improvement in the proposed system.

↘ **Interviews:** We conducted interviews with a sample of entrepreneurs and investors to gain deeper insights into their challenges and motivations.

1.7.2 System Analysis and Design

We use the OOSAD (Object Oriented System Analysis and Design) methodology during the system analysis and design stage of a project. since it is a more effective method of building, organizing, and putting together the objects that are used in our system. There are various stages to this approach, some of which include:

- **Object-Oriented Analysis (OOA)**: In this stage the team, models the system's operation(usecase modeling), locate and identifies the business objects, arranges the items and determines their relationships.
- **Object-Oriented Design(OOD**: In order to improve the use case model and rationale for creating the sequence and activity diagrams, as well as to model object interactions and behavior that support the use case scenario, we use Draw-io and Visio software during this phase.

The following benefits are the reasons we have chosen the OOSAD approach, more especially the UML (Unified Modelling Language) model. To enable a high degree of reusability of designs, decrease the cost of software maintenance, and increase consistency among analysis, design, and programming activities. Additionally, it helps in improving communication among users, analysis, design, and programming.

1.7.3 System Development Model

For our project, we are using an agile development strategy, giving flexibility, teamwork, and client satisfaction top priority. Agile approaches give us a framework that enables us to adapt to shifting market conditions and demand. We can consistently provide our users and stakeholders with incremental value by segmenting the project into smaller iterations or sprints. We can obtain feedback early and frequently thanks to this iterative process, which guarantees that the finished product satisfies user expectations and corporate goals. The adaptability of Agile approaches, especially Scrum, enables our team to make changes in response to input, resulting in ongoing enhancements and a better final product. By selecting Agile, we hope to encourage an open, cooperative, and creative culture among our employees.

1.7.4 System Testing Technology

To ensure the system meets the required quality standards, various testing methodologies will be applied:

- **Unit Testing:** Individual components and modules will be tested to verify their correctness and reliability. Since the designed system is in an object-oriented method the team firstly tested the system at the individual class level.
- **Integration Testing:** To check whether the individual unit of the system is working together correctly or not, we will do Integration testing. The interactions between different modules will be tested to ensure seamless functionality.
- **System Testing:** The entire software system will be tested in a controlled environment to verify that it meets functional and non-functional requirements.
- **Acceptance Testing:** The system will be evaluated by end-users to ensure it aligns with their expectations and needs. Feedback from acceptance tests will be incorporated into the final production of deployment.

1.7.5 Development Tools and Technologies

1.7.5.1 Frontend Technologies

- **Programming Languages**: The frontend of our web application will be built using React, a popular library for creating user interfaces and it is preferable for building fast, responsive user interfaces. Its virtual DOM system ensures high performance by minimizing direct DOM manipulation, which is ideal for handling real-time updates. We'll also use Tailwind CSS for styling, and JavaScript as the main programming language.
- **Integrated Development Environment (IDE)**: Visual Studio Code (VS Code) will be the chosen editor for frontend development.

1.7.5.2 Backend Technologies

- **Programming Languages:** The backend will be developed using the MERN stack, which includes MongoDB, Express.js, React, and Node.js. Node.js with Express.js Framework: Node.js, known for its asynchronous, event-driven architecture, is ideal for handling concurrent requests efficiently. This is critical for matchmaking

functions and real-time data handling between investors and entrepreneurs. Express.js, a fast and minimalist web framework, complements Node.js by simplifying API creation and routing, enhancing both performance and scalability. Together, Node.js and Express.js support rapid development and allow for flexible scaling, which is essential as the platform grows, with JavaScript as the primary language for backend development.

- **Database Technology:** MongoDB: MongoDB, a NoSQL database, is highly scalable and suitable for handling large amounts of unstructured data, making it ideal for storing diverse business profiles, investment records, and user data. Its flexible schema design aligns well with dynamic and evolving application requirements, supporting future feature expansions with minimal structural changes. MongoDB's strong security options, such as encryption at rest and field-level encryption, also help safeguard sensitive user data.

1.7.5.3 Documentation and Modeling Tools

- **UML Design Tools:** System design diagrams will be created using UML tools such as Lucid chart, draw.io, or similar platforms suited for UML modeling.
- **Documentation Tools:** Project documentation will be developed collaboratively using tools like Microsoft Word.

1.7.5.4 Deployment Environment

- **Hosting:** The web platform will be hosted on cloud infrastructure providers that offers the flexibility to scale resources up or down based on demand, ensuring optimal performance during peak traffic periods. This approach also leverages the reliability and robustness of cloud services, providing a stable hosting environment for the web platform.

1.8 Document Organization

the system document is organized into five chapters, each chapter describe in the following manner. in Chapter one we introduced the existing system, its problem statement, the project's objective, its scope, significance, benefits, limitations, and the methods we used to collect and analyze the data. Chapter two we described what the existing system looks

like in detail. Chapter three we described the functional and non-functional requirements of proposed system. Chapter four discussed about use case model,sequence diagrams , activity diagrams object model and dynamic models of proposed system. under Chapter five we designed goals, current and proposed software architecture, hardware/software mapping, persistent data management and access control and security.

CHAPTER TWO

2 DESCRIPTION OF THE EXISTING SYSTEM

2.1 Introduction of the Existing System

In this section, we delve into the operational details of the existing manual system, shedding light on its distinct characteristics and functionalities. The current system in Ethiopia for entrepreneurs seeking funding is based on traditional methods that involve physical meetings, personal connections, and non-standardized processes. These methods are slow, inefficient, and restrict accessibility to funding opportunities. The process can be broken down into the following steps:

1. **Finding Investor:** Entrepreneurs struggle to connect with investors due to the lack of an accessible database or directory. This disorganized process depends heavily on personal networks, word-of-mouth, or attending events, which is time-consuming and limits their reach.
2. **Contacting Investors:** Communication is done through phone calls, emails, or meetings, often resulting in delays when responses are slow, or meetings are hard to arrange.
3. **Scheduling Meetings:** Arranging a meeting with potential investors can take weeks or months. This is particularly challenging for entrepreneurs outside of urban centers like Addis Ababa, where opportunities are scarce.
4. **Presenting Ideas:** During meetings, ideas are presented using printed business plans or slides. There is no standardized digital approach, which affects the professionalism of the process.
5. **Negotiating Terms:** Discussions about equity shares, repayment plans, or other terms are conducted informally. The lack of structure makes the process inefficient and prone to misunderstandings.
6. **Finalizing Deals:** Agreements are typically handwritten or simply typed without proper legal advice. This can lead to disputes or complications in the future.

Overall, the absence of a digital platform hinders the efficiency, accessibility, and transparency of the system, leading to missed opportunities for both entrepreneurs and investors. Entrepreneurs struggle to connect with potential investors and showcase their projects effectively, while investors face challenges in identifying viable opportunities and

tracking their investments. Furthermore, the lack of centralized communication and transaction records results in inefficiencies, delays, and potential security concerns. Implementing a digital platform can bridge these gaps, fostering a more collaborative, efficient, and secure ecosystem for both parties.

2.2 Users of the Existing System

The existing system caters to three primary user groups, each with distinct roles and responsibilities. This section provides a detailed overview of how these groups currently interact with the system and the challenges they face. The lack of a digital platform significantly affects the efficiency of their operations, as most processes rely on manual methods and personal networks. Below is a breakdown of the users and their specific roles and responsibilities within the system:

1. **Entrepreneurs:**
   - **Role:**Young business owners, small business operators, or aspiring entrepreneurs seeking funding to turn their innovative ideas into reality.
   - **Responsibilities:**Searching for investors using personal networks or attending in-person events, preparing comprehensive business plans, including financial projections and pitch presentations, initiating contact with potential investors and engaging in negotiations to secure funding.
2. **Investors:**
   - **Role:** Individuals, organizations, or venture capitalists looking to invest in promising business ideas.
   - **Responsibilities:**Assessing business proposals and evaluating their viability, negotiating funding terms and equity shares with entrepreneurs and monitoring the progress of funded projects and ensuring accountability.
3. **Middlemen or Brokers:**
   - **Role:** Facilitators who connect entrepreneurs with investors and help bridge the communication gap.
   - **Responsibilities:** Identifying potential matches between entrepreneurs and investors.Assisting with proposal preparation and presentation to make the pitch more effective and negotiating terms on behalf of entrepreneurs or investors and providing advisory support.

2.3 Major Functions of the Existing System

The existing system primarily relies on manual processes, limiting its efficiency and scalability. These functions serve as the foundation for connecting entrepreneurs with investors, managing funding activities, and facilitating communication. However, the absence of a digital platform significantly impacts the speed and transparency of these operations, making them time-consuming and prone to errors. Below is an outline of the core functions of the current system:

- **Networking and Investor Outreach**: Entrepreneurs rely on informal networks, word-of-mouth, and events to find potential investors. This method lacks scalability and accessibility, especially for those in rural areas.
- **Idea Presentation:** Business ideas are shared using printed documents, verbal explanations, or slides. The absence of a digital platform results in less professional and often inconsistent presentations.
- **Negotiation and Agreement:** Negotiations occur informally, leading to agreements that lack legal and structural support, which increases the risk of disputes.
- **Document Handling and Feedback:** Documents, such as business plans and contracts, are manually prepared and stored. Feedback is shared informally, often through verbal discussions, and there is no systematic way to revise proposals.

2.4 Forms and Other Documents of the Existing System (If Any)

In this section, we provide a detailed overview of the key forms and documents utilized in the existing system. These documents serve as the backbone of operations, facilitating communication, record-keeping, and decision-making between entrepreneurs and investors. Despite their importance, these materials often reflect the inefficiencies of the manual system, including inconsistencies, lack of professionalism, and limited accessibility. Below is an in-depth exploration of the primary forms and their uses.

1. **Business Plan Document:** The business plan document is central to the entrepreneur's efforts to communicate their vision, objectives, operational strategies, and financial projections to potential investors.

2. **Investment Agreement:** Investment agreements outline the terms and conditions agreed upon between entrepreneurs and investors, such as equity shares, repayment schedules, or profit-sharing models.
3. **Pitch Presentation Slides:** Pitch presentations summarize the core aspects of the business idea, offering a visual aid during investor meetings.
4. **Receipts and Payment Records:** Receipts and payment records serve as proof of monetary transactions between entrepreneurs and investors.
5. **Registration Forms :** Some entrepreneurs or investors may utilize registration forms to formalize initial engagements.
6. **Additional Information:** The lack of a standardized system for managing these documents highlights the inefficiencies of the current system. To address these gaps, the digitization and professionalization of forms and documents are critical. Examples and scanned images of these materials are included in the Appendix to provide a clearer understanding of their current state.

2.5 Drawbacks of the Existing System

The existing system for facilitating connections and transactions between entrepreneurs and investors in Ethiopia is fraught with inefficiencies and limitations. These drawbacks hinder its ability to function effectively, creating barriers to achieving its intended purpose. Below is a detailed discussion of the system's key disadvantages:

1. **Limited Customer Feedback Handling**: Customer feedback is collected informally and not systematically analyzed. This makes it difficult to identify patterns or areas for improvement in service quality
2. **Lack of Accessibility:** Entrepreneurs and investors often rely on personal networks or events to connect, limiting reach and excluding those in rural or underserved areas. **T**here is no centralized or digital platform to enable easy access to opportunities, making the system inaccessible for many.
3. **Inefficient Communication:** Communication is dependent on manual methods such as phone calls, emails, or in-person meetings, which are slow and unreliable. Scheduling meetings or following up on proposals is time-consuming, often leading to missed opportunities.
4. **Absence of Standardization:** Business plans, presentations, and agreements vary significantly in format and quality due to the lack of standard templates or

guidelines. This inconsistency often undermines professionalism and credibility, making it difficult for investors to assess opportunities effectively.

5. **Informal Negotiations and Agreements:** Discussions between entrepreneurs and investors are largely unstructured and informal. Agreements are often handwritten or minimally documented, increasing the risk of misunderstandings or disputes.
6. **Lack of Legal Oversight:** There are no legal frameworks or professional support to safeguard the interests of entrepreneurs and investors. Informal agreements leave both parties vulnerable to exploitation or non-compliance with agreed terms.
7. **Poor Record Keeping:** Financial transactions and agreements are manually recorded, making them prone to errors, misplacement, or tampering. Physical storage of documents increases the risk of damage or loss, leading to accountability issues.
8. **High Costs and Time Requirements:** Entrepreneurs spend significant time and resources on travel, printing, and other logistics to meet investors and prepare documents. The lengthy process of finding investors and finalizing deals delays the implementation of business ideas.
9. **Lack of Confidentiality:** The system does not ensure the confidentiality of business ideas or personal information. This lack of protection discourages entrepreneurs from sharing innovative ideas due to fear of theft or misuse.
10. **Limited Opportunities for Feedback and Improvement:** Investors provide informal feedback, but there is no structured mechanism for entrepreneurs to refine their proposals systematically. This lack of constructive engagement hinders the growth and evolution of business ideas.

The drawbacks of the existing system emphasize the need for a modern, structured, and digitalized solution. Addressing these limitations will enable more efficient communication, streamlined processes, and equitable opportunities for both entrepreneurs and investors.

2.6 Business Rules of the Existing System

In this section, we outline the key business rules that govern the current manual system used by entrepreneurs and investors. These rules reflect the traditional, informal processes that are followed during funding and collaboration. The following table outlines the possible business rules that govern the existing manual system.

