



National University of Computer and Emerging Sciences, Lahore



CollabVerge

Amina Akhtar 22L-6198 BS(SE)

Daniyal Waseem 22L-7868 BS(SE)

Muhammad Khizar 22L-7896 BS(SE)

Supervisor: Ms. Arooj Khalil

Final Year Project

November 17, 2025

Anti-Plagiarism Declaration

This is to declare that the above publication was produced under the:

Title: CollabVerge

is the sole contribution of the author(s), and no part hereof has been reproduced as it is the basis (cut and paste) that can be considered Plagiarism. All referenced parts have been used to argue the idea and cited properly. I/We will be responsible and liable for any consequence if a violation of this declaration is determined.

Date: October 22, 2025

Name: Amina Akhtar

Signature:

Name: Daniyal Waseem

Signature:

Name: Muhammad Khizar

Signature:

Author's Declaration

This states Authors' declaration that the work presented in the report is their own, and has not been submitted/presented previously to any other institution or organization.

Abstract

Social media has greatly influenced influencer marketing during the last decade, as the trend shifted from traditional marketing strategies to social media driven strategies. Brands spend billions of dollars on influencer marketing annually. Nevertheless, they face several issues, such as unverified profiles, false assumptions due to miscommunication, unfair compensation, and unsafe payment. Meanwhile, influencers are not able to find legitimate opportunities. CollabVerge aims to provide a centralized platform that streamlines the entire collaboration process between brands and influencers. This will redefine the brands and influencers engagement by making sure that the whole process of collaboration from project discovery to completion is efficient, fair and transparent.

Executive Summary

In the rapidly evolving industry nowadays, advertisement through social media is one of the most influential ways for brands promotion. Despite its enormous potential, this marketing industry faces numerous challenges such as unverified profiles, miscommunication, unfair compensation and insecure payments. These challenges are a major hindrance in the way effective collaboration between brands and influencers. CollabVerge is a web-based solution developed with the purpose of addressing these issues by providing a transparent platform for connecting influencers and brands.

The objectives of CollabVerge extend beyond simply connecting brands and influencers. It streamlines the entire collaboration process by providing features such as escrow-based payment mechanism, secure communication, and a standardized pricing limit. The feature that distinguishes CollabVerge from existing solutions is a sophisticated recommendation mechanism. The system uses the influencers profile metrics and their previous projects to connect influencers with the relevant projects. To maintain the administrative control, the system will verify the identity of the brands through business documents and resolve the disputes in the collaborations. This will result in an environment where risks of exploitation and financial disputes are reduced and the chances of success are maximized.

As a part of the research work, we explored other similar applications that facilitate the brands and influences collaboration. Although these applications offer various useful features, they lack standardized compensation model, escrow secure payment and an intelligent recommendation system. In contrast, CollabVerge is a complete end to end solution that resolves these by providing a unified and transparent platform. Ultimately, CollabVerge promises a future where digital collaborations are efficient and mutually beneficial. It also aims to revolutionize the standards of collaboration by promoting sustainable economic growth and reshaping the way brands and influencers connect with each other in the modern age. This makes CollabVerge not only an innovative technology but also a strong step toward improving integrity in the modern digital marketing.

Table of Contents

List of Figures	ix
List of Tables	x
1 Introduction	1
1.1 Purpose of this Document	1
1.2 Intended Audience	1
1.3 Definitions, Acronyms, and Abbreviations	1
1.4 Conclusion	2
2 Project Vision	3
2.1 Problem Domain Overview	3
2.2 Problem Statement	3
2.3 Problem Elaboration	3
2.4 Goals and Objectives	4
2.5 Project Scope	4
2.6 Sustainable Development Goal (SDG)	5
2.7 Constraints	5
2.8 Business Opportunity	6
2.9 Stakeholders Description/ User Characteristics	6
2.9.1 Stakeholders Summary	6
2.9.2 Key High-Level Goals and Problems of Stakeholders	6
2.10 Conclusion	7
3 Literature Review / Related Work	8
3.1 Definitions, Acronyms, and Abbreviations	8
3.2 Detailed Literature Review	8
3.2.1 Aria	8
3.2.2 Upfluence	9

3.2.3	Shopify Collabs	10
3.2.4	Grin	11
3.2.5	YouTube BrandConnect	12
3.2.6	Meltwater	13
3.2.7	CreatorIQ	14
3.2.8	Sprout Social	15
3.2.9	Aspire	17
3.2.10	Shoutcart	18
3.3	Literature Review Summary Table	20
3.4	Conclusion	21
4	Software Requirement Specifications	22
4.1	List of Features	22
4.2	Functional Requirements	22
4.2.1	Functional Requirements for Brand	22
4.2.2	Functional Requirements for Influencer	23
4.2.3	Functional Requirements for System	23
4.3	Quality Attributes	24
4.3.1	Reliability	24
4.3.2	Security	24
4.3.3	Maintainability	24
4.3.4	Usability	24
4.3.5	Performance	24
4.4	Non-Functional Requirements	24
4.4.1	Performance	24
4.4.2	Usability	25
4.4.3	Scalability	25
4.4.4	Security	25
4.5	Assumptions	25
4.6	Use Cases	25
4.7	Hardware and Software Requirements	35
4.7.1	Hardware Requirements	35
4.7.2	Software Requirements	35
4.8	Graphical User Interface	35
4.9	Database Design	39

4.9.1	ER Diagram	39
4.9.2	Data Dictionary	39
4.10	Risk Analysis	47
4.10.1	Technical Risks	47
4.10.2	Business Risks	47
4.11	Conclusion	47
5	High-Level and Low-Level Design	48
5.1	System Overview	48
5.1.1	Influencer Discovery and Matching	48
5.1.2	Collaboration and Communication	48
5.1.3	Project Management and Payment Security	48
5.1.4	Transparency and Feedback	48
5.2	Design Considerations	49
5.2.1	Assumptions and Dependencies	49
5.2.2	General Constraints	50
5.2.3	Goals and Guidelines	51
5.2.4	Development Methods	51
5.3	System Architecture	51
5.3.1	High-Level Partitioning	51
5.3.2	Component Collaboration	52
5.3.3	Rationale for Decomposition	52
5.3.4	System Architecture Diagram	52
5.3.5	Subsystem Architecture	53
5.4	Architectural Strategies	54
5.4.1	Choice of Technologies	54
5.4.2	Future Plans for Extension or Enhancement	54
5.4.3	Version Control	55
5.4.4	Concurrency and Synchronization	55
5.5	Domain Model/Class Diagram	56
5.6	Policies and Tactics	56
5.6.1	Coding Guidelines and Conventions	57
5.6.2	Testing Strategies	57
5.6.3	Continuous Integration and Deployment	57
5.6.4	Error Handling and Recovery	57

