PES UNIVERSITY

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Capstone Project Report Phase - 2

on

VentureLink Connecting Startup with Investors

Submitted by

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FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER APPLICATIONS
PROGRAM - MASTER OF COMPUTER APPLICATIONS

Certificate

This is to certify that the project entitled

VentureLink: Connecting Startup with Investors

is a bonafide work carried out by

CHETHN KUMAR KM (PES1PG23CA329)

in partial fulfilment for the completion of Capstone Project Phase - 2 work in the Program of Study MCA under the rules and regulations of PES University, Bengaluru during the period March 2025 – June 2025. The project report has been approved as it satisfies the academic requirements of the **4th semester MCA**.

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DECLARATION

I, **Chethan Kumar KM**, bearing **PES1PG23CA329** hereby declare that the Capstone project Phase - 2 project entitled, **VentureLink Connecting Startup with Investors**, is an original work done by me under the guidance of Ms.**Rajani S**, Assistant Professor, PES University and is being submitted in partial fulfillment of the requirements for completion of 4rd Semester course work in the Program of Study MCA.All corrections/suggestions indicated for internal assessment have been incorporated in the report.

The plagiarism check has been done for the report and is below the given threshold.

I further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other course.

Place: Bengaluru
Date :

Chethan Kumar KM
PES1PG23CA329

ACKNOLEDGEMENT

I take great pleasure in expressing my sincere gratitude to all those who have guided me and supported me to successfully complete this project.

I express my sincere gratitude to the Vice Chancellor of PES University, **Dr. J Suryaprasad** and Chairperson **Dr. Veena S**, who gave me an opportunity to go ahead with this project.

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Abstract

Startups encounter numerous challenges when seeking the appropriate investors. They could be challenged by networking, lack of exposure, and poor ability to communicate their ideas to potential investors. Investors, in turn, have difficulties in spotting good startups, evaluating their potential, and effectively handling numerous investment opportunities at once. All these issues hinder the process of funding and make it more difficult for startups to expand. VentureLink is an AI-based platform meant to resolve this issue by bringing startups in touch with the appropriate investors in a clever and efficient manner. It enables startups to present their business concepts, post proposals, and monitor investor interest, while investors get recommended with personalized suggestions and insights that enable them to make better investment choices. The platform features real-time chat, video conferencing, document exchange, and analytics dashboards, thus making the overall investing process easy, transparent, and efficient. It also employs AI-based matchmaking to help startups and investors identify the most appropriate opportunities for their requirements. Powered with cutting-edge tech such as React, Next.js,Tailwind CSS, Node.js, and PostgreSQL, VentureLink offers a safe, efficient, and user-friendly experience. It also secures data and privacy with functions such as two-factor authentication (2FA) and encrypted document management. VentureLink isn't merely a platform—it's a full solution that makes make startup financing simpler, quicker, and better for both investors and startups.in the future, it will only get better with AI-based risk evaluation, building a wiser and more connected investment network.

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Introduction

Chapter 1

Introduction

An introduction typically consists of the following components:

1.0.1 Project Description

Startups' Challenges: Small Networks Most startups, especially the young ones, lack a big network of investors with connections to their industry or objectives. Without connections, it becomes increasingly harder for new companies to get in touch with the right people who can invest in their ideas. Startups often find it hard to clearly and simply pitch their business ideas. Lost investor interest and funding opportunities could be caused by their failure to articulate their vision or demonstrate their value proposition. Time-consuming Procedures: Pitching events and cold outreach are two examples of old-fashioned investor-finding methods that are inefficient, slow, and time-consuming without yielding desired outcomes.

Investors' Challenges: Finding the Right Startups Investors waste time scrutinizing countless unsuitable or irrelevant startup pitches that lack relevance with their funding needs, interests,or industry focus. Such a situation hinders locating profitable investments. Lack of Data Insights: Investors often have difficulty valuating startups because they lack exhaustive data and insights about the potential for growth, preparedness for the market, and other important determinants that support decision-making. Communication Barriers: Various middlemen, including managers and agents, often hinder straightforward communication with startups, leading to delays and inefficiencies within decision-making.

1.0.2 Proposed Solution

VentureLink offers a robust AI-based solution that overcomes major hurdles in pairing entrepreneurs and investors. Through analysis of the funding requirements and sector focus, its AI-based matching algorithm smartly pairs startups with the most suitable investors to ensure more accurate and successful connections. Startups can make investment proposals and get fast feedback on investor interest due to real-time notifications and proposal tracking, allowing them to monitor progress without unnecessary delays. On the other hand, time is saved for investors as they get personalized suggestions of startups that align with their investment goals and interests so that they can focus on high-potential prospects. To enable investors to make informed decisions, the platform also provides complete data insights and analytics regarding each startup's performance, growth, and investment opportunity. Interaction is smooth due to integrated functionalities such as video conferencing and chat, facilitating direct and efficient interaction between startups and investors. Also, VentureLink provides automated investment processes and secure document management, which speeds up, makes safe, and automates the entire investment process for all stakeholders.

1.0.3 Purpose

VentureLink aims to simplify and accelerate the process of connecting investors and startups. By pairing startups with the right investors according to their objective and requirements, the site relies on artificial intelligence (AI) to assist them in discovering the most suitable opportunities. Through submitting proposals and receiving rapid feedback, startups can minimize time wasted on futile activities. The site assists investors in making decisions by offering them meaningful information and tailored startup suggestions. Direct communication tools and secure management of VentureLink speed up and simplify the process. In general, it seeks to establish a straightforward and powerful method for investors to find excellent opportunities and for startups to raise funds. VentureLink delivers live proposal tracking to enhance transparency, allowing users to easily monitor progress and responses. Its analytics dashboard provides in-depth insight into startup performance, helping investors make well-informed decisions. The platform facilitates broad reach across industries and funding sizes by allowing multiple funding categories. With growing user interactions, AI matchmaking continues to get better to maximize accuracy. No longer are outside tools required with in-built communications features such as voice call, video conference, and live chat. Startups are made more visible by posting detailed profiles that advertise their achievements, industries, and funding goals. All confidential documents are encrypted and have permission-based access for security purposes. VentureLink simplifies the investment process for both parties by linking the discovery, assessment, communication, and transaction process.

1.0.4 Scope

The aim of VentureLink is to facilitate communication and collaboration between investors and startups. By bringing suitable startups and investors together with the help of artificial intelligence, the platform makes the process faster. It assists startups in articulating their ideas well and monitoring investor feedback in real time. VentureLink provides investors with customized advice and relevant information to assist them in making a choice. The platform also keeps it organized and safe while facilitating direct communication via chat and video. In general, VentureLink tries to speed up and streamline the financing and investment process. Startups can make themselves more discoverable by establishing detailed profiles covering sectors, funding needs, and achievements. An intelligent dashboard that points out top-potential opportunities is useful to investors. Through users' interactions, the system continually optimizes matchmaking accuracy to generate improved results.

Literature Survey

Chapter 2

Literature Survey

2.1 Domain Survey

2.1.1 Introduction to the Domain

The investment process has been revolutionized by artificial intelligence (AI), machine learning (ML), and data analytics and is now intelligent, quicker, and more efficient. Old-fashioned ways of accessing investors or startups are inefficient and time-consuming. AI-based platforms now allow startups to find the right investors, estimate their ability to minimize risk, and tailor their proposal to raise funds. AI-based investor matching, startup growth forecast, smart automated contracts for safe funding, and data-based fraud detection are some of the main uses. Smart contracts, risk estimation, due diligence, investor-startup matching, and predictive analytics are some of the main themes. Even with these developments, issues of AI bias, data security breaches, dealing with various proposal formats, and making decisions transparent using AI persist.

2.1.2 Core Terminologies and Definitions

Artificial Intelligence (AI)

The matching system technology used by VentureLink is artificial intelligence. It replicates human judgment in matching startups with the most appropriate investors based on funding requirements, industries, and growth potential. AI simplifies opportunity ranking, proposal evaluation, and decision-making. AI makes matches more accurate and efficient and saves investors and startups time. AI improves future suggestions by learning from user behavior continuously. AI also simplifies scaling by processing large datasets and intricate relationships.

Data Analytics

VentureLink analytics solutions give investors insightful information regarding market trends, startup growth, and finances. Investment decision-making and risk estimation are made easy through analytics dashboards. They give key information like market size, customer acquisition, and revenue growth. Startups can be compared side by side, and trends over time can be monitored. Informed, data-driven funding decisions are made, which minimize risks and maximize return on investment.

PostgreSQL Database

PostgreSQL is the main database to hold user profiles, uploaded proposals, chat messages, investment preferences, and matchmaking data. Due to its high scalability and availability, it is secure and efficient in data management. It can handle complex queries for analytics and matching algorithms. Besides role-based access controls, PostgreSQL also has native data encryption for maximum security of sensitive data. Being open-source, it is easy to customize and integrate with other backend tools.