Table 2-1: Business rule 1 - face-to-face meeting

Name	ID	Description
Face-to-Face Meeting	BR1	Entrepreneurs must meet investors in person, limiting the ability to work remotely or connect quickly.

Table 2-2: Business rule 2 - entrepreneurs do everything

Name	ID	Description
Entrepreneurs Do Everything	BR2	Entrepreneurs are responsible for identifying investors, preparing presentations, negotiating terms, and finalizing agreements.

Table 2-3: Business rule 3 - investors hold power

Name	ID	Description
Investors Hold Power	BR3	Investors dominate negotiations, often setting terms that may not be favorable or balanced for entrepreneurs.

Table 2-4: Business rule 4 - no legal protections

Name	ID	Description
No Legal Protections	BR4	Agreements are informal and lack legal oversight, leading to potential exploitation and disputes.

Table 2-5:Business Rule 5 - confidentiality is assumedis

Name	ID	Description
Confidentiality Is Assumed	BR4	Confidentiality is expected but not formally enforced, increasing the risk of breaches and misuse of sensitive information.

Table 2-6:Business Rule 5 - delayed feedback

Name	ID	Description
Delayed Feedback	BR4	Entrepreneurs often experience delayed responses from investors after presenting their ideas, leading to uncertainty, stalled projects, and missed opportunities.

Table 2-7:Business Rule 5 - unclear communication

Name	ID	Description
Unclear Communication	BR4	Communication between entrepreneurs and investors is often informal and lacks a structured system for updates or clarifications, causing misaligned expectations.

CHAPTER THREE

3 PROPOSED SYSTEM

In this chapter, the overall description of the proposed system is presented, followed by the detailed Functional Requirements and Non-functional Requirements that define the system's capabilities and constraints. The proposed system aims to transition the current manual ordering process into a more automated, efficient, and user-friendly digital platform while maintaining flexibility and security for both customers and administrators.

3.1 Functional Requirements

This section outlines the core functionalities that the proposed EthioCapital system must provide to meet the needs of its users. These requirements detail the specific tasks the system will perform, enabling entrepreneurs, investors, and students to interact effectively and achieve their goals within a streamlined, secure, and user-friendly platform. Below are the core functional requirements for the proposed EthioCapital connect system:

FR1: User Registration and Authentication

- **Description**: Users (entrepreneurs, students, investors) should be able to create an account using an email address or phone number. The system will verify credentials against the user database to grant or deny access.
- **Dependencies**: upport for third-party authentication using Google and LinkedIn for convenience, Secure authentication mechanism, user database, authentication API. or any modules.

FR2: Profile Management

- **Description**: Each user type should be able to create, edit, and manage a profile with customizable fields to reflect their unique objectives.
- **Dependencies**: Dynamic forms for entrepreneurs, students, and investors to capture industry-specific data, profile visibility controls for managing sensitive information, CRUD (Create, Read, Update, Delete) functionality for user profiles, Database to store user profile data securely.

FR3: Project/Business Idea Submission

- **Description**: Entrepreneurs can submit detailed descriptions of their projects, upload supporting documents, and update progress milestones to keep investors informed.
- **Dependencies**: File upload support for documents, images, and videos, backend services to manage project data and updates.

FR4: Investor Matching and Recommendation System

- **Description**: The system will recommend projects or connections based on user profiles and activities. Users can also manually search for projects or connection.
- **Dependencies**: Search functionality with filters (e.g., industry, location, funding size).

FR5: Meeting Scheduling and Communication

- **Description**: Users can schedule meetings, communicate via a built-in real-time messaging system, and hold video calls for project discussions using the platform's own chat and video call functionalities. This feature enhances collaboration and streamlines communication between entrepreneurs, investors, and students.
- **Dependencies**: In-app messaging system with real-time capabilities, Integrated video calling system developed within the platform, Calendar functionality to manage meeting schedules and reminders.

FR6: Funding and Financial Management

- **Description**: Investors can pledge funds to projects, track transactions, and manage share allocations through the platform.
- **Dependencies**: Secure payment gateway integration, Transaction logging system for record-keeping, Financial analytics to track funding progress.

FR7: Feedback and Rating System

- **Description**: Users can provide feedback and rate projects, entrepreneurs, or investors to enhance platform transparency.
- **Dependencies**: Rating module with customizable parameters, Feedback submission forms, Data storage and analytics to display aggregated ratings.

FR8: Administrative Controls

- **Description**: Admins can moderate content, monitor platform activity, and enforce compliance.
- **Dependencies**: Admin dashboard with analytics and reporting tools, Moderation tools for verifying project authenticity, Rule-based content scanning for compliance checks.

FR9: Content Moderation and Compliance

- **Description**: The system will verify that all content adheres to platform policies using manual reviews..
- **Dependencies**: Manual review workflow for flagged content,Database of compliance rules and regulations.

FR10: User Feedback Collection

- **Description**: Users can submit feedback or report issues directly within the platform to help improve its functionality.
- **Dependencies**: Feedback forms integrated into user dashboards, Analytics dashboard for admins to review feedback trends.

FR11: Language Selection

- **Description**: Users should be able to select their preferred language for the interface, initially supporting English and Amharic.
- **Dependencies**: Language selection interface, multilingual support.

FR12: Invitation System

- **Description**: Entrepreneurs should be able to send invitations to investors to showcase their business ideas and projects. This functionality promotes networking and collaboration, allowing entrepreneurs to actively engage with potential investors and facilitate meaningful connections.
- **Dependencies**: Invitation functionality allowing users to send and manage invites, User network system to track connections and invitations sent.

FR13: Events and Ceremonies Calendar

- **Description**: The system will feature an Events and Ceremonies Calendar that displays upcoming events, workshops, and ceremonies relevant to entrepreneurs,

investors, students, and funding organizations. This functionality will help users stay informed about opportunities to connect and collaborate, addressing the challenge of event visibility in existing systems.

- **Dependencies**: Calendar interface to list events with date, time, and location, Integration with a blog page to provide detailed descriptions and updates about each event.

3.2 Non-Functional Requirements

Non-functional requirements for the Ordering and Delivery Platform describe the system's quality attributes, performance metrics, and operational constraints. These requirements ensure that the system not only functions correctly but also meet user expectations for performance, security, and usability.

3.2.1 User Interface and Human Factors

The system should offer an intuitive, clean, and user-friendly interface designed to accommodate users with varying levels of technological expertise. The user interface (UI) should provide an intuitive and seamless experience for all types of users (students, staff, and administrators), ensuring that even users with minimal technical expertise can navigate the system with ease. The design of the system must focus on simplicity, consistency, and accessibility. The UI should be designed to minimize cognitive load, making it easy for users to perform key actions such as ordering meals, tracking deliveries, and managing their profiles. Additionally, the platform must be responsive, easy to navigate, and aesthetically pleasing across all devices, whether mobile, tablet, or desktop.

Requirements:

- The system must be designed with a clean, user-friendly interface, with a focus on navigation simplicity and clarity.
- All text, icons, buttons, and menus should be intuitive and self-explanatory, enabling easy access to core features like.
- The design must be responsive, ensuring compatibility across desktop, tablet, and mobile devices with proper scaling of elements.

Objective: The objective is to create a highly usable, consistent, and responsive system that accommodates a wide range of users, from expert individuals to those with little experience using digital platforms. It is essential that the system ensures inclusivity and accessibility for all members of the university community.

3.2.2 Hardware Considerations

The platform should be designed to function efficiently across a diverse range of hardware configurations, ensuring usability and performance on both modern and older devices. It must account for varying levels of device specifications, from high-performance systems to low-resource hardware. The design should prioritize efficient resource utilization to maintain performance and provide a smooth user experience across all supported devices.

Requirements:

- The platform must maintain compatibility with both desktop and mobile devices, adhering to generalized hardware requirements.
- It should support commonly used web browsers and operating systems to ensure broad accessibility.
- The system must operate efficiently, minimizing resource usage to avoid performance issues on devices with limited processing power.
- The layout and functionality should adapt seamlessly to different device types and screen dimensions.

Objective: The objective is to create a universally accessible platform that delivers consistent performance and usability across various hardware configurations. By accommodating devices with differing levels of resources, the system ensures inclusivity and broad accessibility. The platform should focus on delivering a reliable, efficient, and adaptable experience to support users regardless of their hardware setup or technological environment.

3.2.3 Security Issues

Security is a critical concern for the proposed system, as it will handle sensitive data, including personal information, payment details, and order history. The system must protect user data from unauthorized access and attacks by implementing strong security

measures. The system should provide encryption for sensitive data and implement robust authentication and authorization mechanisms to ensure that only authorized users can access specific resources.

Requirements:

- All sensitive data, including user credentials, payment details, and personal information, must be encrypted during both transmission (using HTTPS) and storage (using AES encryption or equivalent).
- The system must support strong authentication mechanisms, such as multi-factor authentication (MFA), to ensure that only authorized users can access their accounts.
- Role-based access control (RBAC) should be implemented to restrict access to system features based on user roles (e.g., entrepreneurs, students, investors, etc.).
- Security audits should be conducted regularly, and the system should have mechanisms in place to detect and prevent unauthorized access or data breaches.
- The system must be protected against common web security vulnerabilities such as SQL injection.

Objective: The objective is to provide a secure, privacy-respecting platform that safeguards user data and prevents unauthorized access. By implementing strong encryption, secure authentication, and continuous monitoring, the system will ensure that users' personal and financial information is protected.

3.2.4 Performance Considerations

The system must be designed to maintain high performance and responsiveness under standard operating conditions, with the capacity to handle spikes in user activity and increasing demands over time. It should ensure efficient resource management and adaptability to varying levels of user interactions and data processing needs. By optimizing both backend and frontend processes, the system aims to minimize delays, provide seamless functionality, and scale effortlessly as the user base grows.

Requirements:

- The platform must ensure quick response times, loading within a reasonable timeframe to provide a seamless user experience.

- The architecture should be scalable, allowing for efficient expansion to accommodate an increasing number of users and higher data volumes without compromising performance.
- Mechanisms like data optimization, efficient query handling, and resource management must be implemented to support large datasets and media files.
- The system should be designed to balance loads dynamically, ensuring smooth operation during peak usage.

Objective: The objective is to build a robust and adaptable system capable of maintaining optimal performance under various conditions. By ensuring scalability and responsiveness, the system aims to provide users with a consistent, smooth, and efficient experience, regardless of traffic levels or data processing demands. This approach fosters reliability and prepares the system for future growth and evolving requirements.

3.2.5 Error Handling and Validation

The system shall handle errors and exceptions gracefully to ensure stability and prevent crashes or data loss. It shall include validation mechanisms to ensure that only valid, consistent, and properly formatted data is processed. This will help maintain the integrity of the database and the overall system performance while enhancing the user experience.

Requirements:

- The system shall validate inputs from entrepreneurs, investors, and students at multiple levels, ensuring that business proposals, investment details, and funding requests are accurate, consistent, and properly formatted before being processed or stored.
- The platform shall handle errors, such as invalid funding applications or unauthorized actions, with clear and actionable feedback to users. Error messages will be informative while safeguarding sensitive system details.
- All financial and networking transactions shall undergo rigorous validation and error handling to ensure data consistency and reliability. Errors occurring during transactions will be logged securely for debugging and compliance.

Objective: The goal is to implement a robust error management and validation framework specific to the project, ensuring system reliability, data integrity, and user satisfaction. The

framework will safeguard against invalid inputs, unauthorized actions, and potential system failures, creating a seamless and trustworthy user experience.

3.2.6 Quality Issues

Quality assurance is a critical aspect of delivering a reliable, user-friendly platform that performs consistently well under normal and challenging conditions. This requires rigorous testing protocols and continuous improvement through feedback loops. By maintaining a high standard of quality, the system will provide seamless experiences to users and meet the expected functionality. Regular testing and performance monitoring will also ensure that issues are addressed proactively before they affect the user experience.

Requirements:

- Implement periodic testing sessions to gather valuable user feedback on usability and functionality.
- Actively track and enhance performance indicators like API response times, system uptime, and page load times to optimize user experience.
- Ensure system reliability by implementing planned maintenance windows with minimal disruption to service.
- Conduct thorough testing of system components to ensure robustness and correctness.

Objective: The primary goal is to build a high-quality, robust, and scalable system that can efficiently handle both expected usage and unforeseen challenges. This will be achieved through systematic testing and user feedback, allowing continuous improvements while ensuring reliability and usability.

3.2.7 Backup and Recovery

The system must integrate strong and reliable backup and recovery mechanisms to prevent data loss and ensure business continuity in case of unforeseen failures. Regular data backups and a comprehensive recovery process will help restore operations swiftly, minimizing downtime. Additionally, redundant systems should be implemented to mitigate single points of failure, providing extra layers of security for critical data and operations.

Requirements:

- Set up automatic backups for critical data at regular intervals, storing backups in a secure location.
- Define and test clear recovery processes that enable the restoration of data and system functionality with minimal downtime.
- Incorporate redundant systems to eliminate the risks associated with single points of failure, enhancing overall system reliability.
- Provide users with clear feedback and notifications when their data has been successfully backed up or restored, ensuring transparency and trust.

Objective: The objective is to safeguard user data by implementing robust backup and recovery strategies. These strategies will minimize the risk of data loss and service disruptions, ensuring that the system is always available for users and that data integrity is maintained during unexpected failures.