5.6.5	User Interface Design	57
5.6.6	Database Management	57
5.7	Conclusion	58
6	Implementation and Test Cases	59
6.1	Implementation	59
6.1.1	Authentication	59
6.1.2	Collaboration Management	59
6.1.3	Recommendation System	60
6.1.4	Communication	60
6.2	Conclusion	60
7	Conclusion and Future Work	61

List of Figures

2.1 Decent Work and Economic Growth	5
4.1 Landing Screen	36
4.2 SignUp Screen	36
4.3 Login Screen	37
4.4 HomePage of Brand	37
4.5 HomePage of Influencer	38
4.6 Project Screen	38
4.7 Entity Relationship Diagram	39
5.1 System Architecture Diagram	53
5.2 Class Diagram	56

List of Tables

3.1 Summary of Related Work	20
4.1 Login Process	26
4.2 Logout Process	26
4.3 View Profile	27
4.4 Edit Profile	27
4.5 Submit Feedback	28
4.6 Communication	28
4.7 Brand Registration Process	29
4.8 View project	29
4.9 Influencer Registration Process	30
4.10 View Influencer	30
4.11 Create project	31
4.12 Edit project	31
4.13 Delete project	32
4.14 Manage offers	32
4.15 Manage individual proposal	33
4.16 Offer collaboration	33
4.17 Apply to project	34
4.18 Report project	34
4.19 View all proposals	35
4.20 Data Dictionary	39

Chapter 1 Introduction

CollabVerge intends to bring about change within the social media driven marketing industry. Finding the most suitable influencer for a campaign is an important concern for brands aiming to enhance their market impact. At the same time, influencers face numerous challenges during the collaboration. CollabVerge aims to address these challenges by providing an integrated platform that enables reliable collaborations between brands and influencers. In the upcoming chapters of this report, we will explore the project vision, conduct a literature review, and examine relevant works essential for CollabVerge.

1.1 Purpose of this Document

The purpose of this document is to present a detailed overview, scope, and objectives of CollabVerge which aims to develop a web-based application for collaboration between brands and influencers. The research question we aim to answer is: Can we create a technologically sophisticated platform for fair, transparent, and smooth collaborations between brands and influencers? Through this report, we will delve into the design, implementation, testing and evaluation of our project, while also addressing potential challenges and future enhancements.

1.2 Intended Audience

The intended audience of this document includes the academic panel responsible for reviewing and evaluating this project, stakeholders in influencer marketing industry, including brands and influencers interested in technological advancements, as well as technology enthusiasts, researchers, and future developers hoping to build upon this work.

1.3 Definitions, Acronyms, and Abbreviations

SDG: Sustainable Development Goal

FYP: Final Year Project

GUI: Graphical User Interface

UI: User Interface

UX: User Experience

API: Application Programming Interface

AI: Artificial Intelligence

JWT: JSON Web Token

RBAC: Role Based Access Control

OTP: One Time Password

ERD: Entity Relationship Diagram

CRUD: Create, Read, Update, Delete

ORM: Object-Relational Mapping

REST: Representational State Transfer

LLM: Large Language Model

1.4 Conclusion

The first chapter of this report provides an introduction to CollabVerge, its intended audience, and various acronyms, and abbreviations used throughout the report. The second chapter provides a detailed overview of the product vision, covering topics such as problem statement, goals and objectives, scope, constraints, business opportunities and stakeholders' description. The third chapter includes thorough research of related applications in the market. The fourth chapter includes the software requirement specification, describing the functionalities, requirements, and use cases of the application along with database design and risk analysis. The fifth and last chapter elaborates on the design and architecture of the application and illustrates it with multiple diagrams.

Chapter 2 Project Vision

In today's rapidly evolving industry, where time is a valuable commodity, the traditional methods of collaborations between brands and influencers have started to show their limitations. Therefore, CollabVerge is a web-based solution that intends to use advanced technologies including the use of machine learning, to automate key collaboration stages, effectively expediting processes, enhancing fairness and ensuring transparency in the overall process.

2.1 Problem Domain Overview

CollabVerge, will be a cutting-edge web based solution that intends to use the capabilities of modern web development frameworks and machine learning, to bring a revolution in the marketing industry. The platform will cater to both brands and influencers, providing them with a platform to ease out the entire collaboration process for them. The influencers can login into the application by linking their social media accounts, submit proposals for collaborations, and provide feedback after project completion. The system will intelligently recommend the campaigns to the influencers based on their profile metrics and previous collaborations. The brands can login into the application by providing their business documents, create projects, and provide feedback after project completion. In order to facilitate project completion, the system provides fair compensation models by setting price limits for projects, seamless communication, and an escrow-based payment. In addition to these functionalities, the system provides administrative functionalities for verifying brands identity and resolution of disputes in the collaborations. This approach aims to streamline different stages of the collaboration process by making CollabVerge an indispensable tool for modern marketing.

2.2 Problem Statement

The project highlights the problem of having a proper web based application to facilitate different stages of the collaboration process and ensure standardized pricing.

2.3 Problem Elaboration

In the globalized and fast-paced world today, the demand for marketing is ever-growing. While brands want to select the best influencers that fit their campaigns the best, influencers themselves want to end up with brands that are the best for their capabilities. Yet, despite the advent of technology and advancements, the marketing process still faces inefficiencies. Firstly, influencers with similar reach often

demand very different rates, while brands also offer payments without clear market standards. This inconsistency leads to unfair deals because they do not follow the standardized pricing limits. Furthermore, it is a hassle for both parties to manage collaborations by communicating through scattered platforms such as emails and messaging apps. Lastly, both parties keep track of their projects through google sheets and use third party payment services which results in delayed and sometimes incomplete payments. There are many digital platforms to cater to this problem, but most of them focus on only one aspect of the entire process. This results in the users juggling multiple platforms making the process ineffective.

2.4 Goals and Objectives

The primary goals and objectives of this project are:

- Create an intuitive and user-friendly web application that streamlines the different aspects of the collaboration process in one place.
- Ensure that influencers get recommendations for campaigns which align with their profile and previous collaborations.
- Incorporate a fair pricing model to ensure that demands of both brands and influencers align with their profile metrics.
- Integrate an escrow secured payment system to minimize the financial disputes.
- Incorporate feedback mechanisms for both parties ensuring long term transparent collaborations.

2.5 Project Scope

The scope of the CollabVerge is centered around the development of a user-friendly web-based application intended to streamline and optimize various aspects of the collaboration process using advanced web development technologies and machine learning. The application will enable the users to:

- Create verified profiles and access personalized dashboards.
- View, create, submit, and manage collaboration proposals.
- Access secure communication and escrow-based payment system.
- Follow standardized pricing limits based on profile metrics.
- Submit feedback and resolve disputes through admin intervention.