Flask API

The backend API to integrate the database and AI engine with the frontend interface is developed through Flask. Model deployment, real-time data transfer, and HTTP request handling are managed by it to enable dynamic user-platform interaction. Fast response times and simple scalability are obtained as Flask is lightweight. Due to the compliance with RESTful API standards, integration with frontend frameworks is simple. Secure authorization and authentication to safeguard user data are also supported by Flask.

HTML And Tailwind.css

Tailwind CSS styles and responsive design, whereas HTML organizes the web content. They build interfaces as a team that are simple to use, dependable, and easy to comprehend for startups and investors. Tailwind's utility-first method employs less custom CSS to speed up styling. Desktop, tablet, and smartphone use is guaranteed with responsive design. They guarantee rapid iteration and front-end appearance upkeep.

React with TypeScript

React and TypeScript are utilized in frontend development at VentureLink to create a modular, responsive, and interactive user interface. It provides scalable component-based architecture, type safety, and improved debugging. The virtual DOM in React offers quicker rendering for dynamic content changes. With static typing, TypeScript improves code maintainability and fewer runtime errors. They together facilitate the creation of reusable user interface components for uniform design and functionality.

Socket.IO and WebRTC

Real-time features such as voice calls, video calling, and messaging between investors and entrepreneurship startups are enabled by such technologies. WebRTC enables peer-to-peer video and audio communication, while Socket.IO manages real-time data sharing. Platform interaction is thus low-latency and seamless. They enhance user accessibility through multi-device connectivity. Together, they provide a robust communication platform that is required by face-to-face communication and negotiations of contracts.

2.1.3 Existing System

The table contrasts three research papers with the features of a proposal project. It describes major features like real-time communication, matching based on AI, profile management, and user authentication. The Idea Despite the scope difference of the research papers, the project possesses all the mentioned features. While Papers 2 and 3 do not have real-time short listing and AI matchmaking, Paper 1 has proposal tracking, document management, and AI

Functionality	Proposal Project	Paper 1	Paper 2	Paper 3
User Authentication and Access Control	Yes	Yes	Yes	Yes
User Profile Management	Yes	Yes	Yes	Yes
AI-Powered Matchmaking	Yes	Yes	No	No
Project Proposal Submission and Tracking	Yes	Yes	Yes	Yes
Real-Time Communication	Yes	Yes	Yes	Yes
Analytics Dashboards	Yes	Yes	Yes	Yes
Gamified Engagement	Yes	No	No	No
Funding Readiness Scoring	Yes	Yes	No	No
Document Management	Yes	Yes	Yes	Yes

Figure 2.1: Comparison Table

matchmaking. The comparison indicates how the Proposal Project has more sophisticated features than the studies.

2.2 Literature Survey

2.2.1 Related Work

These include reading scholarly papers and journals. The following scholarly papers are taken into account in the process of a literature survey.

1. An internet-based platform that connects startups and investors and uses deep learning to forecast returns on investments

A web-based platform for bringing together startups and investors is suggested in this paper and uses deep learning for investment return prediction. It uses models like RNNs and CNNs and algorithms like KNN, Linear Regression, ANN, and Fuzzy Classification for providing precise investment analysis. Startups can upload their business plans, and investors can invest with data-driven decisions using AI-driven insights. Predictive modeling aids in identifying high-growth startups and reducing investment risk. Bias-free and data-driven analysis, the platform enhances access to capital. Real-time analysis assists investors and startups in making informed decisions. The system maximizes chances of funding and returns by providing a dynamic investment landscape.

2. Investor Relations for Startups: An Examination of the Communication Requirements of Venture Capital Investors

The needs of startups in terms of investor relations (IR) are examined in this paper, with an emphasis on investors in early-stage venture capital. It draws a comparison between

the structured method employed by publicly traded companies and startup IR. The study highlights how crucial it is to have one-on-one conversations with a select group of investors. It determines the preferred communication tactics of venture capitalists through conjoint analysis. Results indicate that investor confidence is increased by openness and customized updates. Long-term collaborations and funding prospects can be improved by effective IR. For startups looking to improve their relationships with investors, the study offers insightful information.

3. An Analysis of Venture Capital Funding

This study examines how venture capital (VC) funding helps startups, focusing on how it affects growth and innovation. It draws attention to the key investor priorities include strong management teams, market potential, and scalability. Risks like information asymmetry and high failure rates are also covered in the study.rates and difficulties with exit strategies. It talks about the value of VC investors' strategic advice and mentoring. According to the paper, government incentives can increase the efficacy of venture capital. Results highlight the necessity of a sophisticated approach to return and risk. All things considered, the study sheds light on how venture capital funding promotes successful entrepreneurship.

4. Creating a Funding Platform to Meet Changing Startup and Investor Needs in the Entrepreneurial Ecosystem:An Analysis of the Orange Mill

This thesis looks at the difficulties that new businesses have getting funding and how The needs of investors change as the entrepreneurial ecosystem does. It offers a funding platform that uses matchmaking and educational materials to strengthen ties between investors and startups. According to the study, startups find it challenging to secure funding due to high failure rates. Promising startups receive mentorship in addition to financial support from investors. For startups to scale successfully, they need resources and strategic direction. Founders with strong leadership and flexibility are sought after by investors. The study emphasizes how crucial dynamic capabilities are to the development of fruitful startup-investor partnerships.

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Hardware and Software Requirements

Chapter 3

Hardware and Software Requirements

3.1 Introduction

Hardware and software tools used in the process of developing and deploying the present project are discussed in depth in this chapter. Performance, scalability, and compatibility with the project requirements.

3.2 Hardware Requirements

There must be an infrastructure with the ability to perform processing for the project to enable proper development, testing, and implementation.

3.2.1 Minimum Hardware Specifications

The following table lists the **minimum hardware configuration** required:

Component	Specification
Processor	Intel Core i5 (or equivalent)
RAM	8GB
Storage	256GB SSD
GPU	Integrated GPU
Network Interface	Wi-Fi 802.11ac / Ethernet
Peripherals	Keyboard, Mouse, Display

Table 3.1: Minimum Hardware Requirements

3.3 Software Requirements

For the platform to be constructed, tested, and deployed, there has to be a solid software base. Alongside providing efficient data processing and strong authentication (for real-time dialogue), it has to be scalable and Compatibility with the prevailing frameworks, databases, and deployment tools has to be available for easy integration and performance tuning.

3.3.1 Software Requirements

The project was developed and tested on different platforms to make it cross-platform compatible.

Specification	Version
Frontend	React.ts(18.v),Tailwindcss(3.x)
Backend development, AI models	Express.js 4.21.2, JWT 9.0, Postgres,
DataBase	PostgreSQL
Frameworks	Flask 3.10, TenserFlow v2.16.1, Keras v3
Server-side scripting	JavaScript (Node.js)

Table 3.2: Software Requirements

3.3.2 Additional Libraries APIs

For making the project more useful, several APIs and libraries were added.

Library/API	Purpose
Gemini APIs	Machine Learning models, AI-powered matchmaking
JWT (JSON Web Tokens)	Secure user authentication and authorization
Socket.io	Real-time communication (chat, notifications)
Axios	Backend communication for data fetching
Cloudinary API	Image and document storage for investment proposals

Figure 3.1: Additional Libraries APIs

Software Requirements Specification (SRS)

Chapter 4

Software Requirements Specification

4.1 Startup

Funding-seeking entrepreneurs who can connect with investors, promote their company, and monitor funding progress.

- Send in project proposals
- track investor interest and interactions
- manage investment documents securely
- AI-driven investor recommendations.
- Use video calls and chat to interact with investors.

4.2 Investors

people or businesses searching for chances to invest in promising startups.

- See analytics on possible investments
- shortlist and review startup proposals
- get AI-powered startup recommendations
- interact with startups instantly.
- Manage and review investment documents

4.3 Admin

platform managers who keep an eye on things, make sure everything runs smoothly, and control user behavior.

- Handle user support and problem solving
- monitor and manage users (investors and startups)
- oversee the effectiveness of AI matchmaking
- and oversee platform security and compliance.

4.4 Functional Requirements

- **Matchmaking Driven by AI:** Based on funding requirements, industry preferences, and prior investments, the system intelligently pairs startups with appropriate investors. past. Algorithms powered by AI guarantee the best matches, increasing the investment process's effectiveness. Startups spend less time looking for funding because they receive customized investor recommendations. High-potential startups that complement their portfolios are made available to investors. Over time, matchmaking accuracy is improved through ongoing learning. The platform cultivates strategic alliances that optimize the success of investments.
- **Submission of Project Proposals and Monitoring:** Investors can monitor, evaluate, and show interest in the investment proposals that startups submit. The system offers up-to-date, assisting new businesses in tracking investor interactions and engagement. To increase their chances, startups are given insights on proposal performance. Investors can ensure relevant matches by filtering proposals according to their preferences. The funding process is more transparent and experiences fewer delays when using a structured tracking system. Startups can improve investor engagement by refining proposals with the aid of smart analytics.
- **Immediate Communication:** Investors and startups are able to have seamless dialogue due to built-in chat and video conferencing. Notifications ensure users remain in the loop, while encryption ensures secure communication. Instant messaging speeds up decision-making by eliminating back-and-forth email threads. Video calls enhance productivity through the ability to conduct lengthy discussions without having to meet in person. Screen sharing and file attachments make group decision-making possible. Message history and logs help trace earlier discussions for context.