3.2.8 Physical Environment

The system will be deployed on a cloud-based server, ensuring reliable hosting with minimal physical maintenance. Cloud hosting provides a stable environment, but users in regions with inconsistent infrastructure, like Ethiopia, may face occasional network disruptions. The design will account for these conditions to ensure continued access for users, even in areas with less reliable connectivity.

Requirements:

- Deploy the system on a cloud-based platform for stable and accessible hosting.
- Provide a mobile-friendly design for users with limited hardware capabilities in remote areas.
- Implement caching mechanisms to reduce data usage in areas with poor connectivity.

Objective: The objective is to ensure that the system remains highly functional and accessible, even in challenging physical environments where infrastructure limitations exist. The system must offer seamless access to core features regardless of network conditions, supporting users with varying connectivity capabilities. Additionally, by ensuring a mobile-friendly and lightweight design, the system can cater to users with lower-end devices or in regions with poor internet reliability. This approach will ensure that users

in remote areas can engage with the platform without facing excessive data consumption or performance issues.

3.2.9 Resource Issues

The system must be optimized for efficient resource usage to minimize costs while maintaining strong performance. Optimization efforts will focus on minimizing the computational and memory overhead to ensure smooth operation without excessive resource consumption.

Requirements:

- Optimize database queries to reduce server load.
- Use efficient algorithms and data structures to minimize computational overhead.
- Implement caching for frequently accessed data to reduce resource consumption.
- Continuously monitor resource usage and scale infrastructure as necessary.

Objective: The objective is to design a system that utilizes resources in a manner that balances performance with cost-efficiency. By optimizing database queries, using efficient algorithms, and implementing caching mechanisms, the system will minimize the load on servers and reduce unnecessary resource consumption. Monitoring resource usage and scaling infrastructure will allow the system to grow with demand while maintaining optimal performance. This approach aims to create a scalable, cost-effective system that delivers a smooth user experience while keeping operational costs in check.

3.2.10 Documentation

Comprehensive documentation must be provided to support system usage, maintenance, and future development. This documentation should cater to both users and developers, offering clear guidelines and instructions to ensure smooth interactions with the system. Well-maintained documentation is essential for enhancing the user experience, easing maintenance tasks, and providing a foundation for future development.

Requirements:

- Provide user documentation explaining how to navigate the platform and utilize its features.

- Include developer documentation outlining the system architecture, APIs, and code structure.
- Add troubleshooting guides to assist users and developers in resolving common issues.
- Maintain version-controlled documentation to track updates and changes.

Objective: The objective is to create comprehensive, accessible, and up-to-date documentation that ensures all users and developers can understand, operate, and maintain the system effectively. User documentation should be clear and easy to follow, ensuring that users can navigate and use all platform features without confusion. Developer documentation will be structured to provide deep insight into the system's architecture, enabling efficient maintenance and future enhancements. Troubleshooting guides will empower both users and developers to quickly resolve common issues, minimizing downtime. By maintaining version-controlled documentation, the system will ensure consistency and clarity across all updates and revisions, supporting ongoing development and ease of use.

CHAPTER FOUR

4 SYSTEM ANALYSIS

4.1 System Model

The Ethiocapital system model includes a variety of object-oriented diagrams to illustrate the components and their interactions. These diagrams consist of Use Case, Class, Data Directory, State Chart, Sequence, and Activity Diagrams. The Use Case Diagram demonstrates the interactions between the system and its actors, mapping out functional requirements. The Class Diagram outlines the system's structure, showing the relationships between different classes. Meanwhile, the State, Sequence, and Activity Diagrams capture the system's dynamic behavior, workflows, and data flow. Together, these diagrams provide a clear understanding of the system's functionality and architecture.

4.1.1 Use case Model

The Use Case Model documents the functional requirements of the system and provides a structured way to capture how different actors interact with the system to achieve specific goals. This section breaks down the key components of the use case model, starting with actor identification, followed by use case identification, use case diagram, use case descriptions, and use case scenarios.

4.1.1.1 Actor Identification

In this section, we identify the various actors interacting with the system. These actors can be internal or external entities, each playing a distinct role within the proposed delivery system. Understanding their responsibilities is crucial for establishing the functionality and design of the system. The primary actors are as follows:

- **Entrepreneur**: Primary users who create and manage projects, track financial contributions, update project details, and communicate with investors to ensure project visibility and growth.
- **Investor**: Users who explore, assess, and fund projects, track investment progress, and communicate with entrepreneurs about project performance.

- **Board**: Composed of top shareholders, the Board manages project decisions, creates bank accounts for project funding, communicate and makes critical funding decisions, including approving or rejecting fund releases and returning funds if no agreement is reached. They ensure project alignment and oversee overall progress.
- **Admin**: Oversees platform operations, manages user accounts, ensures security, handles moderation, and maintains smooth system performance.
- **Payment Gateway (Chapa)**: External payment gateway that securely processes customer payments through its API, ensuring transaction security, real-time processing, and payment status verification.

4.1.1.2 USE CASE IDENTIFICATION

The Use Case Identification section outlines the key functional requirements of the system by identifying and describing the use cases. Use cases are representations of the system's functionality, illustrating how vary actors interact with the system to achieve specific goals.

This section identifies and outlines the key functional requirements of the system by describing its use cases, which represent how various actors interact with the system to achieve specific goals.

The **Entrepreneur** logs in, manages their profile, and showcases business ideas. They can create, update, delete, or view projects, attach documents, provide project updates, and communicate with investors via messaging or video calls. Key use cases include Login, Create/Manage Business Idea, Communicate with Investors, and Submit Complaints. The **Investor** logs in, creates and manages their profile, searches for projects, pledges funds, provides feedback, and communicates with entrepreneurs. Key use cases include Login, Search Projects, Pledge Funds, Rate Projects, and Submit Complaints.

The **System Admin** manages platform operations, including user management, content moderation, overseeing transactions, and resolving complaints. Key use cases include Login, Manage Users, Content Moderation, Process Transactions, and Analytics Dashboard. The **Board**, consisting of top shareholders, manages project decisions, funding, and communication. Key use cases include create account, Managing Project Funding, Approving/Rejecting Funding, and Submitting Complaints. Finally, **Chapa**, the external payment gateway, securely processes transactions and verifies payment statuses. Its key

use cases include handling payment processing, verifying payments, and ensuring real-time confirmation of transactions.

4.1.1.3 Use Case Diagram

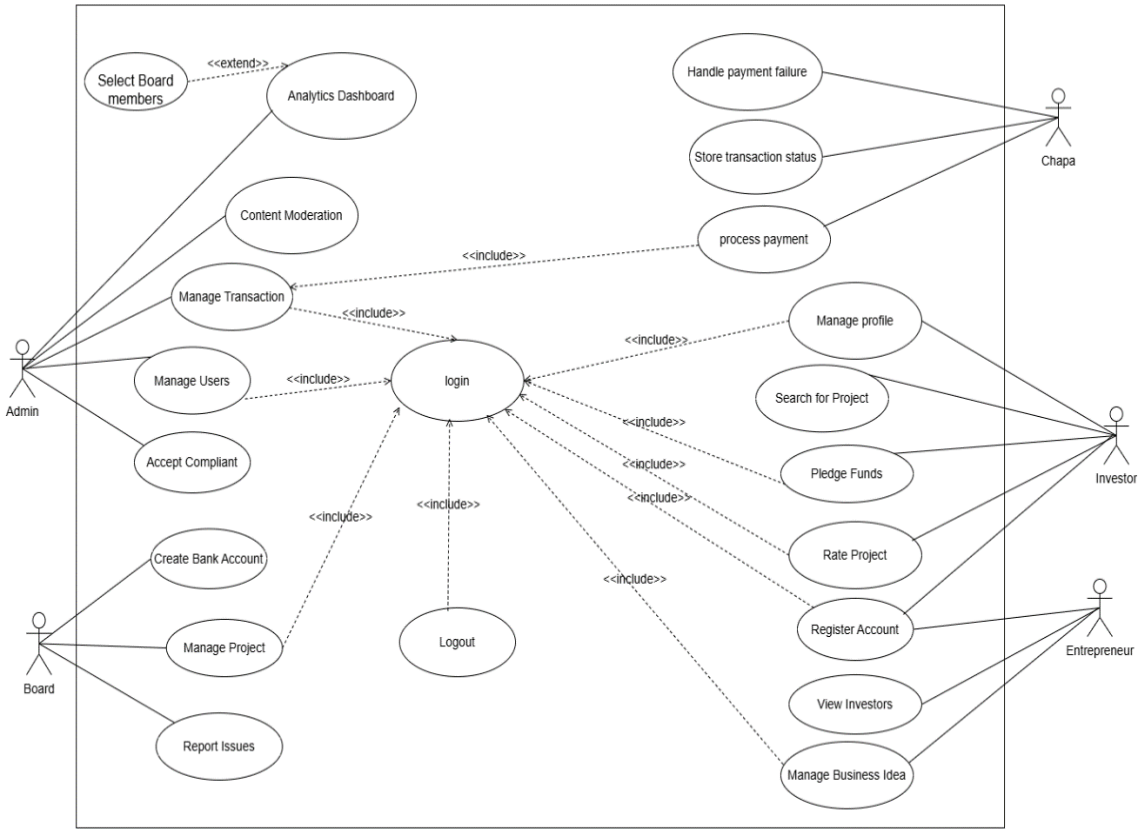

Figure 4-1: Usecase Diagram for Proposed System

4.1.1.4 Use Case Description

In this section, we will provide detailed use case scenarios for some of the key actions within the system, outlining the flow of events that occur during each process. These scenarios are based on the actions identified in the use case diagram and describe how different actors interact with the system in specific instances.

Table 4-1:Use Case Description for Register Entrepreneur Account

Use Case ID	**UC-01**
Use Case Name	Register Entrepreneur Account
Actors	Entrepreneur

Use Case Description	Enables entrepreneurs to create an account on the platform.	
Goal	To enable entrepreneurs to register and create an account on the Ethio Capital platform.	
Precondition	The system is operational and accessible via a web browser. - The entrepreneur does not have an existing account.	
Basic Flow	**Actor Action**.	**System Response**
	Step 1: The entrepreneur opens the system webpage. **Step 3**: The entrepreneur clicks the sign-up button on the landing page. **Step 5**: The entrepreneur fills in required details (name, email, password, phone number, and business details) and clicks the sign-up button.	**Step 2:** The system displays the landing page. **Step 4**: The system displays the sign-up interface for the user. **Step 6:** The system confirms the user's email and password. **Step 7**: The system displays a success message
Alternative Course of Action	If the email is already in use, the system prompts the user to log in or reset their password.	
Postcondition	The entrepreneur's account is successfully created, and they can now log in.	

Table 4-2: Use Case Description for Approve Investor Registration

Use Case ID	**UC-02**
Use Case Name	Approve Investor Registration
Actors	System Admin, Investor
Use Case Description	Allows the system admin to review and approve investor registration requests, ensuring only verified investors gain access.
Goal	To allow system admin to verify and approve investor registrations.
Precondition	- The investor has submitted the registration form and required documents. - The system admin has access to the admin dashboard.

Basic Flow	**Actor Action** Step 1: The investor completes the registration form, uploads verification documents, and submits for approval. Step 3: The system admin logs into the admin dashboard and reviews the application. **System Response** Step 2: The system notifies the admin of the new registration request. Step 4: The system sends a notification to the investor regarding approval or rejection.
Alternative Course of Action	If rejected, the system provides reasons and prompts the investor to resubmit documents.
Postcondition	Approved investors can log in; rejected investors can resubmit their applications.

Table 4-3: Use Case Description for Login

Use Case ID	**UC-03**
Use Case Name	Login
Actors	Entrepreneur, Investor, System Admin
Use Case Description	A system allows users to log in and access their privileges.
Goal	To authenticate users and grant access to respective privileges.
Precondition	- The system is accessible. - The user must have an account.
Basic Flow	**Actor Action** Step 1: The user opens the system webpage. Step 3: The user clicks the login button. Step 5: The user enters email and password, then clicks login. **System Response** Step 2: The system displays the landing page. Step 4: The system displays the login interface. Step 6: The system authenticates the credentials. Step 7: The system grants access based on privileges.
Alternative Course of Action	Alt A: If credentials are incorrect, the system displays an error. Alt B: If the user logs out, the session ends.
Postcondition	Users are successfully logged in or logged out.

Table 4-4: Use Case Description for Upload Business Idea

Use Case ID	**UC-04**

Use Case Name	Upload Business Idea
Actors	Entrepreneur
Use Case Description	Allows entrepreneurs to submit business ideas for review.
Goal	To enable entrepreneurs to share ideas with potential investors.
Precondition	The entrepreneur is logged in.
Basic Flow	**Actor Action** Step 1: The entrepreneur navigates to the dashboard and clicks "Upload Business Idea." Step 3: The entrepreneur enters details and uploads documents. **System Response** Step 2: The system displays the upload interface. Step 4: The system confirms submission and marks the idea as pending.
Alternative Course of Action	If fields are incomplete, the system prompts corrections.
Postcondition	The idea is uploaded and marked for review.