The project scope does not include mobile application development. Furthermore, posting content on

social media accounts is out of scope. The application will be built using modern web-development frameworks like Next.js coupled with additional libraries and tools for styling. The back end will be developed using a framework like Nest.js. We plan to utilize MongoDb database to store the application data. We will be using Agile Model as our project management methodology. The major deliverable of the project will be a functional Web Application that will help users to improve the effectiveness of their collaboration process. Furthermore, there would be a comprehensive user manual and detailed documentation on the literature, requirement specification, design, development, implementation and testing phases of the project.

2.6 Sustainable Development Goal (SDG)

CollabVerge aligns with the Sustainable Development Goal of “decent work and economic growth”. By facilitating the collaboration process and ensuring the small scale influencers are not overlooked, the application promotes sustained and sustainable economic growth. This provides a platform that ensures efficiency, thus everyone has a chance for productive employment and decent work.

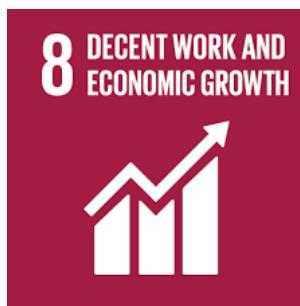


Figure 2.1: Decent Work and Economic Growth

2.7 Constraints

For a system like CollabVerge to be introduced, there are the following constraints that need to be brought under consideration:

- Integration with social media APIs may pose technical restriction due to platform-specific policies.
- The traditional users might be reluctant to change or be skeptical about automating the collaboration process

2.8 Business Opportunity

As the landscape of collaboration evolves, the application provides a significant business opportunity. Revenue can be generated by introducing some advanced features or insights for premium members. As the platform's user base grows, advertisements could be incorporated. CollabVerge positions itself to capture a large market segment, from small startups seeking affordable influencer marketing to high profile brands requiring scalable campaign management.

2.9 Stakeholders Description/ User Characteristics

Here we will identify and explain the various stakeholders of CollabVerge and define their respective roles and responsibilities. Afterwards, we will summarize the goals and objectives of our stakeholders and the problems we plan to address.

2.9.1 Stakeholders Summary

The system will be used by the following:

- **Influencers:**

They are the primary users of the platform who will be able to create an account by linking their social media profiles and then apply to the brand projects or receive an offer to collaborate on the projects.

- **Brands:**

They are the businesses that are more inclined to being authentic by providing their business documents. They post and offer projects for the influencers and make payment using the payment system integrated within the platform.

- **Administrator:**

They are responsible for maintaining the authenticity of the platform by verifying the brands and resolving any disputes in the collaboration process to ensure a secure and trustworthy environment.

2.9.2 Key High-Level Goals and Problems of Stakeholders

The targeted impact of CollabVerge can be achieved by the collaboration and endorsement from multiple stakeholders. Influencers and brands look for significant collaboration opportunities and chances to cooperate on worthwhile projects. Brands aim to find verified influencers and manage collaborations without problems. Influencers also want a system that helps them explore new ideas and build long-term

working relationships. Administrator focuses on keeping the platform safe, ensuring brands are authentic, and making sure that everything runs smoothly. By comprehending these objectives and issues, the CollabVerge is kept user-centric and purpose-driven, empowering all stakeholders and encouraging innovation, trust, and collaborative success.

2.10 Conclusion

CollabVerge is an application that aims on transforming the way brands and influencers collaborate with each other. It is a web-based application that harnesses the capabilities of web development and machine learning to streamline the different stages of the recruitment process. The project vision is to revolutionize the marketing industry by improving the entire. The main goal of the application is to create a user-friendly platform that makes collaboration easier and more efficient. However, there are some potential challenges like exploring this field of technology and making it work for our particular use case along with training people on using it. This application offers huge opportunities for brands and influencers by simplifying the collaboration process for them.

Chapter 3 Literature Review / Related Work

This chapter includes detailed literature reviews of key brand influencer collaboration tools to learn about their strengths, weaknesses, and points of overlap with the proposed project. The chapter positions CollabVerge in today's technological landscape to promote secure, transparent, and equitable brand influencer collaborations through innovative features.

3.1 Definitions, Acronyms, and Abbreviations

Important definitions, acronyms, and abbreviations used in this section are listed below. **CRM:** Customer Relationship Management

ROI: Return on Investment

eCommerce: Electronic Commerce

UGC: User-Generated Content

Escrow: A trusted third-party financial arrangement that temporarily holds payment until both parties complete agreed contract terms.

3.2 Detailed Literature Review

The following sections provide each review material in detail including its summary, the critical analysis and relation to our work.

3.2.1 Aria

Socially Powerful Aria [?] is an AI-based influencer collaboration platform that leverages machine learning and data analysis to maximize campaign performance. It was introduced to tackle the intricacies of influencer marketing including highly customized creator-brand pairing, strong campaign management features, and real-time performance measurement.

3.2.1.1 Summary of the related work

Aria has the objective of revolutionizing influencer marketing by using AI to enhance cooperation. It uses advance data analysis to enable brands to find influencers whose profile most effectively suit their marketing objectives. To safeguard all stakeholders, the platform facilitates communication, equitable pricing models, and safe payments. Its end-to-end ecosystem prioritizes long-lasting partnerships over temporary promotions, which boosts the campaign performance.

3.2.1.2 Critical analysis of the related work

Aria offers AI powered matching mechanism which reduces the time spent by brands looking for suitable influencers, thus accelerating campaign speed and ROI. Confirmed pro-files, secure payments and in-depth analytics tackle the cases of fraud and misrepresentation which are prevalent in social media marketing. Nevertheless, smaller influencers or less popular brands may drive out due to strong focus on AI and data. Even though it performs well in long-term collaboration, users seeking quick and simple solutions may find the complexity and variety of options overwhelming. For optimum adoption, reducing the gap between advanced analytics and simplicity has remained a challenge.

3.2.1.3 Relationship to the proposed related work

Aria and CollabVerge have a common goal of ensuring successful influencer-brand partnerships, which makes them compatible. CollabVerge aims to combine these benefits with enhanced platform security features like secure communication and escrow-based payments. While Aria uses AI to boost influencer discovery and partnership benefits. Verified profiles are given preference on both websites in order to improve clarity and protect stakeholders from dishonesty. CollabVerge expands Aria's idea into a more complete, user-focused collaboration platform by combining AI-powered matching with safe payment and communication.

3.2.2 Upfluence

Upfluence [?] is an AI-powered platform for influencer marketing with a focus on campaign performance, relationship management, and influencer discovery. Initially, the app was designed to help brands utilize conventional collaborations and convert consumers into brand ambassadors. It stands out with the integration of influencer marketing and eCommerce features.