- **Dashboards for Analytics:** AI-driven dashboards that indicate engagement trends, proposal performance, and investment opportunities are provided for investors and startups. Decisions can be made and strategies optimized with the help of data insights. Startups can track investor interest and adjust their offers accordingly. Investors have access to key metrics for viewing in order to evaluate potential investments and identify trends. Users can focus on the most relevant data with visual reports that can be customized. Early warnings of fresh investment prospects are provided by predictive analytics.

- **Gamified Involvement:** Engagement metrics, achievements, and leaderboards drive engagement and enhance the investment process to be more engaging.Namic. This inspires more engagement by providing a collaborative yet competitive environment. Startups can get noticed for their work, increasing their visibility. The most active and potential startups within the ecosystem are seen by investors. Interactive challenges also drive networking and substantial engagement. More efficient and quicker matchmaking happens due to increased engagement.

- **Document Management:**

  Startups and investors can comfortably upload, share, and manage files related to investments using a secure document vault. Access controls and encryption ensure that confidential information is always secure. Investors can comfortably view financial statements, business plans, and legal documents. Startups need not be concerned about unauthorized access when sharing and updating their documents. For instance, a version control system ensures the document history. Multiple devices can access information easily due to association with cloud storage.

- **Management of Documents:** Startups and investors can easily upload, share, and manage investment-related documents with a safe document vault. Access control and encryption ensure that confidential information remains safe at all times. Investors can view financial statements, business plans, and legal documents effortlessly. Startups no longer need to be concerned about unauthorized access when they share and update their documents. For reference, a version control system helps keep a record of document history. Various devices are capable of accessing data effortlessly with the help of cloud storage integration.

- **Alerts for Updates and User Activity:** Users never miss important updates on proposals, interest from investors, or messages due to real-time notifications. Push notifications and Email notifications facilitate continuous engagement. Startups can respond faster as they receive real-time notifications every time an investor interacts

with their pitch. Users can get the most useful updates due to personalized notification options.

4.5 Non-Functional Requirements

- **Performance:** In order to ensure a smooth user experience, the system must be fast and responsive, handling lots of users and activity with minimal delay. Even under peak usage, users need to see fast loading times without any lag or performance degradation.

- **Safety:** User data must be securely stored and encrypted. For ensuring privacy for users as well as complying with relevant laws, best practices in security must be followed by the platform. To stay ahead of potential threats, periodic security audits and updates need to be performed.

- **Scalability:**

  As the number of users increases, the platform should be able to scale with it, supporting more investors, startups, and information without sacrificing functionality. It shouldn't require a complete overhaul to handle a significant spike in traffic and activity.

- **Availability and Dependability:**

  With minimal downtime, the site should be available 99.9 percent of the time. Further, it should be able to handle breakdowns and support smooth recovery in case of issues. Users should also be notified of any interruptions during late nights when maintenance is taking place.

- **Usability**

  Startups and investors both ought to be able to simply use the platform with no need for technical skills due to the intuitive and user-friendly nature of the system. On any device, users should be led on their journey by straightforward instructions, tooltips, and a responsive design.

System Design

Chapter 5

System Design

5.1 Architecture Diagram

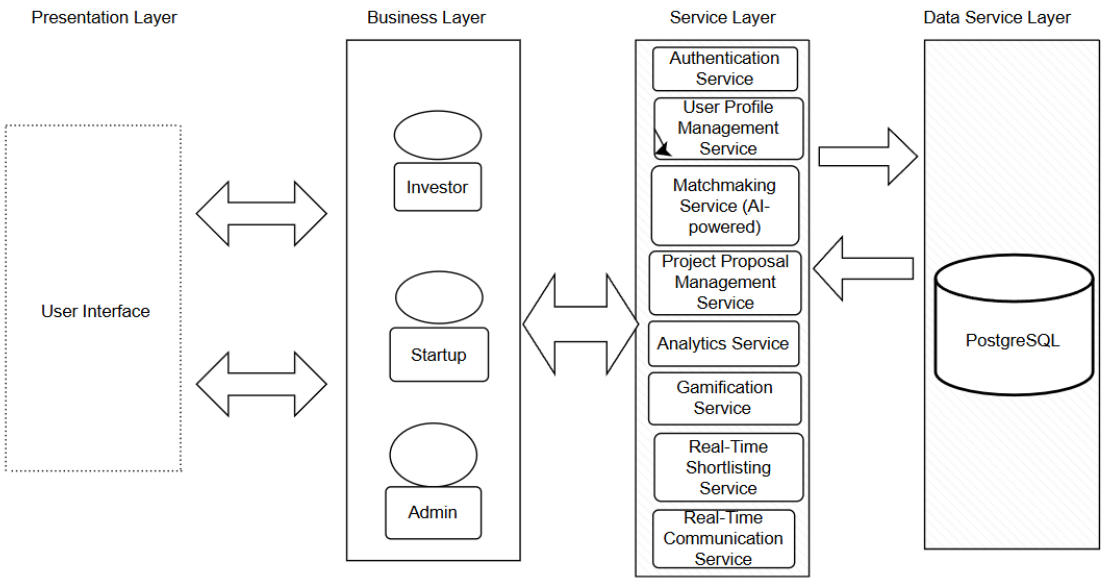

Figure 5.1: Architecture Diagram

The Presentation Layer manages the user interface, through which administrators, investors, and startups can interact with the system. Developed using React.js, Next.js, and Tailwind CSS, it makes it easy and interactive. Users are able to view opportunities, maintain their activities, and make proposals seamlessly due to the simplicity of navigation and real-time feedback.

The main users that the Business Layer is designed for include administrators, investors, and startups. It provides appropriate role allocation despite not dealing with business logic. Startups are able to provide proposals and communicate with investors, and investors are able to review opportunities and decide how much funds to invest. Administrators monitor platform operation to ensure seamless functioning. This layer acts as the basis for user interaction and ensures role-based, safe access control.

The Service Layer governs the platform's primary capabilities, including AI matchmaking, proposal tracking, chat, video calls, analytics, notifications, and document management. It processes user requests and allows easy communication between various system components through RESTful APIs, Node.js, and Express.js. It ensures transaction processing and data consistency across distributed services. For better maintainability, strong middleware integration enables authentication, logging, and error handling.

5.2 Data Flow Diagram

5.2.1 Context Flow Diagram

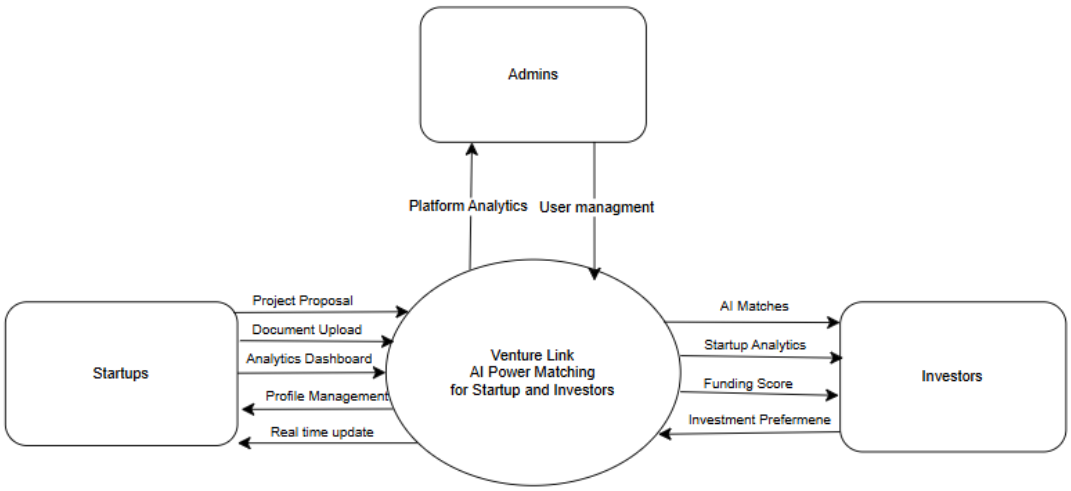

Figure 5.2: Context Diagram

The context diagram gives a top-level description of VentureLink's interactions with its users and outside systems. It shows the movement of information between the system's main participants, such as administrators, investors, and startups. Startups send funding requests, have profiles, and attract investor interest while investors look at startup profiles, communicate with startups, and get recommendations based on AI. Admins manage platform functionality, handle users, and keep track of system activity.