Table 4-5: Use Case Description for Browse and Filter Opportunities

Use Case ID	**UC-05**
Use Case Name	Browse and Filter Opportunities
Actors	Investor
Use Case Description	Allows investors to explore and filter business opportunities.
Goal	To help investors find relevant ideas for investment.
Precondition	The investor is logged in.
Basic Flow	**Actor Action** Step 1: The investor navigates to the dashboard. Step 3: The investor selects an idea to view details. **System Response** Step 2: The system displays a list of ideas. Step 4: The system shows detailed information.
Alternative Course of Action	If no results match criteria, the system displays "No results found."
Postcondition	The investor browses or selects an idea for further action.

Table 4-6: Use Case Description for Invest in a Business

Use Case ID	**UC-06**
Use Case Name	Invest in a Business
Actors	Investor
Use Case Description	Enables investors to purchase shares in a business.
Goal	To allow investors to fund selected business ideas.
Precondition	- The investor is logged in. - A business idea is selected.
Basic Flow	**Actor Action** Step 1: The investor clicks "Invest Now." Step 3: The investor completes the payment process. **System Response** Step 2: The system displays payment options. Step 4: The system confirms the investment and updates funding status.
Alternative Course of Action	If payment fails, the system prompts a retry.
Postcondition	The investment is processed, and the entrepreneur is notified.

Table 4-7: Use Case Description for Manage Board Activities

Use Case ID	**UC-07**
Use Case Name	Manage Board Activities
Actors	System Admin, Entrepreneur, Board Members
Use Case Description	Facilitates collaboration for business management.
Goal	To manage ideas and funds effectively through collaboration.
Precondition	- A board is created. - Members have access to the board section.
Basic Flow	**Actor Action** Step 1: Members click "My Board." Step 3: Members review proposals, provide feedback, and vote. **System Response** Step 2: The system displays the board page. Step 4: The system notifies the admin once consensus is reached.
Alternative Course of Action	If the board rejects the idea, the system processes refunds securely.
Postcondition	Decisions are finalized, and records are updated.

4.1.1.5 USE CASE SCENARIO

These scenarios serve as instances illustrating the major actions users take within the EthioCapital system. For example, in the “showcaseBusinessIdea” use case for Entrepreneurs, a scenario could unfold as follows: The Entrepreneur logs into the system, navigates to the “Showcase Idea” section, uploads relevant documents (e.g., business plan, research paper), and fills out a form describing their idea. The system validates the submitted data, displays a preview of the showcase, and, upon confirmation, publishes the idea for investors to review. The system notifies the Entrepreneur of successful publication.

4.1.2 OBJECT MODEL

The object diagram provides an integrated view of the conceptual structure and relationships within the EthioCapital system. It complements the class diagram by focusing on system objects and their specific interactions in various scenarios, offering a snapshot of the system’s dynamic behavior. Additionally, the section includes a data dictionary, detailing the attributes and relationships of key entities, ensuring clarity and consistency in the system's design. Together, these components provide a comprehensive overview of how the proposed system is structured and functions.

The proposed system identifies several potential classes, each with distinct roles and responsibilities. The Admin class oversees system operations, including user management, transaction monitoring, and facilitating fund transfers, ensuring smooth system administration and secure financial processes. Representing users who propose business ideas, the Entrepreneur class includes functionalities for idea submission, participating in board meetings, and collaborating with investors on post-investment activities. The Investor class embodies individuals or organizations interested in reviewing business ideas, purchasing shares, and contributing to entrepreneurial growth through investment and board collaboration. Designed for individuals seeking educational funding, the Student class allows students to upload supporting documents, interact with funding entities, and receive allocated funds directly to their university accounts. Encapsulating business plans and projects, the Idea class manages the information uploaded by entrepreneurs for review by investors, facilitating idea exploration and decision-making. The Transaction class handles all financial interactions, including share purchases, fund transfers, and transaction monitoring, ensuring transparency and reliability. Supporting direct communication, the

Chat class facilitates interactions between entrepreneurs and investors, promoting collaboration and trust. Representing a collaborative group of selected investors and the entrepreneur, the Board class manages post-investment activities, ensuring the proper utilization of funds and business development. So integrating these classes into a cohesive structure, the system ensures seamless functionality and robust support for its users' goals.

4.1.2.1 CLASS DIAGRAM

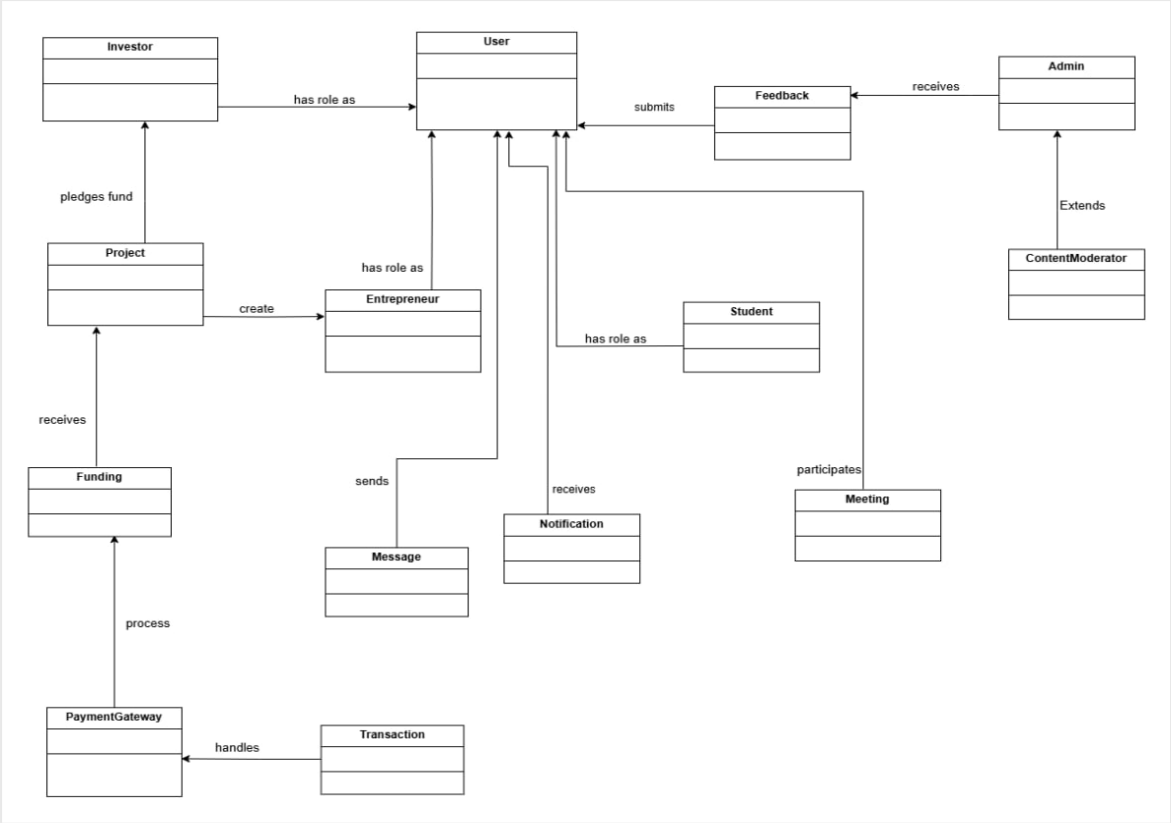

Figure 4-2: Class Diagram for Proposed Sysstem

4.1.2.2 DATA DICTIONARY

A class diagram, part of the Unified Modeling Language (UML), illustrates the static structure of a system by showing its classes, along with their attributes, methods, and relationships. It serves as a blueprint for understanding and designing a software system's structure from an object-oriented perspective.

Table 4-8: Attribute Description for Entrepreneurs Class

Attribute	**Data Type**	**Data Size**	**Key**	**Constraints**
EntrepreneursID	int	11	Primary Key	Not Null, Unique
Name	String	100	N/A	Not Null
Email	String	150	N/A	Not Null, Unique
Address	String	255	N/A	Not Null
paymentMethod	String	50	N/A	Not Null

Table 4-9: Attribute Description for Project Class

Attribute	Data Type	Data Size	Key Constraints	Constraints
Project_id	Integer	11	Primary Key, Auto-increment	Not Null, Unique
title	String	200	N/A	Not Null
description	String	-	N/A	Not Null
user_id	Ineteger	11	N/A	Not Null
status	ENUM	-	N/A	Not Null
fundingNeeds	Float	-	N/A	Not Null,Positive

Table 4-10: Attribute Description for Funding Class

Attribute	Data Type	Data Size	Key Constraints	Constraints
fundingId	Integer	11	Primary Key, Auto-increment	Not Null, Unique
projectId	String	200	N/A	Not Null
amount	String	-	N/A	Not Null
trasactionDate	Ineteger	11	N/A	Not Null

Table 4-11: Attribute Description for Message Class

Attribute	Data Type	Data Size	Key Constraints	Constraints
messageId	Integer	11	Primary Key, Auto-increment	Not Null, Unique
senderId	String	200	N/A	Not Null
recieverID	String	-	N/A	Not Null
content	Ineteger	11	N/A	Not Null

Table 4-12: Attribute Description for Notification Class

Attribute	Data Type	Data Size	Key Constraints	Constraints
notificationId	Integer	11	Primary Key, Auto-increment	Not Null, Unique
useri d	String	200	N/A	Not Null
message	String	-	N/A	Not Null

Table 4-13:Attribute Description for Investor Class

Attribute	**Data Type**	**Data Size**	**Key**	**Constraints**
investorID	int	11	Primary Key	Not Null, Unique
name	String	100	N/A	Not Null
email	String	150	N/A	Not Null, Unique
address	String	255	N/A	Not Null
pludgedFunds	Float	N/A	N/A	Default: 0.0

Table 4-14:Attribute Description for User Class

Attribute	**Data Type**	**Data Size**	**Key**	**Constraints**
userID	int	11	Primary Key	Not Null, Unique
name	String	100	N/A	Not Null
email	String	150	N/A	Not Null, Unique

address	String	255	N/A	Not Null
password	String	255	N/A	Not Null

Table 4-15:Attribute Description for Admin Class

Attribute	Data Type	Data Size	Key	Constraints
adminID	int	11	Primary Key	Not Null, Unique
userID	String	100	N/A	Not Null

Table 4-16:Attribute Description for Student Class

Attribute	Data Type	Data Size	Key	Constraints
studentID	int	11	Primary Key	Not Null, Unique
userID	String	100	N/A	Not Null
academicRecords	String	255	N/A	Nullable
financialNeeds	Float	N/A	N/A	Not Null

Table 4-17: Attribute Description for Feedback Class

Attribute	Data Type	Data Size	Key	Constraints
feedbackID	int	11	Primary Key	Not Null, Unique
userID	int	11	Foreign Key	References User(userID)
rating	int	5	N/A	Not Nul
comments	String	255	N/A	Nullable

4.1.3 DYNAMIC MODEL

In this section, we discuss the sequence diagrams, activity diagrams, and state chart diagrams to visualize the interactive behavior of the EthioCapital system and describe the interactions among its various elements.