3.2.2.1 Summary of the related work

Upfluence was founded by Vivien Garnes' and Kevin Creusy and is designed to help influencer marketing campaigns by equipping brands with data-driven insights. The platform has a robust search option to filter influencers based on the relevance of content on social media platforms. It can be easily integrated with eCommerce platforms such as Shopify so that brands can find and reward influencers with pro-motion codes and affiliate links. In order to optimize marketing efforts, it also provides campaign management tools like influencer gifting, automated outreach, PayPal or Stripe payment processing, and performance analytics.

3.2.2.2 Critical analysis of the related work

Upfluence is an optimal choice for direct-to-consumer firms because it combines strong AI algorithms with CRM features like influencer relations management and eCommerce integration. Brands can effectively classify campaigns and make strategic decisions with the platform's advanced influencer analytics and audience information. Its capability to handle affiliate marketing together with influencer partnerships provides multiple revenue streams from one platform. However, the platform lacks batch outreach functionality, which can slow large-scale influencer campaigns. Nevertheless, its seamless payment management and content tracking provide a strong foundation for transparent and efficient influencer marketing.

3.2.2.3 Relationship to the proposed related work

Upfluence and CollabVerge both hold a dedication towards optimizing transparency, efficiency, and security between influencer-brand partnerships. Both platforms unite through influencer verification to facilitate trust in collaboration expectations. While Upfluence prioritizes eCommerce integration and affiliate marketing, CollabVerge stresses more on establishing fairness prices through upper and lower limits, promoting transparent communication, and escrow-based payments. In this way, CollabVerge might be considered as a supporting platform that builds on Upfluence's base by adding extra layers of safety specifically intended for varying brand and influencer requirements.

3.2.3 Shopify Collabs

Shopify Collabs [?] is an influencer marketing and affiliate platform built natively into Shopify for merchants to work with creators and drive sales through authentic collaborations. Originally introduced in 2022, it has now emerged as a cornerstone solution for brands to find, connect with, and compensate creators within the Shopify environment. It includes AI-powered creator matching, real-time commission tracking, automatic payments, and hassle-free gifting options that encourage actionable collaborations.

3.2.3.1 Summary of the related work

Shopify built Collabs to enable merchants to streamline influencer and affiliate marketing. The platform provides a searchable marketplace of authentic creators sorted by niche, demographics, engagement, and platforms. Brands are able to build affiliate programs with tiered commissions and gifting capability, shipping products directly to influencers for natural promotion. Creators enjoy seamless application to brand campaigns, affiliate link management, and earnings tracking in a transparent way. For managing inventory, sales data synchronization, and PayPal payment processing, the application interacts with

Shopify's store backend. The mobile-first approach targets the expanding creator economy, focusing on easy experiences across all devices.

3.2.3.2 Critical analysis of the related work

Shopify Collabs is great at connecting ecommerce merchants with creators to facilitate direct sales through product gifting and affiliate marketing, producing a measurable growth channel. Its in-depth integration with the Shopify platform provides greater convenience for merchants to see through inventory tracking, automate payments, and measure the specific ROI of creator campaigns. The AI-driven creator discovery streamlines effort and enables brands to discover high-engagement influencers that match desired customer personas. But Shopify Collabs is only available to Shopify merchants, which might cut off brands on other ecommerce sites. Additionally, though it offers necessary communication and campaign management features, it does not have advanced escrow payment features that could enhance financial security. In general, Shopify Collabs is a powerful platform designed to optimize affiliate-driven ecommerce sales.

3.2.3.3 Relationship to the proposed related work

Shopify Collabs and CollabVerge have the common objective of promoting efficient influencer-brand collaborations but with different orientations. Shopify Collabs serves essentially ecommerce brands requiring affiliate and gifting solutions closely coupled with Shopify's store management and sale tracking. CollabVerge builds on this by adding more general features such as escrow-based payments, authenticated profiles, and AI-driven matchmaking for multi-influencer campaigns for various non-ecommerce activities. While Shopify Collabs is strong on sales-influenced influencer collaborations, CollabVerge is focused on integrating discovery, trust, equity, and monetary security into every brand-influencer collaboration and setting it up as a complete solution.

3.2.4 Grin

Grin [?] is a top influencer marketing platform that specializes in assisting brands to create and expand creator programs with robust integration and eCommerce support. It delivers a centralized command centre for influencer discovery, content collaboration, and campaign analytics. Grin is generally used by direct to consumer brands that want to maximize their influencer partnerships.

3.2.4.1 Summary of the related work

Founded by marketing and software professionals, Grin provides end-to-end solutions for brands to execute influencer collaborations on a scale. The platform includes automated influencer outreach, re-

cruitment via marketplace and CRM, audience analysis, and real-time performance dashboards for campaigns. Integrated closely with eCommerce platforms such as Shopify, WooCommerce, and Magento, it allows product seeding, order fulfilment and sales tracking directly tied to campaign ROI. Brands can communicate effectively with the influencers to approve and manage UGC. Its content storage analyzes the impact of influencers on revenue and brand awareness and aids in the reuse of influencer media.

3.2.4.2 Critical analysis of the related work

Grin's strengths include its robust eCommerce integration, which automates product selection, shipment, and sales attribution to influencer campaigns efficiently. The CRM type interface of the platform enables brands to have in depth project life cycle management. Additionally, Grin has content approval workflows to maintain campaign consistency and comply with the law. The complexity of the platform is tricky, which might need onboarding assistance and adjustment time for new users. Although it has great campaign metrics, some users prefer more sophisticated AI-driven predictive analytics. Overall, Grin provides an enterprise-level solution appropriate for brands with high stakes in influencer-commerce.

3.2.4.3 Relationship to the proposed related work

Grin aligns on a few fundamental objectives with CollabVerge, such as concentration on genuine influencer-brand relationships, influencer marketing through eCommerce, and clear campaign monitoring. Both platforms concentrate on authentic influencer information and content collaboration but vary on method toward payment security and communication. Grin makes eCommerce fulfilment and sales performance core features, whereas CollabVerge combines more generalized campaign types with secure communications, escrow-based payments, and AI-based fair pricing. CollabVerge can be positioned as an extension system that builds upon Grin's foundation by focusing on improved financial protection and a more general multi-platform influencer verification process.

3.2.5 YouTube BrandConnect

YouTube BrandConnect [?] is the official influencer marketing platform for YouTube, aiming to bridge brands with verified YouTube creators for authentic brand partnerships. It runs on the Google Ads platform, allowing advertisers to find creators, handle campaign briefs, and measure sponsored content performance on YouTube in one place. BrandConnect assists brands in tapping the vast reach of YouTube creators by simplifying the sponsorship process.