The system is also coupled with third-party services, including email notifications, AI analytics, and secure databases (PostgreSQL), to extend functionality. This diagram secures safe and effective operations by providing a clearer way of comprehending how data flows through the platform. It provides clearness in system design by graphically demarcating boundaries between internal and external elements.

Detailed Design

Chapter 6

Detailed Design

6.1 Use Case Diagram

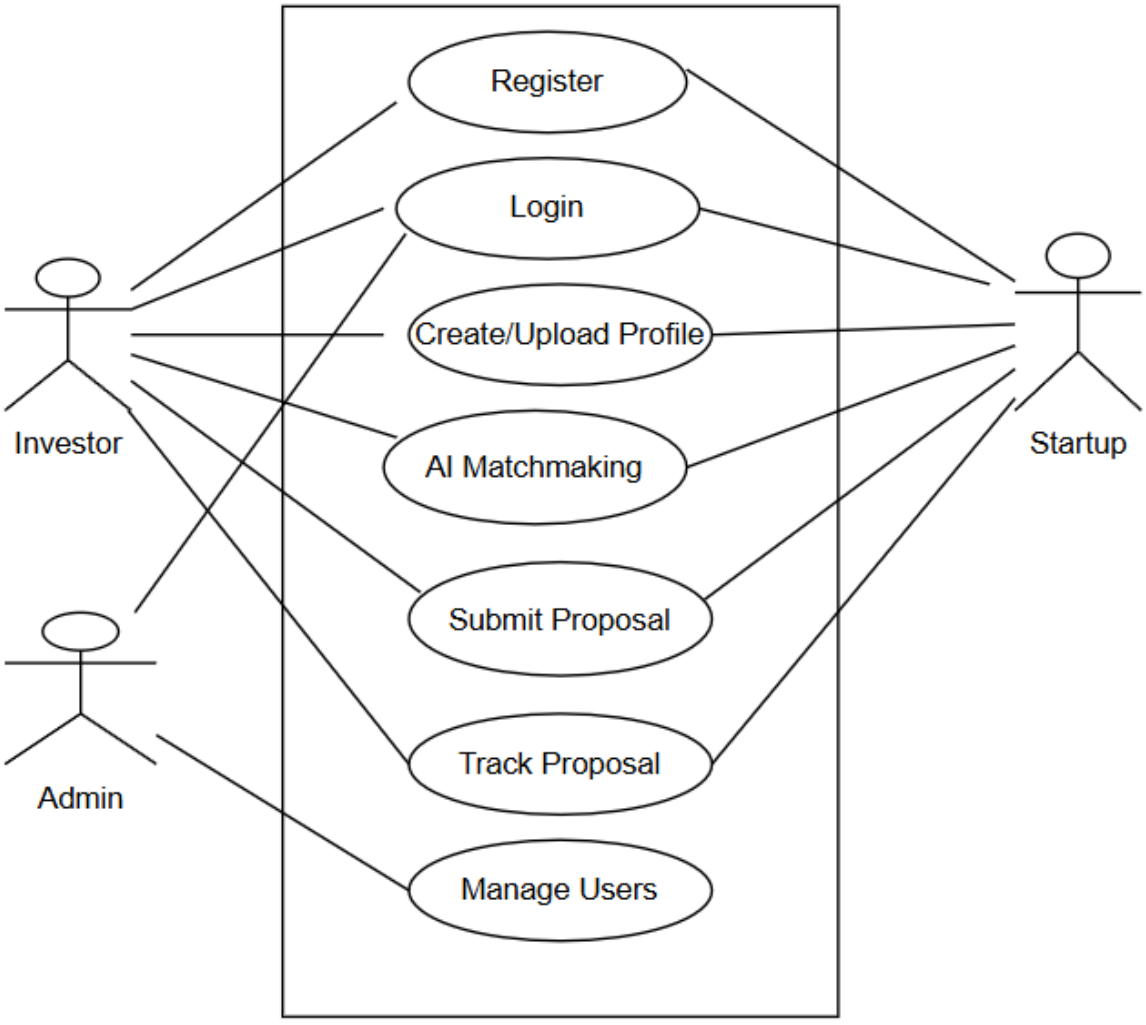

Figure 6.1: Use Case Diagram

A use case diagram illustrates how various users engage with the system. Startups, investors, and administrators are the primary users of VentureLink. While startups register, create profiles, and submit funding proposals, investors peruse profiles, get AI-based recommendations, and monitor investments. chances. Admins manage users and keep an eye on platform usage. The system's features, which include real-time messaging, video calls, AI-based matchmaking, analytics dashboards, and document management, enable seamless interactions and safe data handling. This diagram improves the efficiency of the investment process by showing user roles and system functionality.this diagram enhances the investment process efficiency.

6.2 Class Diagram

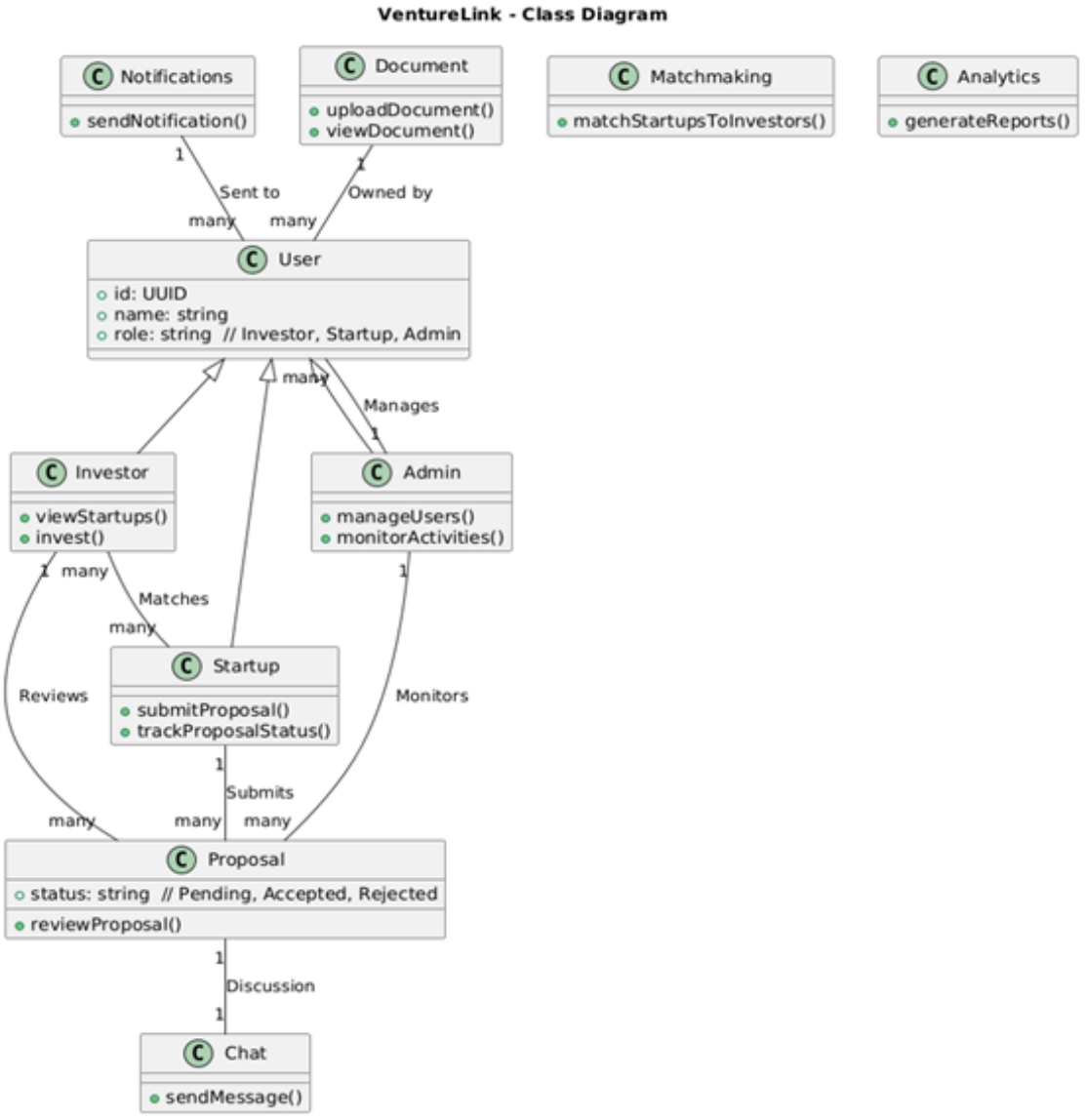

Figure 6.2: Class Diagram

Administrators, startups, and investors are the three main user roles in VentureLink's system. Investors can look for startups, evaluate proposals, and make investments while startups submit proposals and monitor their funding status. Administrators manage users, keep tabs on investment activity, and keep an eye on platform functionality. By intelligently matching startups with suitable investors, a matchmaking system guarantees smooth funding opportunities. Proposals are official investment requests that go through several approval procedures. A notification module informs stakeholders of significant developments, and an integrated chat system facilitates real-time user discussions and streamlines communication. An analytics system and a document management module guarantee the safe handling of documents pertaining to investments.