4.1.3.1 SEQUENCE DIAGRAM

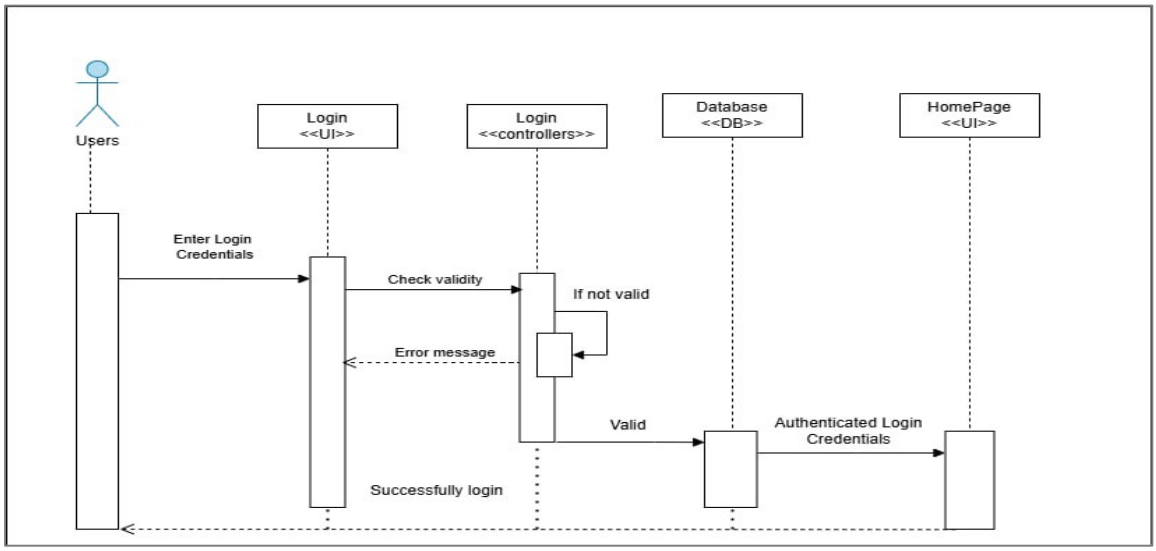

Figure 4-3: Sequence Diagram for Login

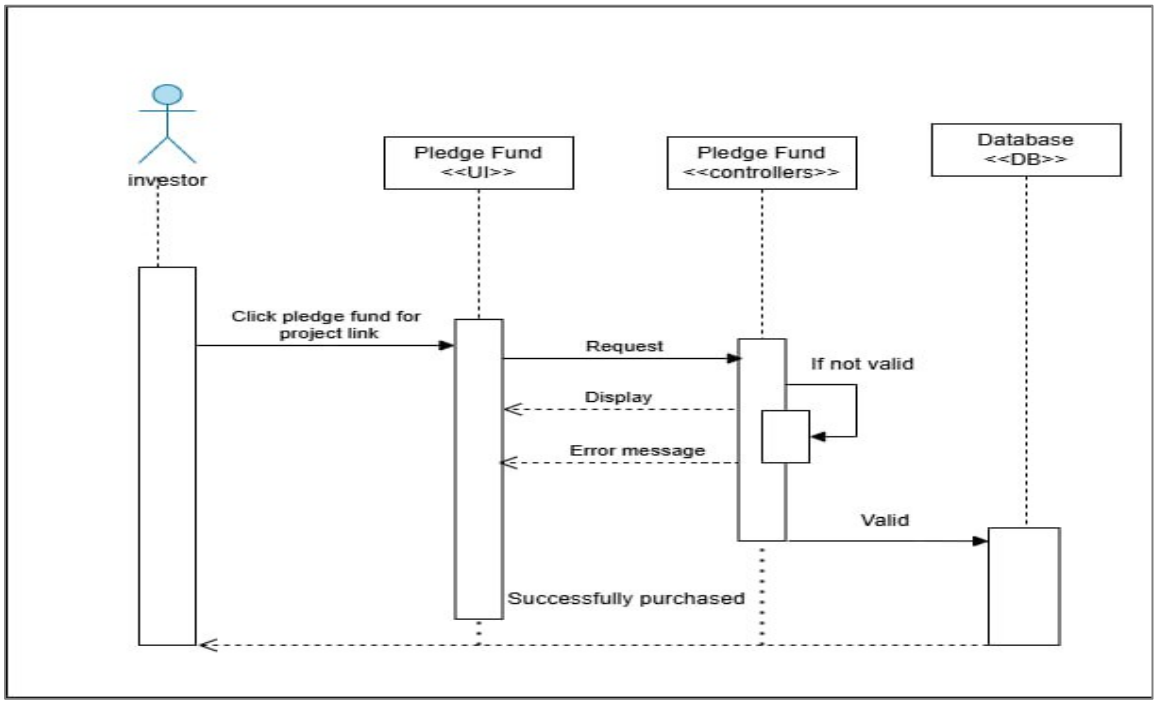

Figure 4-4: Sequence Diagram for Pledge Funds

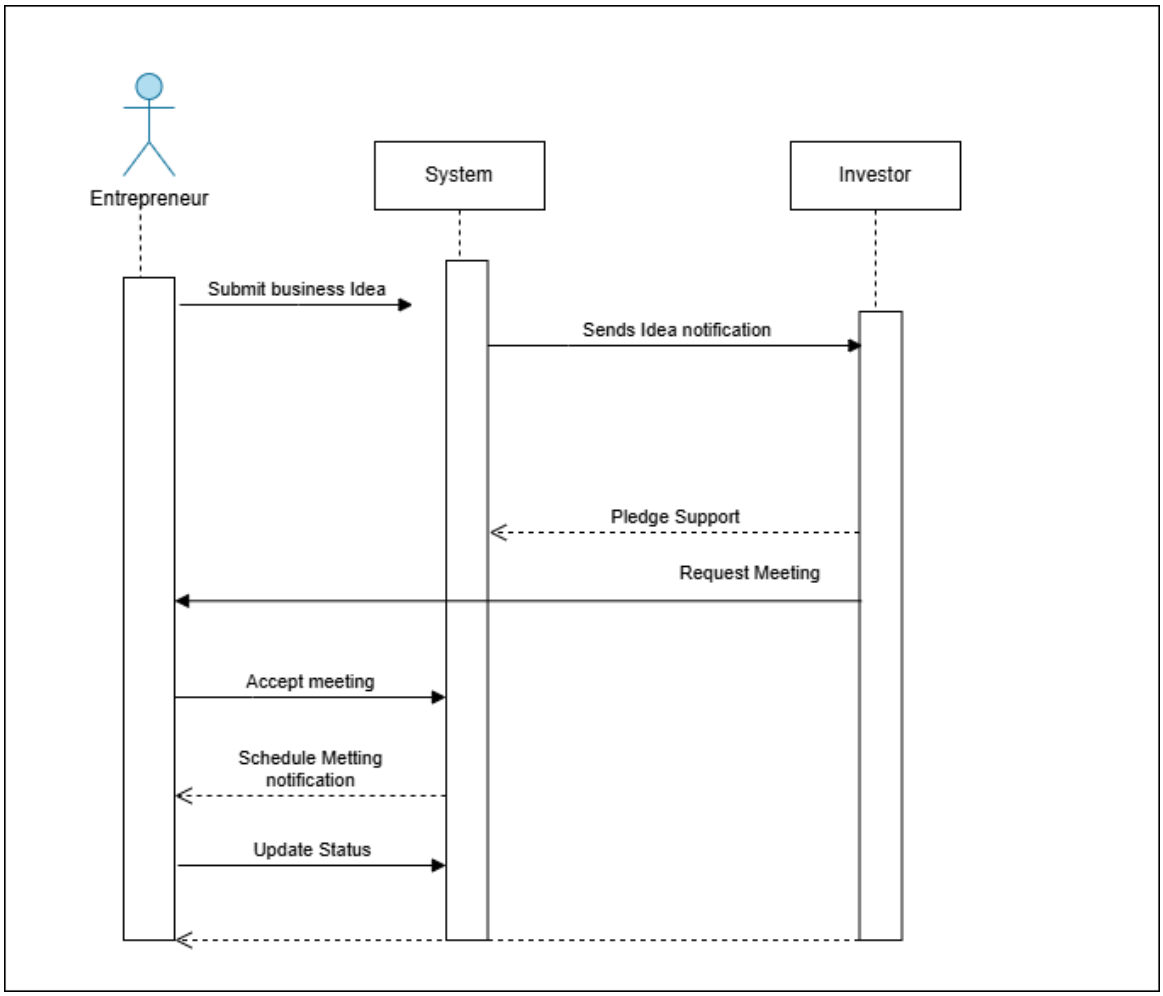

Figure 4-5: Sequence Diagram for Business Idea

4.1.3.2 ACTIVITY DIAGRAM

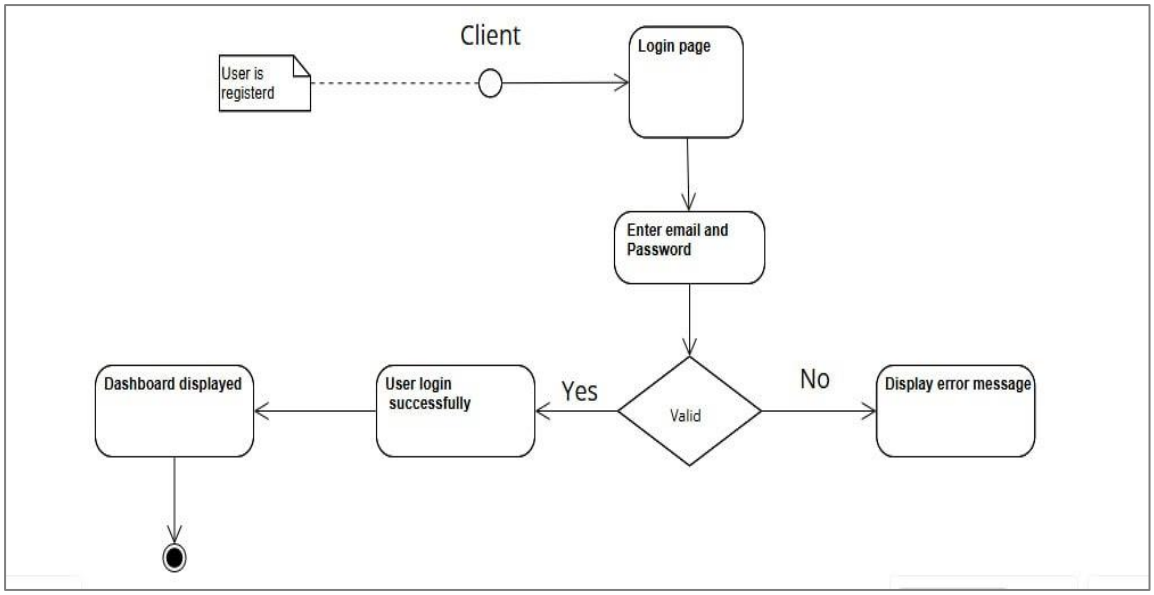

Figure 4-6: Activity Diagram for Login

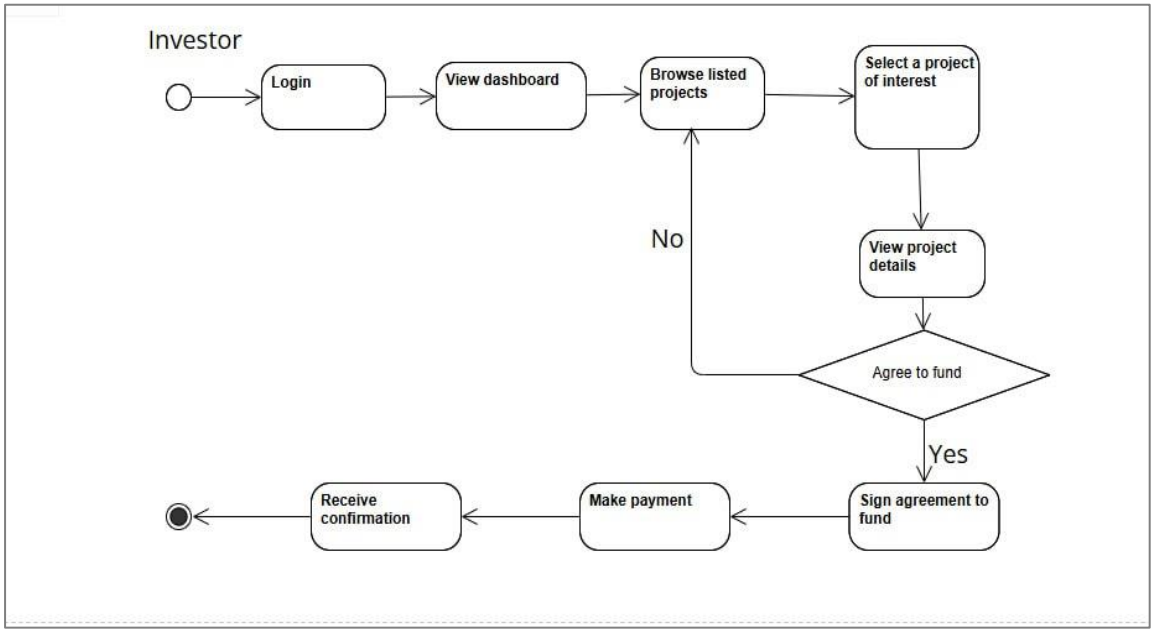

Figure 4-7: Activity diagram for Funding Projects

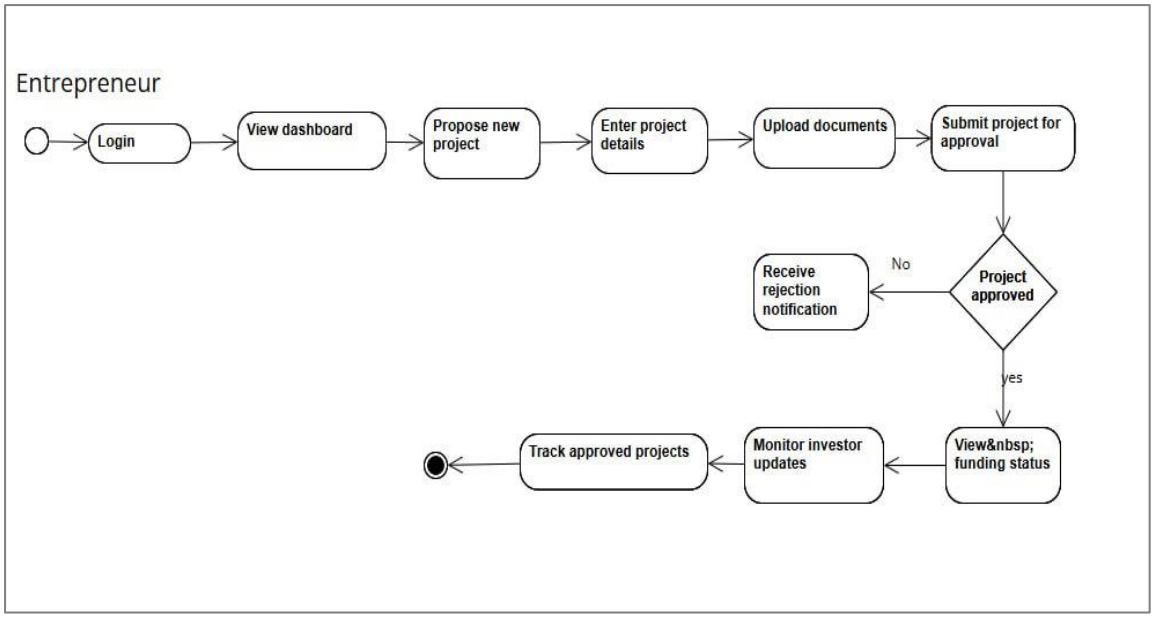

Figure 4-8: Activity diagram for Submitting Projects

4.1.3.3 **State Chart Diagram**

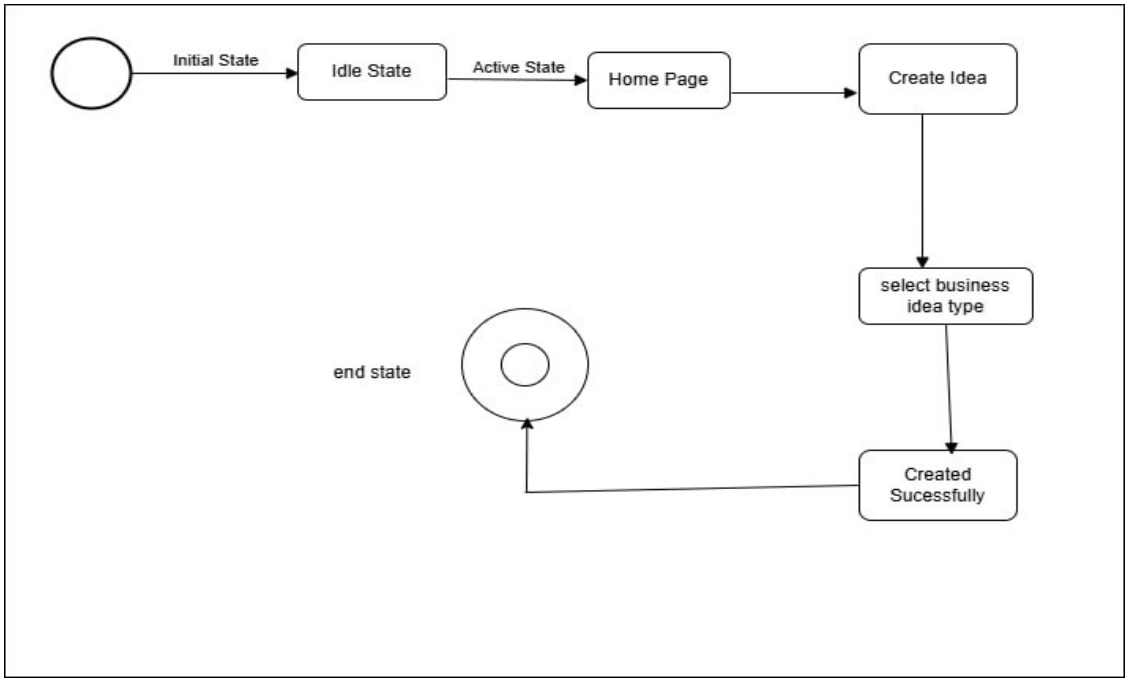

Figure 4-9: State chart Diagram for Create Idea

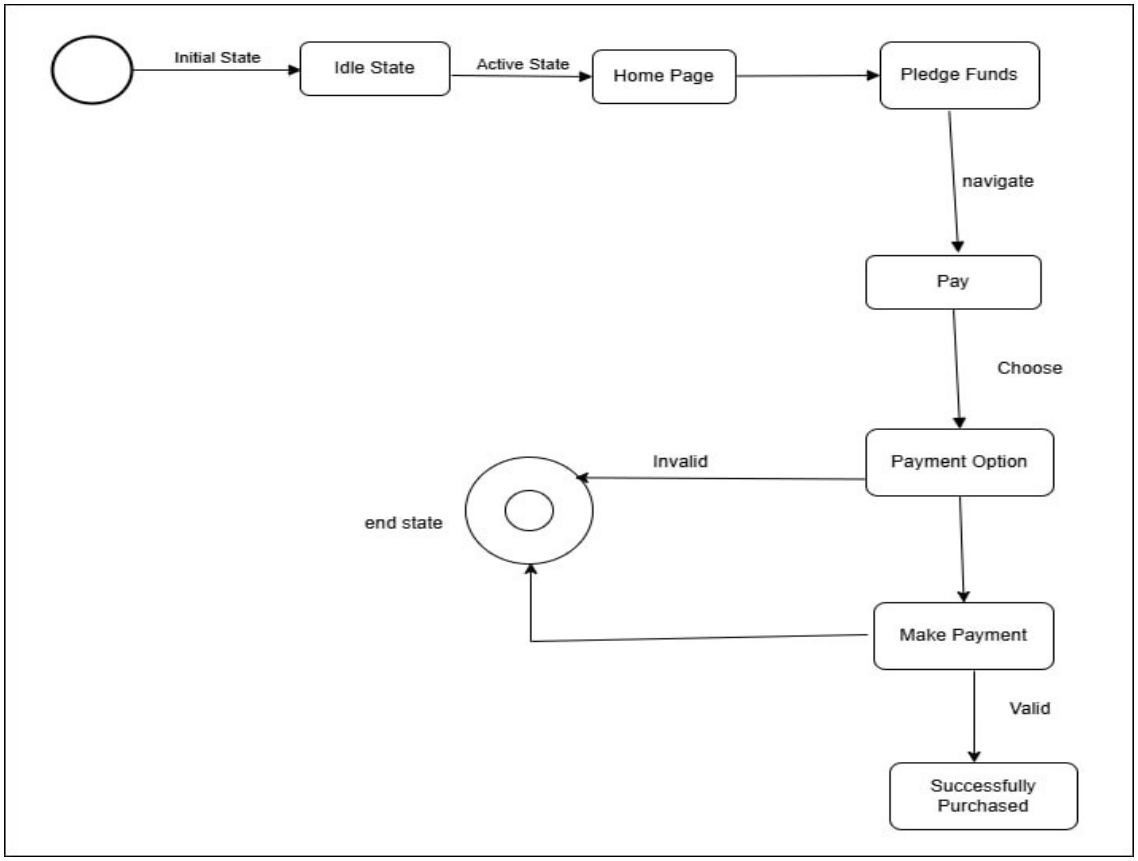

Figure 4-10: State chart Diagram for Pledge funds

CHAPTER FIVE

5 SYSTEM DESIGN

System design provides a comprehensive framework for understanding and implementing the technical architecture, data flow, and functional components of the project. It focuses on achieving scalability, security, and usability while maintaining high performance and reliability. This chapter outlines the design goals, proposed software architecture, hardware/software mapping, data management, and access control mechanisms for the system.

5.1 DESIGN GOALS

The design goals for the proposed system are prioritized based on the critical problems identified in the current manual system and aligned with the system's key non-functional requirements. These goals ensure the platform addresses security, performance, usability, and maintainability effectively.

- **Security Issues:**

  Goals: Ensure data confidentiality, integrity, and availability by implementing strong encryption mechanisms for both data at rest and in transit. Protect the system against common vulnerabilities such as SQL injection and cross-site scripting. Enforce robust authentication and access control mechanisms.

- **Performance Consideration:**

  Goals: Optimize database queries and application code for quick response times.Use caching techniques to enhance performance for frequently accessed data.

- **Error Handling and Validation:**

  Goals: Provide robust error messages for user actions and system errors. Implement input validation both on the client and server to ensure data integrity.

- **User Interface and Human Factors:**

  Goals: Provide a clean, responsive, and user-friendly interface with easy navigation. Focus on accessibility, ensuring the design accommodates diverse user needs.

- **Hardware Considerations:**

  Goals: Deploy the system on a reliable cloud platform to ensure availability and scalability. Optimize the application to run efficiently on standard devices and browsers.

- **Quality Issues:**

  Goals: Conduct unit and integration testing to ensure system reliability. Regularly monitor and update the system to maintain quality standards.

- **Backup and Recovery:**

  Goals: Schedule automated backups to secure user data and support data recovery. Ensure the system can recover from interruptions with minimal data loss.

- .**Physical Environment:**

  Goals: Host the system on a scalable and secure cloud infrastructure. Ensure compatibility with standard network environments.

- **Resource Issues:**

  Goals: Optimize resource usage for database and application services to ensure cost-efficiency. Scale system resources dynamically based on user demand.