3.2.5.1 Summary of the related work

Originally launched in 2013 under the name FameBit, BrandConnect is a crucial platform for brand-creator collaboration on YouTube. In 2016, YouTube acquired the site. Brands can sift through creators to find the best fit. The application provides campaign management tools such as price negotiation and setting the deadlines. BrandConnect enables creators to create original content, including product reviews, tutorials, or narrative videos, that include brand message. Marketers can increase creator content and integrate paid and organic reach with Google Ads' Partnership Ads to achieve the best campaign results.

3.2.5.2 Critical Analysis of the related work

YouTube BrandConnect stands out by providing a reliable platform for brands to work with YouTube creators only which is supported by YouTube big data. The Google Ads integration provides strong campaign insights and supports scalable ad amplification. BrandConnect's filtering and matchmaking capabilities minimize the time spent by brands looking for appropriate creators and enhancing campaign relevance. The platform is primarily limited to YouTube creators, which constrains influencer variety from other social media platforms. In addition, while it promotes communication and campaign briefs, it does not yet feature escrow payment methods or secure messaging, which would improve financial and communication safety. Nevertheless, it is currently one of the most robust video-centric influencer marketing platforms in the YouTube ecosystem.

3.2.5.3 Relationship to the proposed related work

Both YouTube BrandConnect and CollabVerge seek to give brands and influencers tools that allow for fair and effective collaborations. Whereas BrandConnect is focused on influencer collaboration exclusively on YouTube, CollabVerge aims to address a broader spectrum of social media platforms and content formats through AI-matching, verified profiles and escrow-protected payments. CollabVerge may enhance BrandConnect by offering a single, multi-platform collaboration platform with improved financial and security while providing greater market coverage beyond YouTube alone.

3.2.6 Meltwater

Meltwater [?] is a comprehensive SaaS solution that assists brands in discovering, managing, and analyzing social media influencers in order to achieve the greatest possible return from their campaigns. It uses AI-powered influencer discovery with a CRM specifically designed for the task and superior analytics to eliminate the complexity of influencer relationship management, campaign execution, and

ROI measurement.

3.2.6.1 Summary of the related work

By creating a platform that integrates each stage of influencer campaigns, Meltwater revolutionized influencer marketing. Finding the ideal influencers is made possible by offering a thorough database of influencer profiles, audience authenticity, and sophisticated search parameters including region, demographics, and niche. Tools for contracts, content curation, and communication make campaign administration easier. Meltwater offers interactive dashboards and real-time reporting, enabling organizations to effectively assess brand awareness and engagement.

3.2.6.2 Critical analysis of the related work

Meltwater's enterprise influencer marketing tool, which combines CRM capabilities, influencer analytics, and social listening, is its strongest point. Because of its authentication capabilities, brands are unable to collaborate with subpar influencers. While advanced analytics facilitate data-driven decision making with transparent ROI indicators, effective campaign management routines save time and increase productivity. Onboarding and training are necessary because Meltwater's platform is a little complicated for novice marketers starting influencer campaigns. It lacks secure messaging and custom escrow payment features, which would increase the security of collaboration. Despite minor flaws, Meltwater is a cutting-edge technology that works well for mid-market and corporate organizations looking to implement scalable influencer marketing campaigns.

3.2.6.3 Relationship to the proposed related work

Meltwater and CollabVerge both have the aim of enabling open, data-driven influencer-brand partnerships through verified profiles as well as holistic campaign management. While Meltwater emphasizes advanced social listening integration and measurement of end-to-end influencer marketing ROI, CollabVerge builds on the value proposition with a focus on secure communications, escrow-protected payments, and intrinsic fairness mechanisms for pricing and collaboration. CollabVerge fills the gap that Meltwater leaves behind by meeting the growing demand for communications and financial safeguards, by advancing trust and efficiency in multiple influencer ecosystems.

3.2.7 CreatorIQ

CreatorIQ [?] is an enterprise-level influencer marketing platform that is intended to assist brands, agencies, and marketers in executing influencer campaigns efficiently. It uses AI-driven discovery and

data insights to recruit influencers, build relationships, run campaigns, and measure performance on top social media platforms such as Instagram, TikTok, YouTube, and Facebook.

3.2.7.1 Summary of the related work

CreatorIQ was founded in 2014 and offers an all-around solution for brands to find authentic influencers through in-depth audience demographics, engagement authenticity, and content relevance. The platform aggregates a database of more than 6 million social creators and uses AI-driven algorithms to ensure brands are matched with best fit influencers. It provides powerful campaign management features such as control and monitoring of performance such as reach, engagement, and ROI. It also includes fraud detection capabilities to ensure regulatory compliance. It offers seamless integration with other software such as Salesforce and Google Analytics to get end-to-end insights of campaigns.

3.2.7.2 Critical Analysis of the related work

CreatorIQ is distinguished by its ability to scale to serve the marketing demands of enterprises along with influencer discovery, management, and reporting. Its fraud detection feature allows brands to fight against artificial followers and engagement, protecting marketing expenses. The rich analytics and compliance features of the platform facilitate data backed campaign optimization and legal transparency. Nonetheless, Its advanced features have a more abrupt learning curve and cost that might be out of budget for smaller businesses or individual marketers. Despite this, its extensive set of features makes it one of the most reliable options for large-scale influencer marketing programs.

3.2.7.3 Relationship to the proposed related work

CreatorIQ is aligned with CollabVerge's mission of providing efficient influencer collaboration ecosystems supported by verified influencer data, AI-powered searches, and feature-rich campaign management. While CreatorIQ is built for scaling influencer marketing for large-scale enterprises with rich compliance capabilities, CollabVerge prioritizes secure communication, escrow-protected payments, and fairness mechanisms that can be applied to a wide variety of influencer tiers and brand sizes. CollabVerge can be considered as complementary to CreatorIQ, adding enterprise-grade influencer management with added transaction security and more comprehensive multi-platform influencer authentication.

3.2.8 Sprout Social

Sprout Social [?] is a full-featured social media management and influencer marketing platform that enables brands to find genuine creators, manage collaborations, and amplify the reach of their campaigns. Praised for its AI-powered insights and comprehensive analytics, Sprout Social couples social

listening, publishing, engagement, and reporting with influencer marketing to facilitate complete social media strategies.

3.2.8.1 Summary of the related work

Established in 2010, Sprout Social grew to become a social media management pioneer with more than 30,000 international brands utilizing its tool. Its Influencer Marketing module offers AI-driven discovery tools by audience interest, brand safety, and content relevance to enable quick discovery of the creators. Streamlined workflows for influencer outreach, contract approval, content review, and real-time performance measurement are its key features. The social listening and brand-safety features of the platform prevent risky partnerships and optimize campaign alignment. Branded content can be amplified effortlessly as Partnership Ads to maximize reach and conversions. Brands can manage more than one client account with flexible dashboards through Sprout's modular workspace organizational system.