6.3 Activity Diagram

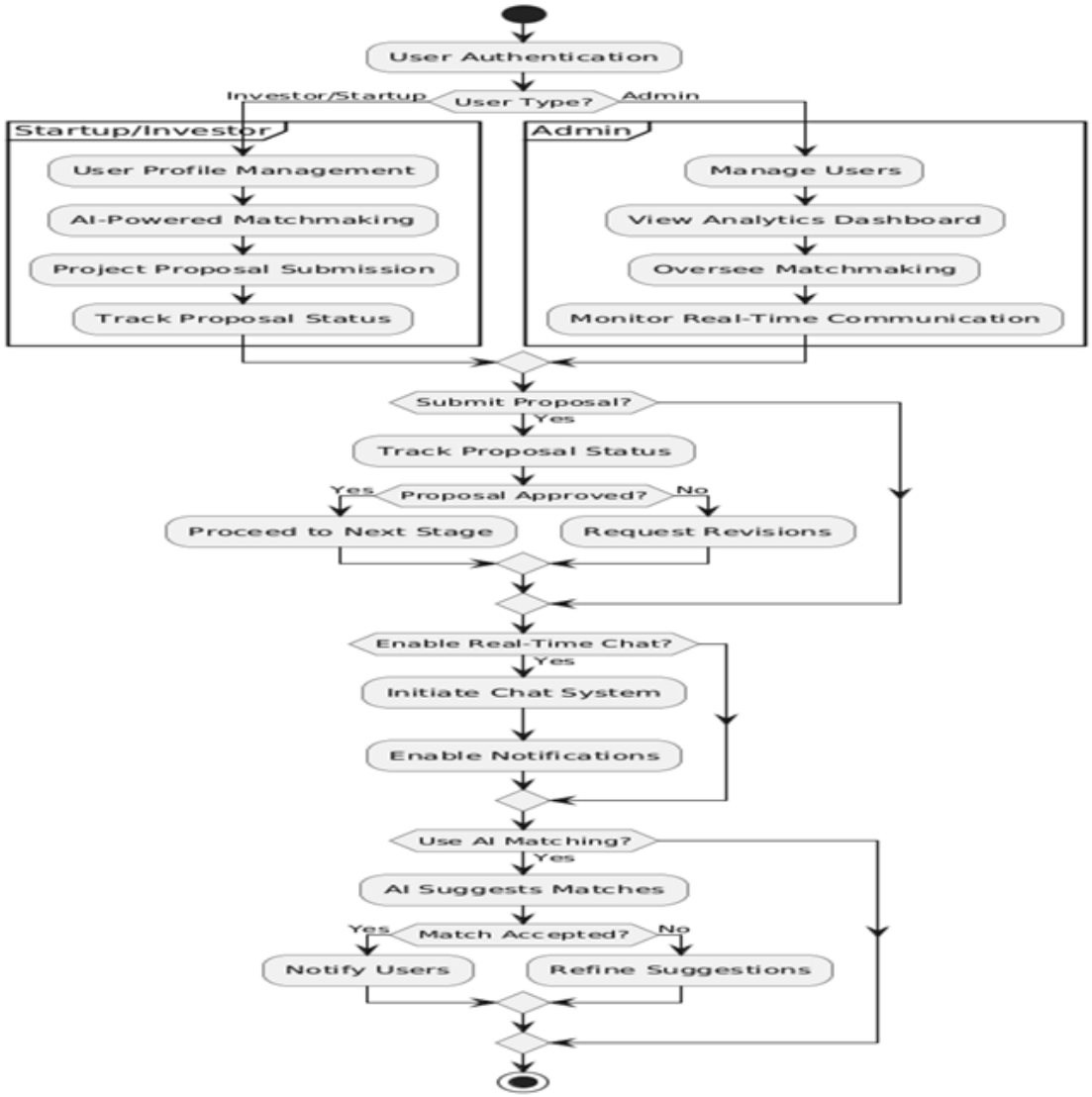

Figure 6.3: Activity Diagram

The activity diagram shows how the investment and startup platform works and how investors, startups, and administrators interact with each other. After users log in, they

can do a lot of things, like create profiles, submit and follow proposals, use AI to find matches, and talk to each other in real time. Administrators are in charge of finding matches, managing users, and analyzing data. The system lets users respond to approval by either making changes or continuing, depending on the status of the proposal. AI suggestions make matchmaking better, and users get real-time alerts. This structured process makes it easier to make investment decisions, get funding, and work together.

The diagram shows how things like proposal tracking and messaging can happen at the same time by making conditional logic and parallel work clear. Each role has a clear decision-making process, which makes things less confusing and cuts down on the number of steps users have to take. Automated proposal reminders and escalation notices are examples of system events that make the platform more responsive. Using swimlanes in the diagram makes it clear which roles belong to which actors, which helps stakeholders and developers understand role-based processes better.

6.4 Databse Design

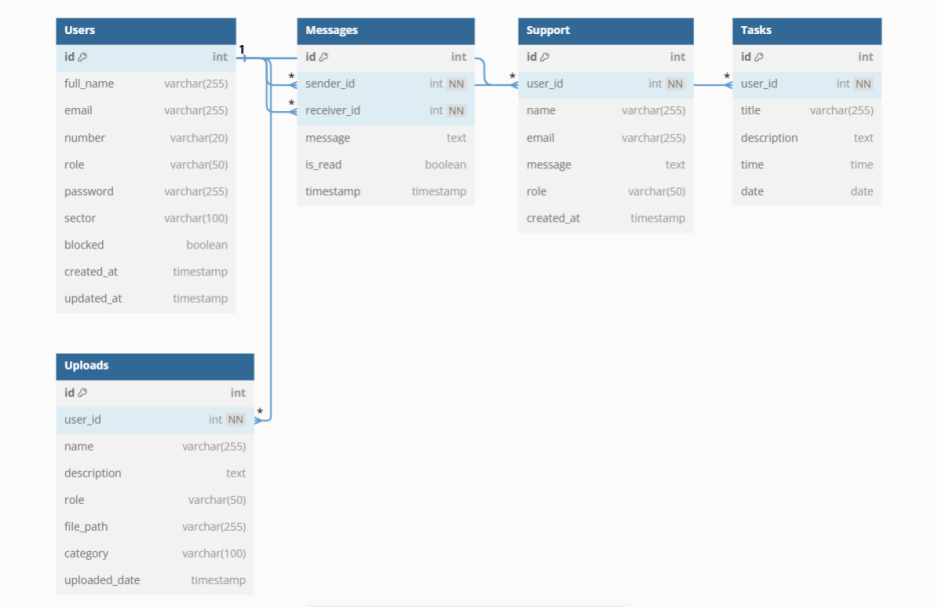

Figure 6.4: Databse Design

The Users table stores important user data, such as sector information, role-based access, and authentication details. The Messages table makes it possible for users to talk to each other in real time by keeping track of sender-receiver relationships, read status, and timestamps. The Support table makes customer support go more smoothly by keeping track of user requests and the information that goes with them. The Tasks table keeps track of tasks and lets users create and keep track of their assigned tasks. The Uploads table stores document metadata and makes it easy to find by grouping uploaded documents by user roles.

Foreign keys are used to connect tables to each other so that data is consistent across all modules. Optimized indexing makes sure that queries are quick. gives an idea of how funding and engagement work.

Implementation

Chapter 7

Implementation

7.1 Pseudocode

7.1.1 User Authentication and Access Control

```
Function authenticate_user(username, password):
    Retrieve user record from Users table
    If credentials match:
        Generate session token
        Redirect to role-specific dashboard
    Else:
        Show authentication error

Function authorize_access(user, resource):
    If user.role has permission on resource:
        Grant access
    Else:
        Deny access
```

authenticate user: Checks the password and username against hashes that have been stored. If matched, a secure session token is generated. takes you to the appropriate dashboard.authorize access: checks the role permissions of the user. checks the permitted list against the requested resource. correspondingly grants or denies.

7.1.2 Profile Management

```
Function view_user_profile(user_id):
    return query Users where id = user_id

Function update_user_profile(user_id, profile_data):
    validate(profile_data)
```

```
    update Users set data where id = user_id
    return success
```

view user profile: Retrieves a user's information based on their ID. formats fields for display according to their role. allows any user to view their personal information.

update user profile: Verifies incoming profile modifications. Updates are written to the database. gives the caller confirmation of success.