- **Documentation:**

  Goals: Provide clear user documentation for accessing and navigating the system. Maintain developer documentation for the core system architecture and APIs.

5.2 CURRENT SYSTEM ARCHITECTURE (IF ANY)

The current system relies on manual processes without any centralized architecture.

5.3 PROPOSED SYSTEM ARCHITECTURE

The proposed system architecture for this project follows a three-tier structure, consisting of the Presentation Tier, which Provides the user interface for Entrepreneurs, Investors, Students, and Admins to interact with the system, Application Tier, that Processes user requests, enforces business rules, and bridges the Presentation and Database Tiers, and Database Tier, Ensures secure data storage and retrieval for users, transactions, and system logs. This structure ensures a clear separation of responsibilities, making the system modular, scalable, and maintainable.

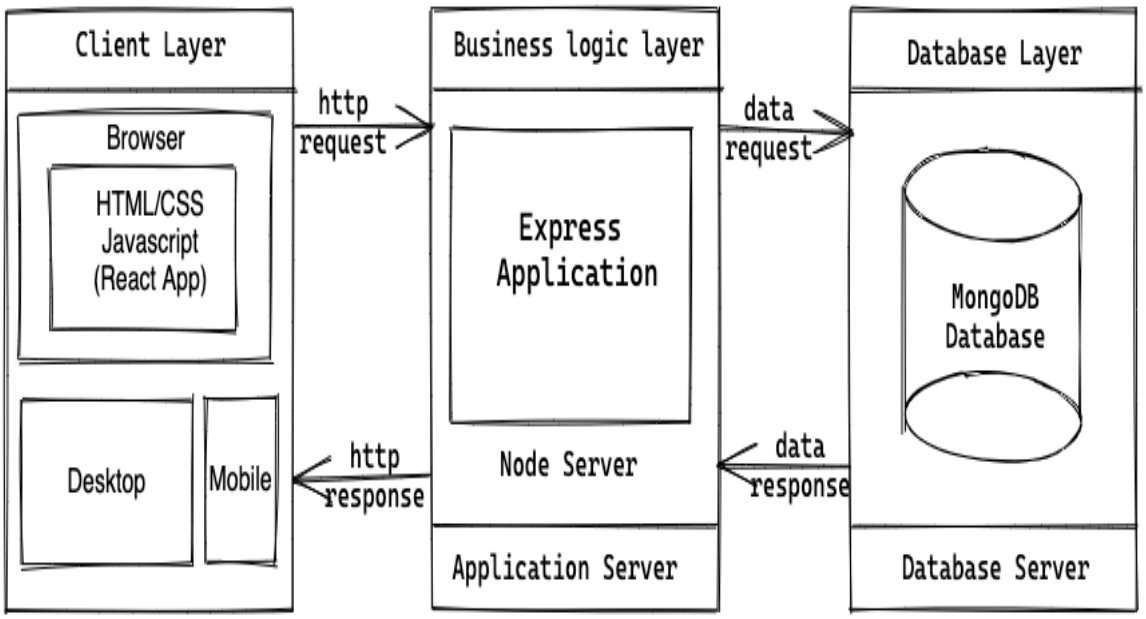

Figure 5-1: Proposed System Architecture

5.3.1 Subsystem Decomposition and Description

In this approach to subsystem decomposition, we decomposed the system into several subsystems, each responsible for specific functionalities, ensuring modularity, flexibility, and ease of maintenance. Each subsystem operates independently but collaborates with others through well-defined interfaces. Below is a description of each subsystem:

Table 5-1: Subsystem Decomposition and Description

Subsystem (Components)	**Description**	**Responsibilities**
User Management Subsystem	The User Management Subsystem handles user registration, login, and role assignments. It ensures proper authentication and access control, protecting user data and managing different user roles like admin, investor, and entrepreneur.	Authentication (login, registration, logout). Security features (role-based access, data protection). Managing user profiles and roles (e.g., admin, investor, entrepreneur).

Project Management Subsystem	This subsystem manages the entire lifecycle of projects, including creation, editing, and deletion. It tracks the approval process by board members and provides tools for entrepreneurs to monitor their projects.	Handles the lifecycle of projects (creation, editing, viewing, deletion). Tracks the approval process by board members. Provides features for entrepreneurs to monitor their projects.
Financial Management Subsystem	The Financial Management Subsystem manages investments and funding contributions, tracks payment statuses, and generates financial summaries for projects and users.	Manages funding contributions from investors. Tracks payment status and updates funding records. Generates financial summaries for projects and users.
Investor Management Subsystem	This subsystem enables investors to explore and select projects, track their investment decisions, and monitor the progress of funded projects.	Enables investors to explore projects and select opportunities. Tracks investment decisions and commitments. Provides tools for monitoring funded projects.
Communication Management Subsystem	The Communication Management Subsystem facilitates notifications, messages between users, and provides feedback on project approval or rejection to entrepreneurs.	Facilitates notifications and system updates for all users. Provides a platform for messages between investors and entrepreneurs. Sends approval or rejection feedback for proposed projects.