3.2.8.2 Critical Analysis of the related work

Sprout Social's integrated strategy combines influencer marketing with social media management staples, offering a solid toolkit for brands looking for end-to-end solutions. Its AI-based influencer discovery, brand safety rating, and review workflows minimize risk and optimize collaboration efficiency. Its combined inbox and scheduling functionalities streamline engagement and content distribution across multiple channels. But, Sprout's platform might pose a steep learning curve for new users because of its scope of features. Moreover, it does not yet incorporate specific escrow payment and secure messaging features that would enhance security in influencer communications and payments. Nevertheless, for companies handling large social presence and influencer relations, Sprout provides a sturdy and scalable platform.

3.2.8.3 Relationship to the proposed related work

Sprout Social is committed to the same as CollabVerge in building open, data-driven influencer marketing platforms that promote trust and scale. Both focus on verified creator discovery, campaign management, and measurement of performance. CollabVerge takes these features a step further by emphasizing more vigorously secure communication and escrow-based payment models to avoid typical collaboration hazards. Whereas Sprout Social's core strength is its combined social and influencer platform, CollabVerge stands as a specialized collaboration platform with improved transaction security and equity features for a wide range of influencers and brands.

3.2.9 Aspire

Aspire [?] is a full-suite influencer marketing platform that makes it easy to drive brand-influencer partnerships and grow influencer programs on a scale. It brings together powerful influencer discovery, campaign orchestration, content creation, relationship building, and sales attribution capabilities within one integrated platform that is specific to e-commerce and consumer-first brands.

3.2.9.1 Summary of the related work

Aspire was created to enable brands, from startups to big businesses, to discover and engage top creators on Instagram, TikTok, YouTube, Pinterest, and Facebook. Its search engine for influencers provides powerful demographic and engagement filtering in addition to image recognition features to identify ideal creators. Aspire's Creator Marketplace is an inbound platform where influencers can apply for brand campaigns themselves, speeding up discovery and suitability. Campaign workflows include planning, product seeding, content approval, payment processing, and analytics. Aspire's relationship management features support maintaining long-term influencer relationships with email platform integration and automatic messaging. eCommerce integration with Shopify and connectivity to data with Meta and TikTok enable accurate sales attribution and ROI tracking.

3.2.9.2 Critical Analysis of the related work

Aspire's greatest strength is its end-to-end influencer marketing platform that integrates discovery, relationship management, content rights automation, and sales tracking in an easy-to-use interface. Its built-in digital term sheets help ease the acquisition of content rights, minimizing legal friction in the use of branded content. Its first-party data integration ensures real-time campaign performance measurement, essential for data-driven marketing programs. Nevertheless, Aspire will have a learning curve for users with no such advanced tools and involves annual contracts that may hinder flexibility. Although it performs well in encouraging organic, long-term partnerships, it does not include some financial protection measures such as escrow payments, which would add further strength to campaign security. Generally, Aspire is a solid solution preferred by industry top brands dedicated to scalable influencer programs.

3.2.9.3 Relationship to the proposed related work

Aspire closely shares similarities with CollabVerge in prioritizing genuine influencer-brand connections, full-fledged campaign management, and eCommerce-driven attribution of sales. Both platforms feature verified influencer discovery and data-driven matchmaking to enhance collaboration effective-

ness. CollabVerge stands out from the rest by integrating secure messaging and escrow-based payments to advance the security, solving major pain points within influencer agreements. Its automated workflow and content rights strength is complemented by CollabVerge's emphasis on fairness and security, making CollabVerge a likely next step for brands and influencers that require added trust and transactional protection from Aspire.

3.2.10 Shoutcart

Shoutcart [?] is a simple influencer marketing platform mainly geared towards making it easy for brands to conveniently buy shoutouts from social media influencers on social media platforms. Built for speedy and affordable promotional campaigns, It provides businesses with the ability to engage with influencers via a pay-per-post strategy without incurring lengthy contracts or negotiations.

3.2.10.1 Summary of the related work

It was established as a platform to facilitate influencer shoutouts which makes the process easier by giving access to a searchable influencer database with strong filters. Brands can easily choose and order shoutouts from influencers with pre-determined prices for their posts. Influencers generally offer short-term shoutout services, which means the platform is well-suited for campaigns with urgent visibility and brand awareness spikes. Payment as well as campaign management are made via the platform. Shoutcart accommodates budget-friendly campaigns with a cost-effective pricing model, and so even small businesses or startups can utilize influencer marketing.

3.2.10.2 Critical analysis of the related work

The primary advantage of Shoutcart lies in its speed and simplicity, offering an easy influencer marketing avenue for those brands that have tight deadlines or run on shoestring marketing budgets. The pay-per-post strategy eliminates complicated negotiations and long contracts, lowering entry barriers for influencer marketing. Its extensive filtering mechanism and influencer assessment increase targeting accuracy. This network isn't ideal for long-term collaborations because influencers are typically contracted for one-time shoutouts with little opportunities for further communications. Its use is also restricted in more complex marketing campaigns due to its lack of advanced features like escrow payment protection and comprehensive campaign data.

3.2.10.3 Relationship to the proposed related work

CollabVerge and Shoutcart both focus on influencer marketing for similar reasons. Shoutcart is best suited for initial campaigns since it targets instant shoutout purchases, which are perfect for quick prod-

uct releases and brand surges. CollabVerge, on the other hand, aims to develop an end-to-end platform for collaboration that encourages openness and equity through escrow-based payments, secure communication, AI-based matching, and verified profiles. CollabVerge is a more sophisticated solution for companies and influencers seeking long-term partnerships and transaction security by taking influencer marketing beyond shoutouts to safer, more scalable, and equitable partnerships.

3.3 Literature Review Summary Table

This section contains a brief summary of the conducted literature reviews.