7.1.3 AI-Powered Matchmaking

```
Function perform_matchmaking():
    For each startup in Startups:
        features ← extract_features(startup)
        investors ← AIModel.predict(features)
        save_matches(startup, investors)

Function display_recommendations(user_id):
    role ← get_role(user_id)
    If role = 'startup':
        return get_matches_for_startup(user_id)
    Else if role = 'investor':
        return get_matches_for_investor(user_id)
```

perform matchmaking: Retrieves investor preferences and startup features. ranks compatibility by running the AI model. saves pairs that match for later use.

display recommendations: Determines if the caller is an investor or a startup. retrieves the pre-calculated match list for that user. displays the opportunities that are ranked highest.

7.1.4 Proposal Management

```
Function submit_proposal(startup_id, proposal_data):
    validate(proposal_data)
    insert Proposal with status = 'submitted'
    notify_investors(startup_id)

Function track_proposal_status(proposal_id):
    return query Proposal where id = proposal_id
```

submit proposal: Verifies the file types and completeness of the proposal. adds a new record with the status "submitted." Instantly alerts matching investors.

track proposal status: Gets a proposal's history and current status. displays milestones such as approved or reviewed. assists new businesses in tracking their progress.

7.1.5 Real-Time Communication

```
Function send_message(sender_id, receiver_id, message):
    insert into Messages(sender, receiver, message, timestamp, status = 'unread')
    push_notification(receiver_id, 'new_message')

Function start_video_call(user1_id, user2_id):
    room ← create_video_room()
    log_call(room, user1_id, user2_id)
    return room.link

Function send_notification(user_id, type, content):
    insert into Notifications(user_id, type, content, timestamp)
    dispatch_realtime(user_id, content)
```

send message: Holds chat text along with the timestamp, sender, and recipient. marks it as unread for the recipient. sets off a push notification in real time.

start video call: Uses the video service to establish a secure room. records time stamps and participant IDs. gives each user their join link back..

7.1.6 Analytics Dashboard

```
Function generate_dashboard(user_id):
    role ← get_role(user_id)
    data ← aggregate_metrics(role, user_id)
    return data
```

send notification: Writes the type and content of a notification row. alerts the target user via email or WebSocket. centralizes all alerts.

generate dashboard: Compiles KPIs pertinent to the role of the caller. converts numbers into tables and charts. returns a JSON payload that is prepared for rendering.

7.1.7 Analytics Dashboard

```
Function generate_dashboard(user_id):
    role ← get_role(user_id)
    data ← aggregate_metrics(role, user_id)
    return data
```

send notification: Writes the type and content of a notification row. alerts the target user via email or WebSocket. centralizes all alerts.

generate dashboard: Compiles KPIs pertinent to the role of the caller. converts numbers into tables and charts. returns a JSON payload that is prepared for rendering.

7.1.8 Gamified Engagement

```
Function update_achievements(user_id, activity):
    If qualifies_for_achievement(activity):
        add_achievement(user_id, activity)
        increment_score(user_id)

Function display_leaderboard():
    return top_users_by_score(limit = 10)
```

update achievements: Compares an action to the requirements for the badge. points and new accomplishments are awarded when they are earned. refreshes the cache for the leaderboard.

display leaderboard: Sorts the top users based on their engagement score. gives back the top ten along with points and names. promotes constructive competition.

7.1.9 Funding Readiness

```
Function calculate_readiness_score(startup_id):
    metrics ← gather_startup_metrics(startup_id)
    score ← ReadinessModel.predict(metrics)
    return score
```

calculate readiness score: Gathers startup data (traction, team, and documents). feeds the readiness machine learning model with them. produces a score in numbers along with hints.

7.1.10 Document Management

```
Function upload_document(user_id, file, metadata):
    store_file(file)
    insert into Uploads(user_id, metadata, path = file.path)
    return reference_id

Function retrieve_documents(user_id, filter):
    return query Uploads where user_id = user_id and filter
```

retrieve documents: Uses owner and criteria to filter the uploads table. gives back download links, dates, and file names. makes retrieving documents easier.

upload document: Stores the file in a safe location. adds metadata, including path, type, and owner. gives back a reference ID for future use.

7.1.11 Notifications

```
Function monitor_activity_triggers():
    On event (proposal_submit / message / match):
        send_notification(target_user, event.type, event.summary)

Function view_notifications(user_id):
    return query Notifications where user_id = user_id order by timestamp desc
```

monitor activity triggers: Keeps an eye out for important system events in real time. automatically creates the relevant notifications. keeps users updated at all times.

view notifications: Retrieves every alert for the user who is currently logged in. puts them in order of newest to read and highlights those that have been viewed. gives access to a central activity feed.

7.2 Implementation Screenshots

7.2.1 Screenshot Reference title

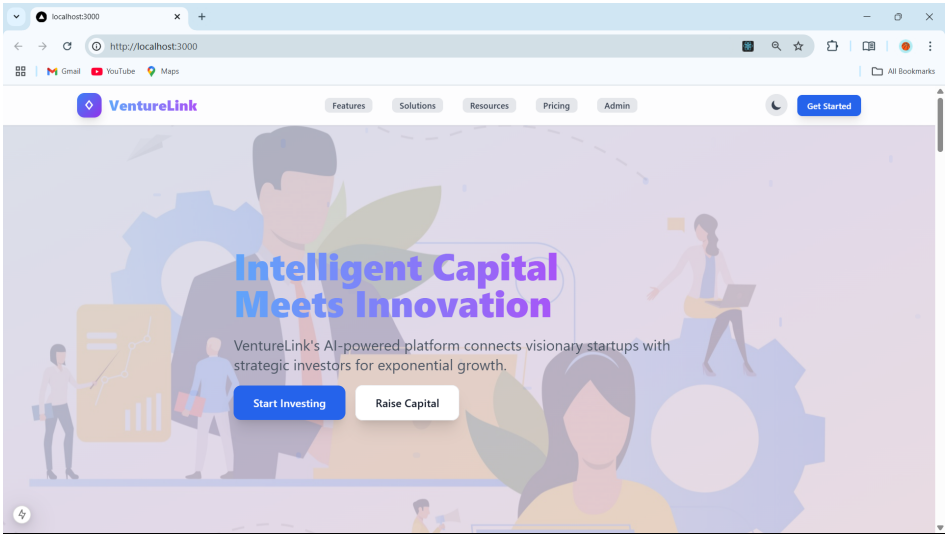

Figure 7.1: Landing Page

In Figure 7.1 Users can access information about the platform's services and contact details on the VentureLink homepage. It advances the platform's objective of bringing together investors and startups for their mutual development and prosperity.Users are urged to sign up and begin their startup or investment journey. For user preference, the page also offers a dark mode option..

7.2.2 Login Page

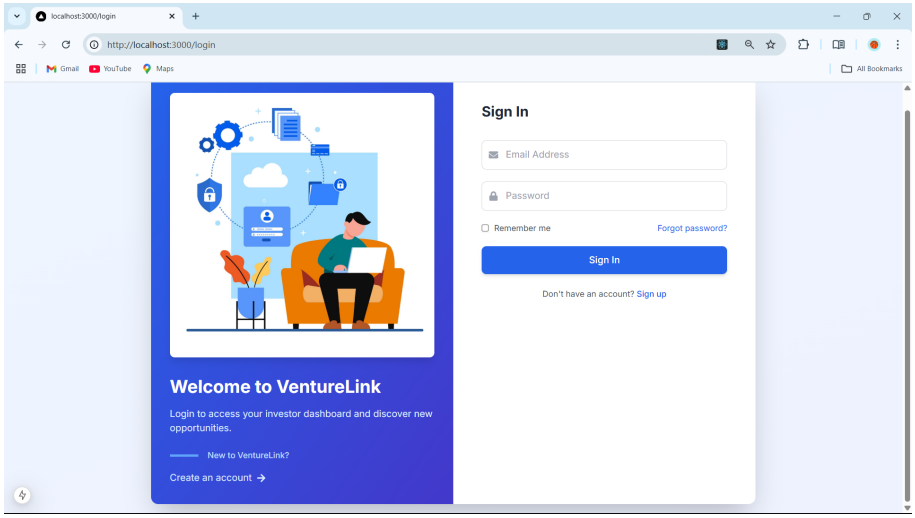

Figure 7.2: Login Page

In Figure 7.2 Users can safely access VentureLink using credentials and password recovery through the Login Page. By choosing their role and supplying necessary information, new users can register on the Register Page, which ensures security through verification.Both pages have user-friendly layouts for smooth onboarding and entry.