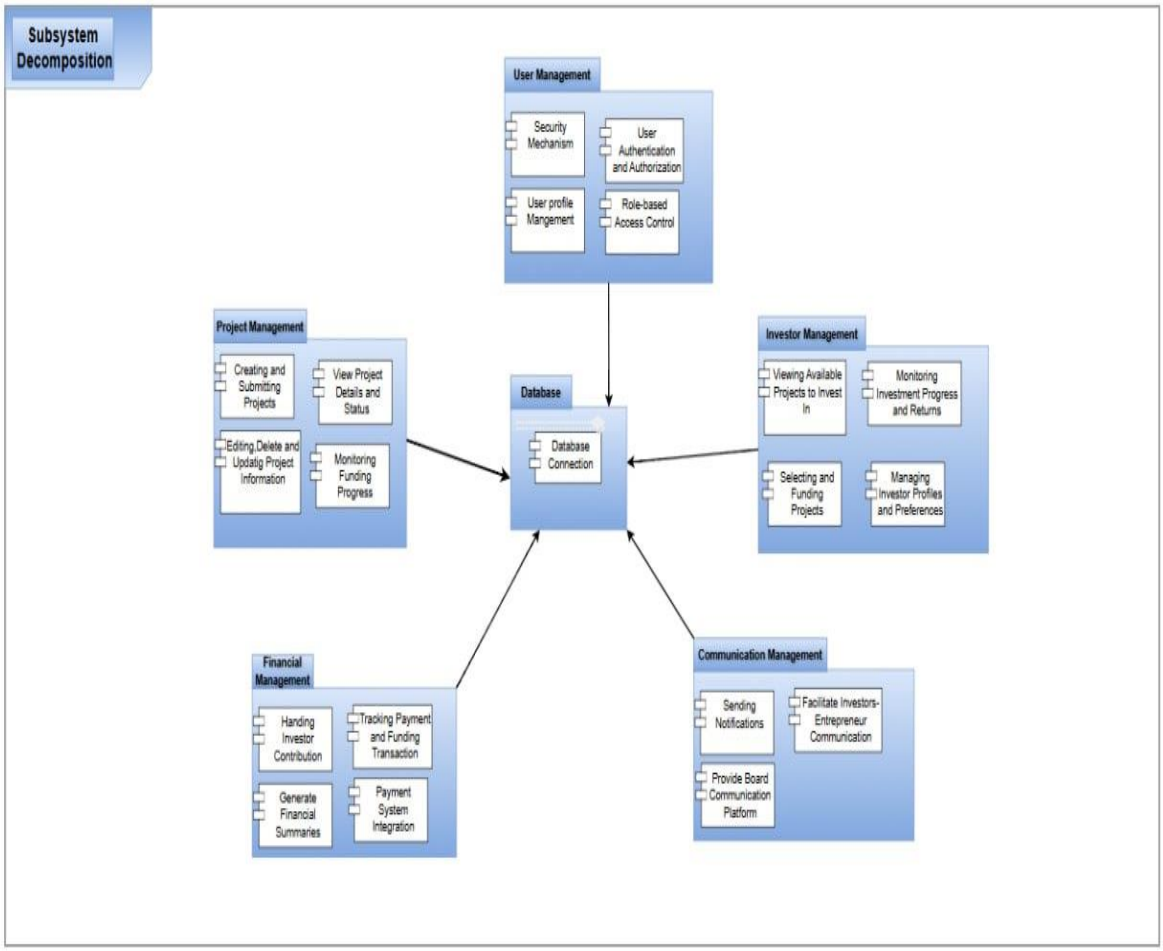

Figure 5-2: Component Diagram for Decomposed System

5.3.2 Hardware/Software Mapping

The deployment diagram for EthioCapital Connect provides a static representation of the run-time configuration of hardware nodes and the software components that operate on these nodes. This diagram highlights the interaction between hardware and software, illustrating how they collaborate to deliver the functionalities of the EthioCapital Connect platform. It connects various physical and virtual nodes, creating a cohesive network for seamless communication and processing. The diagram serves as a visual roadmap for understanding the deployment environment, showcasing how the system's components are distributed across the infrastructure.

This diagram shows the essential interaction of the hardware nodes, such as client devices, application servers, database servers, and external services like the payment gateway. It emphasizes the symbiotic relationship between hardware and software, enabling the efficient operation of EthioCapital Connect.

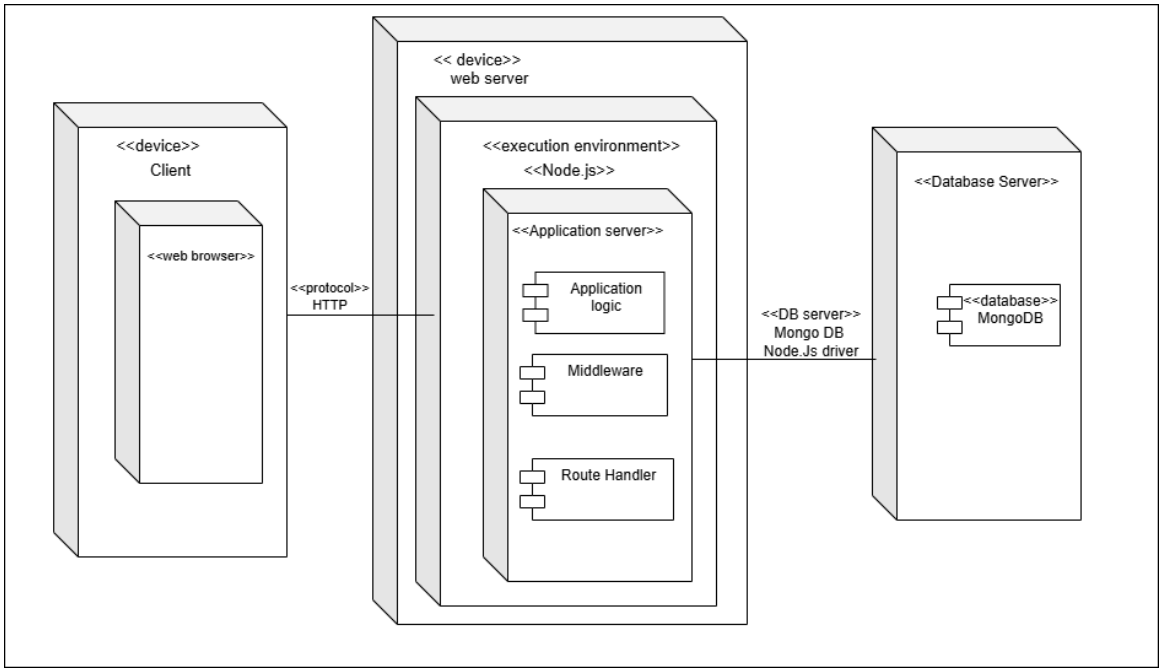

Figure 5-3: Depolyment Diagram for Hardware/Software Mapping

5.4.3 Detailed Class Diagram

The class diagram is one of the types of UML diagrams which is used to represent the static diagram by mapping the structure of the systems using classes, attributes, relations, and operations between the various objects.

We are going to demonstrate classes, their attributes, methods and visibility of attributes and methods also the relationship between different classes.

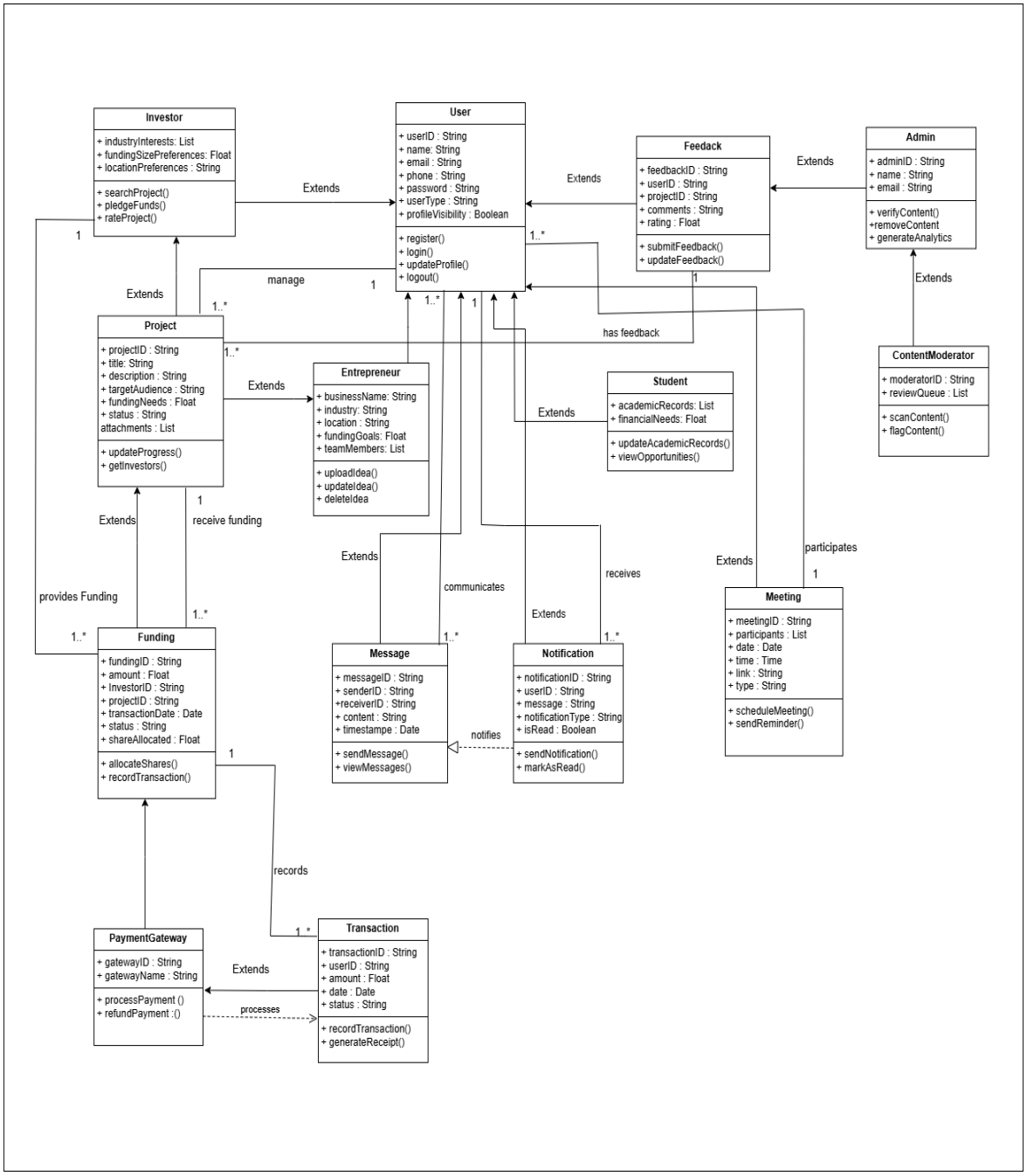

Figure 5-4: Detailed Class Diagram for Data Management

5.4.4 Persistent Data Management

Persistent Data Management involves designing and maintaining the system's database to handle all critical information efficiently. Ethio Capital uses collections to store data for different user roles, business processes, and transactions. Below are the key collections and their attributes.

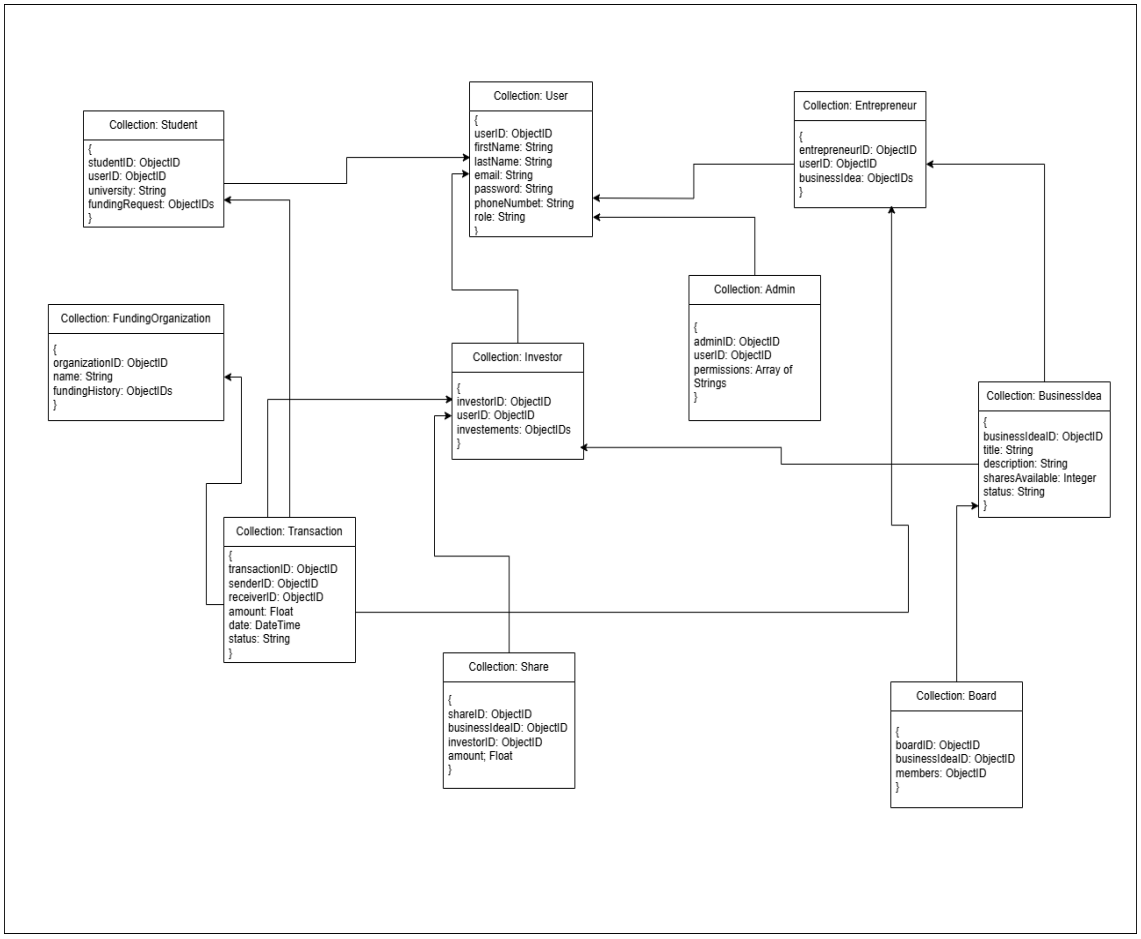

Figure 5-5: Persistent Data Management Diagram for Storage

5.4.5 Access Control and Security

Access control is a fundamental data security mechanism designed to protect the information within a system. The primary objective of access control in Ethio Capital is to ensure that users' identities are verified before granting access to the system. This process determines what parts of the system a user can interact with and what actions they are authorized to perform. Ethio Capital employs email and password-based authentication to verify user identities.