Table 3.1: Summary of Related Work

Application	Features	Relevance	Limitations
Aria [?]	AI-driven brand-influencer matchmaking, secure payments, verified profiles, robust analytics	AI-based matching and secure payments, verified profiles, multiplatform compatibility	Complexity and steep learning curve may alienate smaller users
Upfluence [?]	AI-powered influencer discovery, eCommerce integration, CRM-like relationship management	Strong brand and influencer relationship tools, verified profiles, multiplatform compatibility	Missing bulk outreach feature, hard for beginners to learn, no pricing standards
Shopify Collabs [?]	Shopify-integrated affiliate marketing, product gifting, AI matching, automated payments	Escrow secured payments	Restricted to Shopify merchants.
Grin [?]	Influencer discovery, content collaboration, eCommerce fulfillment, campaign analytics	Transparent project tracking	Complex interface, onboarding challenges, no escrow-based payment
YouTube BrandConnect[?]	YouTube-based creator marketplace, campaign briefs, Google Ads integration, content amplification	Niche focus on YouTube creators, campaign transparency	Limited to YouTube, lacks escrow payment, no standardized pricing
Meltwater[?]	Social listening integration, verified influencer discovery, campaign workflow and analytics	Data-driven transparency with influencer verification	Complex for smaller users, no escrow payment, lacks standardized pricing
CreatorIQ[?]	Enterprise-grade AI discovery, contract automation, compliance, extensive analytics	Large-scale trusted influencer platform	Steep learning curve, pricing limits for small users
Sprout Social[?]	Unified social media management, influencer discovery, brand safety scoring, AI insights	Integrated influencer and social media management	Lacks escrow-based payment security and standardized pricing model
Aspire[?]	End-to-end influencer marketing, digital rights management, automated workflows, eCommerce sales attribution	Supports long-term campaigns, promotes fairness	Lacks escrow-based payment
Shoutcart[?]	Marketplace for quick influencer shoutouts, pay-per-post pricing	Entry-level influencer marketing solution	Limited for complex and long-term campaigns, lacks escrow payment

3.4 Conclusion

In conclusion, this chapter described and analyzed a number of influencer and brand collaboration platforms. These platforms have distinct features such as AI powered match making, eCommerce integrations, management tools and secure payments. With a strong emphasis on scalable partnerships, these platforms reflect the changing nature of the influencer collaborations. CollabVerge seeks to improve upon these strengths by adding more advanced security features like transparent communication and escrow-protected payments while ensuring fairness via AI-driven matchmaking and pricing protection. This places CollabVerge as an integrated influencer collaboration platform that seeks to bridge major limitations in current solutions.

Chapter 4 Software Requirement Specifications

This chapter provides an in-depth analysis of all associated software requirements of the project. It includes list of features, functional requirements, quality attributes, non-functional requirements, related assumption, use cases, hardware and software requirements, graphical user interface, all necessary diagrams and figures, along with the risk analysis of the project.

4.1 List of Features

The following features will be available in the system:

- A simple and intuitive interface for both brands and influencers to manage, assess, and track projects.
- Allows brands and influencers to create verified profiles through business or social media verification.
- Provides AI powered recommendation to help brands discover the suitable influences for their projects.
- Facilitates secure communication between brands and influencers.
- Integrates an escrow-based payment system to ensure that transactions are secure between brands and influencers.
- Enforces compensation standards to ensure that profile metrics and rates of influencers are well aligned.
- Allows admin to verify the authenticity of brands and handle disputes in the collaborations.

4.2 Functional Requirements

This section describes the functional requirements of the application for different users involving Brand and Influencer.

4.2.1 Functional Requirements for Brand

- The system shall allow the brand to create their verified profiles by their uploading business documents.
- The system shall allow the brand to login into the application using their login credentials.

- The system shall allow the brand to create new projects by providing the detailed requirements and deadlines.
- The system shall allow the brand to edit already created projects.
- The system shall allow the brand to delete a project.
- The system shall allow the brand to send collaboration offers to the specific influencers.
- The system shall allow the brand to accept or reject proposals submitted by the influencers.
- The system shall allow the brand to communicate with the influencer.
- The system shall allow the brand to make payments through secure escrow-based gateway.
- The system shall allow the brand to submit feedback of the influencer.

4.2.2 Functional Requirements for Influencer

- The system shall allow the influencer to create verified profiles by authenticating their social media accounts.
- The system shall allow the influencer to login into the application using their login credentials.
- The system shall allow the influencer to submit proposals against projects created by the brands.
- The system shall allow the influencer to accept or reject the collaboration offers sent by the brands.
- The system shall allow the influencer to update their profile information.
- The system shall allow the influencer to communicate with the brands.

4.2.3 Functional Requirements for System

- The system shall authenticate both brands and influencers using OTP verification.
- The system shall match brands with suitable influencers and vice versa using AI powered recommendation engine.
- The system shall enforce fair compensation standards against verified profile metrics.
- The system shall ensure smooth transactions through escrow-based payments.
- The system shall ensure secure communication between brands and influencers.

4.3 Quality Attributes

The project aims to incorporate the following quality attributes in order to ensure the prevention of defects in the application.

4.3.1 Reliability

The system should operate reliably ensuring that the user data is not compromised or lost in any kind of application features.

4.3.2 Security

The system should protect data from unauthorized access and breaches to ensure data confidentiality and integrity.

4.3.3 Maintainability

It must be easy to maintain and update the application thus, it should support updates to existing features and provide the support to add new features.

4.3.4 Usability

The system should provide such an interface and experience to the users that it is easy for them to navigate through the application. It shall provide a smooth user experience in response to their queries so the interaction could become seamless.

4.3.5 Performance

The system shall perform effectively when there are time and resource constraints.

4.4 Non-Functional Requirements

This section mentions several non-functional requirements to ensure performance and efficiency of the system.

4.4.1 Performance

- The system shall load data from the database and display results in under 5 seconds.
- The system shall ensure a response time of less than 5 seconds.

4.4.2 Usability

- The system shall be responsive, ensuring compatibility across different screen sizes.
- The user interface shall be intuitive and straightforward for users of all technical proficiencies.

4.4.3 Scalability

- The system should be scalable to support an increasing number of users over time without performance degradation.
- It should be easy to add or modify features to accommodate future requirements.

4.4.4 Security

- The system shall encrypt the passwords and sensitive information stored in the system's database.
- The system shall implement secure authentication and authorization mechanisms to prevent unauthorized access to sensitive information.

4.5 Assumptions

The following assumptions have been made regarding the system specification:

- The users have access to a browser with JavaScript compatibility.
- A stable internet connection is available for all users to interact with the system.
- Users are expected to have a basic understanding of website navigation and form submission.

4.6 Use Cases

This section lists relevant use cases that represent central functionalities of our system encompassing all stakeholders.

Table 4.1: Login Process

Name	Login		
Actors	Brand, Influence, Super Admin		
Summary	The user shall provide their email and password on the login form, and after successful verification, redirect the user to the home page.		
Pre-Conditions	The user must be in the database records, either added by any of the authorized users or added manually by a developer. The user must not already be logged in.		
Post-Conditions	The user's session is successfully established and shall be redirected to the home page.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user opens the login page.	2	The login page is displayed asking for email and password.
3	The user enters valid email and password.	4	The system verifies the email and password, establishes a session for the user and redirects the user to the home page.
Alternative Flow			
3	The user enters invalid email or password.	4-A	The system responds with an error message: Incorrect email or password entered.