7.2.3 Admin Dashboard

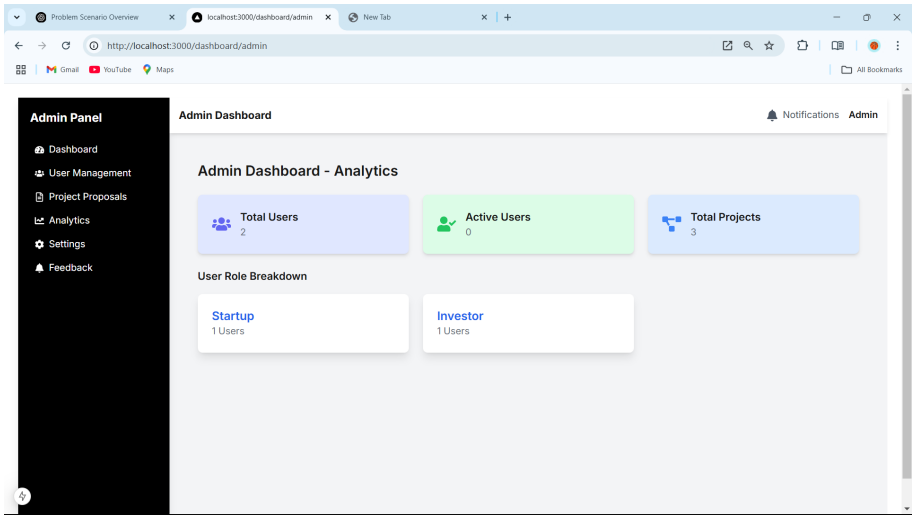

Figure 7.3: Admin Dashboard

In Figure 7.3Administrators can manage users, projects, and platform analytics with the help of the Admin Dashboard, which is a centralized control panel. In order to ensure effective platform oversight, it provides insights into user activity, role breakdowns, and project statistics. Administrative tasks are made easier with features like user management, feedback handling, and settings customization.

7.2.4 Startup Dashboard

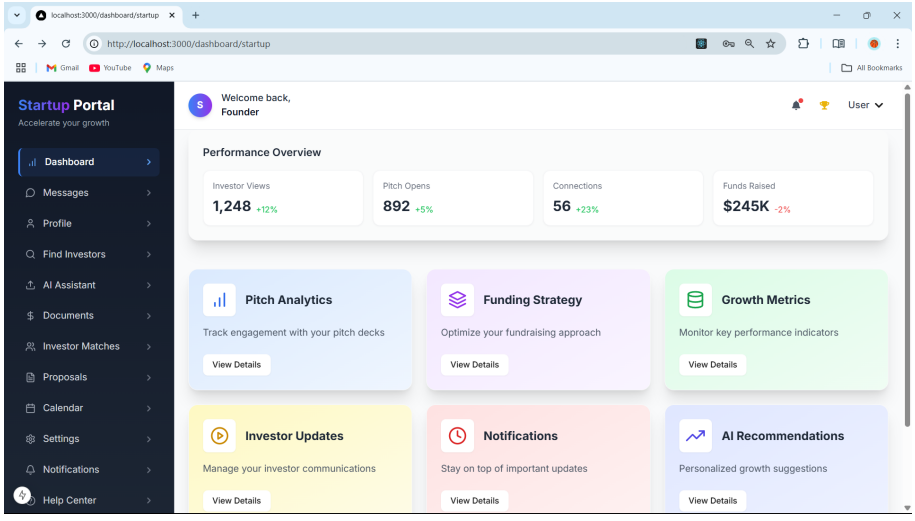

Figure 7.4: Startup Dashboard

In Figure 7.4 Startups can submit investment proposals, manage their profiles, and monitor investor engagement with the Startup Dashboard. For smooth communication with investors, it offers AI-powered matchmaking, analytics dashboards, real-time communication, and document management. Startups can improve their funding readiness and learn more about the performance of their proposals with the dashboard..

7.2.5 Investor Dashboard

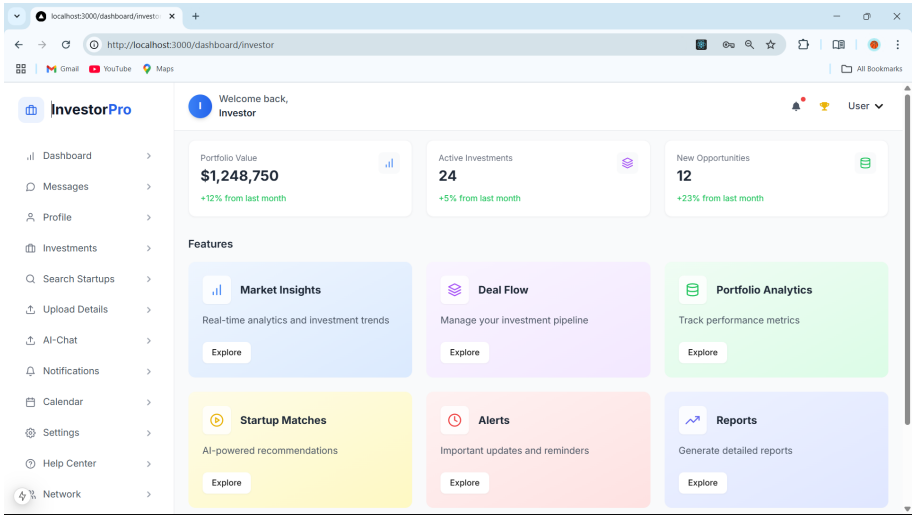

Figure 7.5: Investor Dashboard

In Figure 7.5 Investors can shortlist possible investments, examine proposals, and research startups using the Investor Dashboard. It offers real-time communication, analytics dashboards, AI-powered matchmaking, and document management to help users make well-informed decisions. Investors can effectively connect with promising startups, monitor engagement, and get notifications.

7.2.6 Match Making Dahsboard

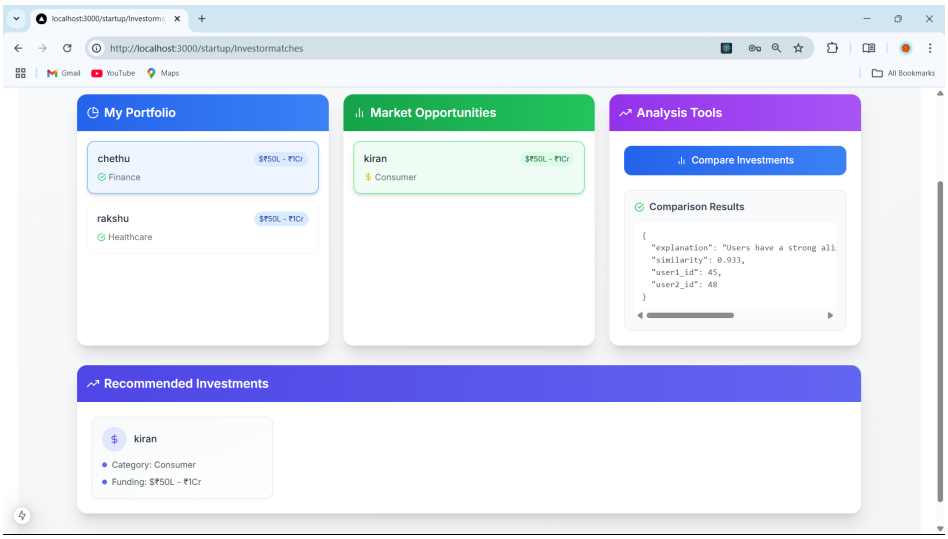

Figure 7.6: Match making Dashboard

In Figure 7.6 The Matchmaking Dashboard uses AI-powered algorithms to offer investors and startups tailored recommendations. To assist users in assessing possible connections, it graphically presents compatible profiles, match scores, and important metrics. Through a simplified interface, users can swiftly investigate, connect, and take advantage of high-potential opportunities.

7.2.7 Funding Score Dashboard

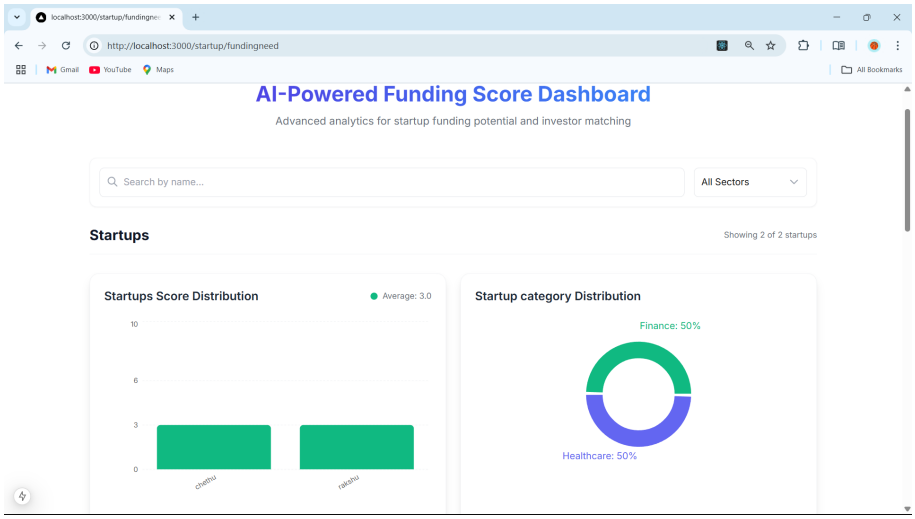

Figure 7.7: Funding Score Dashboard

In Figure 7.9 A startup's investment readiness is assessed by the Funding Score Dashboard using important criteria such as documentation, financials, team strength, and traction. It helps investors and startups evaluate funding potential by assigning a dynamic score produced by AI models. The dashboard provides information and recommendations to raise the score and draw in more investors.