Table 5-2: Access Control List

User type	**Admin**	**Entrepreneur**	**Investor:**
User Registration and Authentication	No	Yes	Yes
Profile Management	Yes	Yes	Yes

Project/Business Idea Submission	No	Yes	No
Investor Matching and Recommendation System	No	No	Yes
Meeting Scheduling and Communication	No	Yes	Yes
Administrative Controls	Yes	No	No
Funding and Financial Management	No	No	Yes

This Access Control and Security helps to manage and protect sensitive information by assigning specific roles and permissions to users. It ensures that only authorized individuals can access certain features or data, minimizing risks of unauthorized actions. By structuring access based on roles, the system promotes efficiency, enhances data security, and ensures smooth operations across the platform.

5.4.6 Security Measures

To address the critical security concerns outlined, the system incorporates comprehensive measures to protect sensitive data and ensure secure operations.

All sensitive data, including user credentials, payment details, and personal information, is encrypted during transmission using HTTPS and stored securely with AES encryption or an equivalent standard. Robust authentication mechanisms, including multi-factor authentication (MFA), are implemented to ensure that only authorized users can access their accounts, adding an additional layer of protection. Role-based access control (RBAC) restricts access to system features and data based on user roles, such as entrepreneurs, students, and investors, ensuring that permissions are precisely allocated. Regular security audits are conducted to evaluate the system's defenses, while mechanisms for detecting and preventing unauthorized access or data breaches are actively maintained.

The system is safeguarded against common vulnerabilities like SQL injection, Cross-Site Scripting (XSS), and Cross-Site Request Forgery (CSRF) through parameterized queries,

input validation, and anti-CSRF tokens. To counter brute force attacks, login attempts are rate-limited, and failed logins are closely monitored.

These measures ensure that the platform provides a secure and privacy-respecting environment, protecting users' personal and financial information while maintaining system integrity.

5.5 PACKAGES

The subsystem can be divided in to three packages

- ✓ Interface package layer is client tier that is the user interface
- ✓ Application package layer is middle tier that contain subsystem.
- ✓ Database package layer is data tier that stores system information.

The package diagram for our system is illustrated below

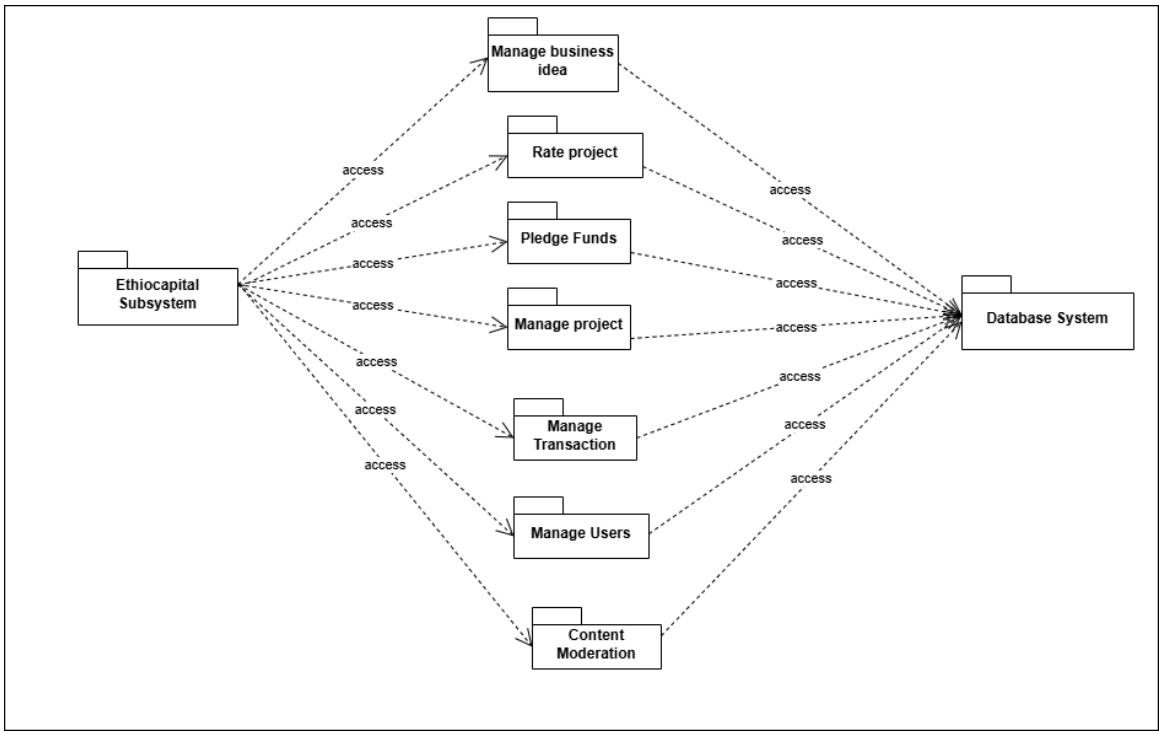

Figure 5-6: Package Diagram for Module Organization

5.6 Algorithm Design

Algorithm design refers to the process of creating step-by-step procedures or sets of rules to solve specific problems or achieve particular tasks. Designing an algorithm for the EthioCapital Connect Platform involves creating a structured set of procedures and rules to manage various functionalities for both entrepreneurs and investors. These functionalities include user authentication and authorization, business idea submissions, investment processes, and communication between users.

LOGIN

- System displays Landing Page.
- Client clicks on the login option from the navigation menu.
- System redirects the client to the Login Page.
- Client enters email and password.
- Client clicks on login button

If email and password are correct, then the system displays the Home Page:

Else email and password are not correct, then the system displays the wrong email or password message and stays in the login page.

REGISTER AS AN ENTREPRENEUR

1. Display the **Landing Page**.
2. User clicks on the **Register** option.
3. Redirect to the **Registration Page**.
4. User selects **Entrepreneur** as the account type.
5. User fills in the required details (name, email, password, business information).
6. User clicks **Submit**.

If all required fields are filled correctly and meet validation rules:

Display a success message and redirect to the **Login Page**.

Else: Display an error message, prompting the user to complete or correct the form.

ADD BUSINESS IDEA (ENTREPRENEUR)

1. Display the **Entrepreneur Dashboard**.
2. Entrepreneur clicks on **Add Business Idea**.
3. Redirect to the **Business Idea Submission Page**.

4. Entrepreneur fills in details (title, description, funding amount, business plan document, etc.).
5. Entrepreneur clicks **Submit**.

    If all required fields are filled correctly and meet criteria:

        Display a success message and save the idea in the system.

    Else if required fields are incomplete:

        Display an error message, **"Please fill all required fields."**

    Else if the submission does not meet platform standards:

        Display a validation error message.

5.7 User Interface Design

User Interface (UI) design involves crafting the visual elements and interactive features that users interact with in our system. It's the process of creating interfaces that are not just visually appealing but also intuitive, functional and user-friendly.

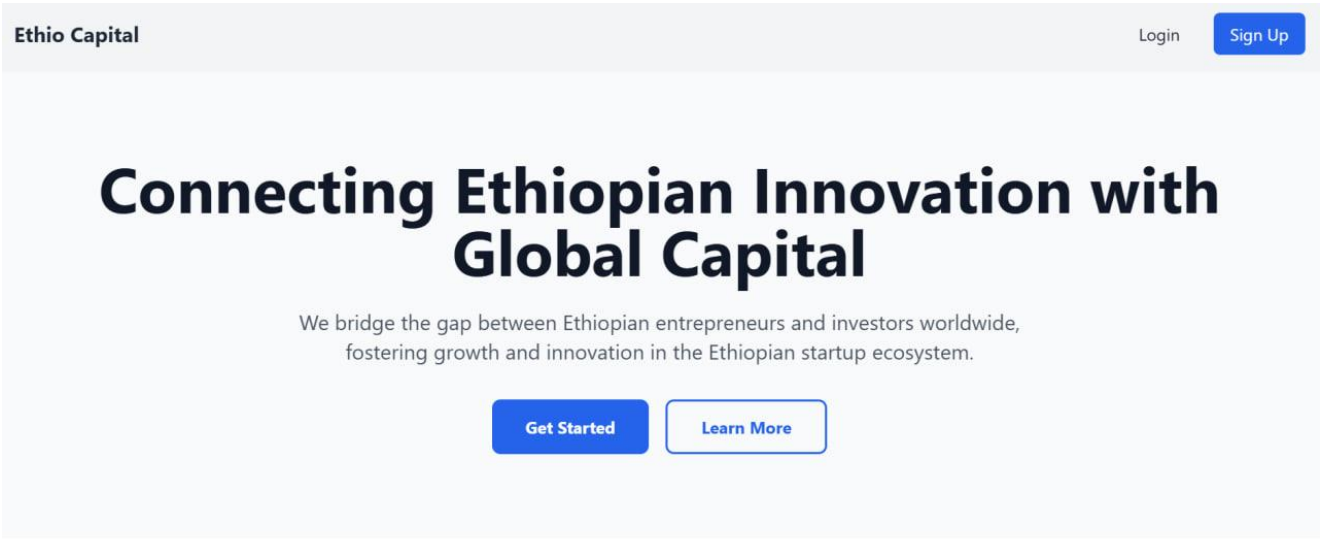

Figure 5-7: Landing Page of proposed system

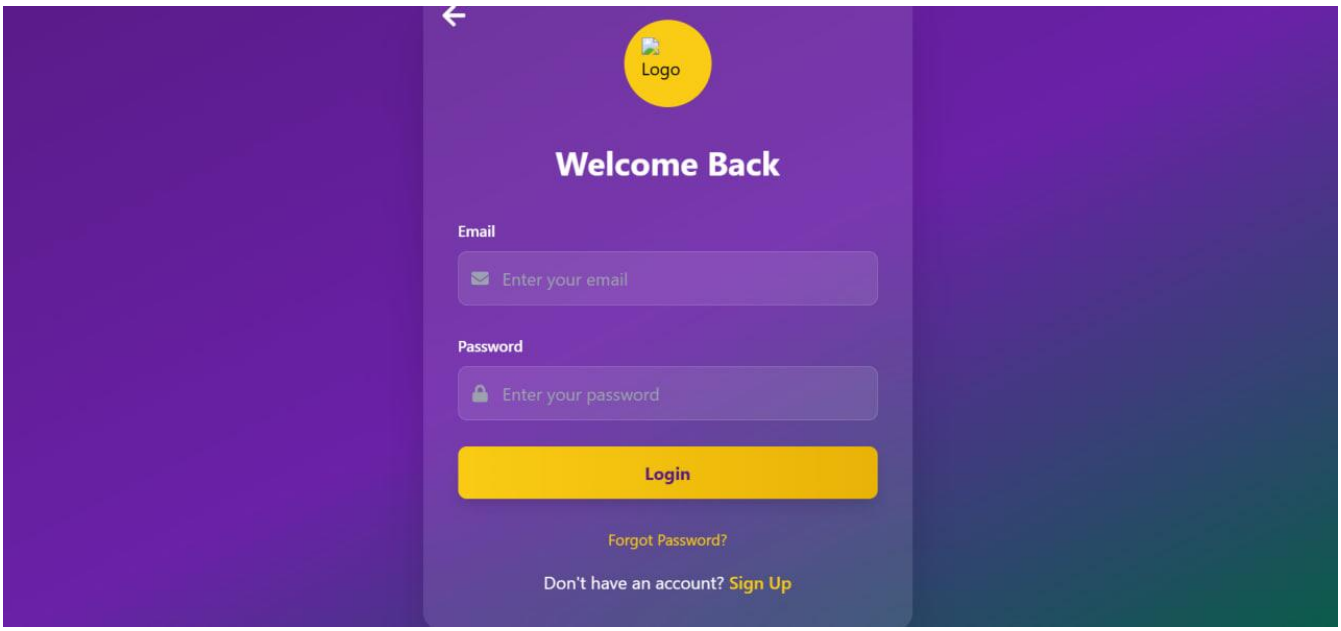

Figure 5-8: Loging Page inteface design moackups