7.2.8 Message Dashboard

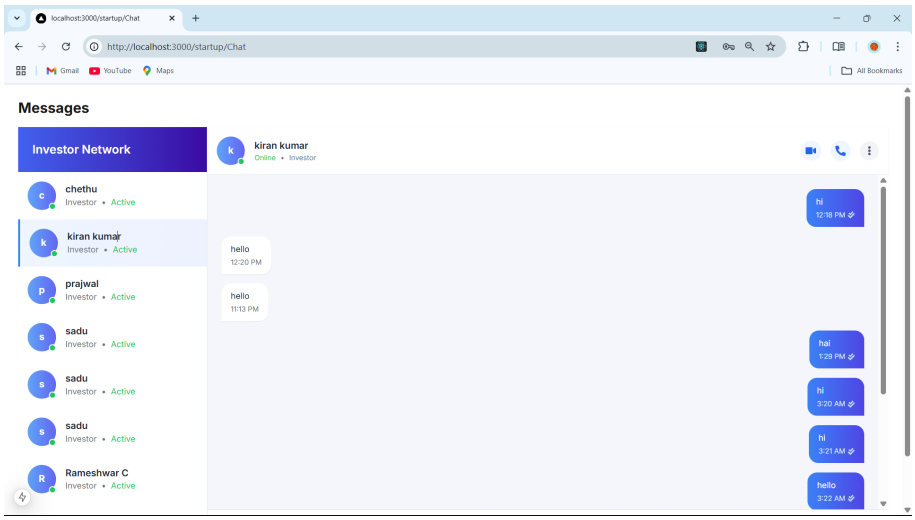

Figure 7.8: message Dashboard

In Figure ?? Users would communicate with one another through the Messages page. Startups and investors can message each other about possible joint ventures, partnerships, or other forms of cooperation. In order to keep users informed of crucial communications, the page would probably have a list of conversations, message sending and receiving capabilities, and perhaps even tools like message search, archiving, and notifications.

7.2.9 Gamified Engagement Dashboard

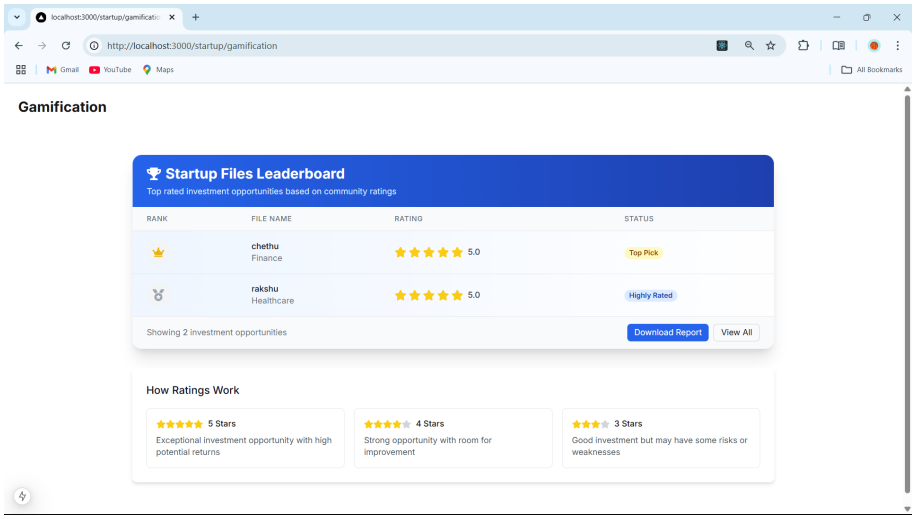

Figure 7.9: Gamified Engagement

In Figure ??While the context may not be a traditional game, a gamified engagement dashboard is a digital interface that uses game design elements such as points, badges, levels, leaderboards, and challenges to track, encourage, and visualize user activity.

Through a sense of accomplishment and competition, it is utilized in applications such as e-learning platforms, employee productivity tools, fitness applications, community platforms, and customer engagement systems to inspire users and influence behavior.

Chapter 8

Test Cases

8.1 Test Case Table

Test Case Table

TC_ID	Module Name	Test Case Description	Input	Expected Output	Actual Output	Status
TC_01	User Authentication	Verify user login with valid credentials	Valid email and password	Redirected to user dashboard	Redirected to user dashboard	Pass
TC_02	User Authentication	Verify login fails with invalid credentials	Invalid email or password	Error message shown: "Invalid login credentials"	Error message shown: "Invalid login credentials"	Pass
TC_03	Profile Management	Verify user can update profile details	Valid profile form data	Profile updated confirmation displayed	Profile updated confirmation displayed	Pass

TC_ID	Module Name	Test Case Description	Input	Expected Output	Actual Output	Status
TC_04	Project Proposal Submission	Submit a new project proposal	Complete project form data	Proposal saved and confirmation displayed	Proposal saved and confirmation displayed	Pass
TC_05	Project Proposal Tracking	Check status of submitted proposals	Proposal ID	Correct current status displayed	Correct current status displayed	Pass
TC_06	AI-Powered Matchmaking	Verify matchmaking suggestions generated	User profile with preferences	List of recommended matches displayed	List of recommended matches displayed	Pass
TC_07	Real-Time Communication	Send message via chat interface	Valid message text	Message delivered and displayed in chat	Message delivered and displayed in chat	Pass

TC_ID	Module Name	Test Case Description	Input	Expected Output	Actual Output	Status
TC_08	Notifications	Verify notifications received on new updates	Triggering event (e.g. new message)	Notification shown in user interface	Notification shown in user interface	Pass
TC_09	Funding Readiness Scoring	Calculate funding readiness score	User/project data input	Correct readiness score displayed	Correct readiness score displayed	Pass
TC_10	Document Management	Upload valid document files	Valid PDF/-DOC file	Document uploaded and visible in documents list	Document uploaded and visible in documents list	Pass

Conclusion

Chapter 9

Conclusion

The VentureLink platform is a smart way to match startups with potential investors from start to finish. It also lets people work together in real time and find matches using AI. VentureLink makes the investment process easy and clear by securely authenticating users, managing their profiles in detail, tracking project proposals, and scoring funding readiness. The platform keeps users interested with gamified features and easy-to-use dashboards. It also makes sure that the system is safe and can grow with PostgreSQL and real-time notifications. VentureLink makes it easier for investors to make decisions and gives startups a way to show off their new ideas. It has built-in document management, role-based access control, and AI-powered analytics. In general, the system helps with getting money, helps startups grow, and encourages smart investing, making it a useful tool for modern entrepreneurial ecosystems.

The platform's real-time communication features, like video conferencing and chat, also make the user experience better and more personalized. Administrators can easily manage the platform, which helps keep operations stable and complaints from users get fixed quickly. The AI matchmaking engine reduces human bias by connecting people who are interested in the same things based on their investment behavior and industry interests. Users are notified of important events, the status of proposals, and chances to work together through alerts and notifications. A funding score dashboard helps people decide if they are ready to start a business, which boosts both confidence and investment. Responsive design, which is based on React.js, Next.js, and Tailwind CSS, makes the UI work on all devices. VentureLink's modular design makes it easy to add new features and tools from other companies. The platform can grow, all other things being equal.

Future Work

Chapter 10

Future Work

A number of improvements are in development to broaden the capabilities and interface of the VentureLink platform as it matures further. Future iterations will include machine learning-based investment forecast models and recommended startups based on past data and behavior to investors. We are also working to implement blockchain integration for proposal verification and secure, transparent funding transactions. Regionalization tools and multilingual functionality will be implemented to reach a wider user base and support global expansion.

More sophisticated analytics dashboards for information that provide deeper insights into trends in funding, sector performance, and user interaction metrics will be part of future releases for investors and startups.VentureLink will also be built as a mobile app to offer easy access and reminders on the move. To optimize the matchmaking engine, natural language processing (NLP) will be used to interpret investor interests and pitches more accurately. In addition, automated due diligence technology needs to be implemented in order to build trust and accelerate investor decision-making.

We will also employ cloud deployment and microservices architecture to ensure long-term scalability and performance. Future additions will be focused on expanding access with the introduction of voice assistants and AI-powered chatbots to be used for onboarding and support. These updates will help VentureLink become a premier, savvy investment platform that links innovative startups with visionary investors across the globe.

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