Table 4.2: Logout Process

Name	Logout		
Actors	Brand, Influence, Super Admin		
Summary	The user shall click on the “Logout” button and will be redirected to the login page.		
Pre-Conditions	The user must be logged in.		
Post-Conditions	The user's session is successfully ended and shall be redirected to the login page.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user clicks the logout button.	2	The system terminates the user's session and redirects the user to the login page.
No Alternative Flow			

Table 4.3: View Profile

Name	View profile		
Actors	Brand, Influencer		
Summary	The user shall assess its detailed profile.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system displays detailed profile, including all relevant details.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user clicks the view profile button.	2	The system retrieves detailed profile information from the database and displays it.
No Alternative Flow			

Table 4.4: Edit Profile

Name	Edit profile		
Actors	Brand, Influencer		
Summary	The user shall be able to edit its profile.		
Pre-Conditions	The user must be logged to the system.		
Post-Conditions	The system updates the user's profile in the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user clicks the view profile button	2	The system retrieves detailed profile information from the database and displays it.
3	The user clicks the edit profile icon.	4	The system displays the existing profile data.
5	The user edits the necessary fields.	6	The system validates the entered data.
7	The user clicks the "Edit" button.	8	The system stores the updated profile information in the database and confirms the successful update of the profile.
Alternative Flow			
5	The user enters invalid data.	6-A	The system responds with an error message: Incorrect data entered.

Table 4.5: Submit Feedback

Name	Submit Feedback		
Actors	Brand, Influencer		
Summary	The user shall provide feedback in form of review and rating.		
Pre-Conditions	The user must be logged to the system and the project must be completed.		
Post-Conditions	The system stores feedback in the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user clicks the submit feedback button.	2	The system displays feedback form.
3	The user enters all the required details.	4	The system validates the entered data.
5	The user clicks the submit button.	6	The system stores feedback in the database and confirms the successful feedback submission.
Alternative Flow			
3	The user enters incomplete or invalid data.	4-A	The system responds with an error message requesting corrections to the form.

Table 4.6: Communication

Name	Communication		
Actors	Brand, Influencer		
Summary	The users shall be able to communicate with each other.		
Pre-Conditions	The user must be logged to the system.		
Post-Conditions	The messages are successfully delivered to the intended recipient.		
Special Requirements	The system must ensure message security and privacy.		
Basic Flow			
Actor Action		System Response	
1	The user clicks the chat button.	2	The system displays the chat interface.
3	3 The user types the message or select file to send and clicks the send icon.	4	The system sends message and displays it in the chat window.
Alternative Flow			
3	The user clicks the send icon without network connection.	4-A	The system notifies the user that message could not be delivered and suggests retrying.

Table 4.7: Brand Registration Process

Name	Sign up as brand		
Actors	Brand		
Summary	A new user shall be registered in the database as a brand.		
Pre-Conditions	The user must not already be registered in the database.		
Post-Conditions	The user profile is created and stored in the system's database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to sign up as brand section.	2	The system displays the sign up as brand page.
3	3 The user enters email and password.	4	The system validates the data, sends OTP and prompts the user to enter the OTP.
5	The user enters the OTP.	6	The system verifies the OTP and asks for business details.
7	The user provides the required business details.	8	The system verifies the business details, stores it in the database and notifies successful profile creation within an hour.
Alternative Flow			
3	The user enters invalid email.	4-A	The system responds with an error message: Incorrect data entered.
5	The user enters incorrect OTP.	6-A	The system responds with an error message: Incorrect OTP entered.
7	The user provides incomplete or inaccurate business details.	8-A	The system responds with an error message: Business verification failed and suggests retrying

Table 4.8: View project

Name	View project		
Actors	Influencer		
Summary	The user shall access the details of the project.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system displays the selected project, including all the relevant details.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the homepage.	2	The system displays the homepage of the application.
3	The user selects the desired project.	4	The system retrieves the details of the project from the database and displays it.
No Alternative Flow			

Table 4.9: Influencer Registration Process

Name	Sign up as influencer		
Actors	Influencer		
Summary	A new user shall be registered in the database as an influencer.		
Pre-Conditions	The user must not already be registered in the database.		
Post-Conditions	The user profile is created and stored in the system's database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to sign up as influencer section.	2	The system displays sign up as influencer page.
3	The user enters email and password.	4	The system validates the data, sends OTP and prompts the user to enter the OTP.
5	The user enters the OTP.	6	The system verifies the OTP and prompts for social media account authentication.
7	The user provides details for social media account authentication.	8	The system verifies the account authentication and displays form for portfolio and payment details.
9	The user provides portfolio and payment details.	10	The system verifies the details, stores details in the database and notifies successful profile creation.
Alternative Flow			
3	The user enters invalid email.	4-A	The system responds with an error message: Incorrect data entered.
5	The user enters incorrect OTP.	6-A	The system responds with an error message: Incorrect OTP entered.
7	The user provides invalid details for social media authentication.	8-A	The system responds with an error message: Social media authentication failed and suggests retrying.

Table 4.10: View Influencer

Name	View influencer		
Actors	Brand		
Summary	The user shall access the detailed profile of the influencer.		
Pre-Conditions	The user must be logged in to the system and influencer's profile must exist in the database.		
Post-Conditions	The system displays the profile of the selected influencer, including all the relevant details.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the homepage.	2	The system displays the homepage of the application.
3	The user selects the desired influencer.	4	The system retrieves the detailed profile of the specific influencer from the database and displays it.
No Alternative Flow			

Table 4.11: Create project

Name	Create project		
Actors	Brand		
Summary	The user shall create a new project including its requirements and prices.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system adds the new project to the database and makes it available for relevant processes.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to “Create Project” section.	2	The system displays the form for project creation.
3	The user fills out the necessary fields.	4	The system validates the entered data.
5	The user clicks the “Submit” button.	6	The system stores the new project in the database and confirms the successful creation of the project to the user.
Alternative Flow			
3	The user enters invalid data.	4-A	The system responds with an error message: Incorrect data entered.

Table 4.12: Edit project

Name	Edit project		
Actors	Brand		
Summary	The user shall be able to edit an existing project in the system.		
Pre-Conditions	The user must be logged in and the project must exist in the database.		
Post-Conditions	The system updates the existing project in the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the “Projects” section.	2	The system displays all the projects of the user.
3	The user clicks edit icon in front of the project.	4	The system displays the existing project details.
5	The user edits the necessary fields.	6	The system validates the entered data.
7	The user clicks the “Edit” button.	8	The system updates the project details in the database and confirms the successful update of the project to the user.
Alternative Flow			
3	The user enters invalid data.	4-A	The system responds with an error message: Incorrect data entered.

Table 4.13: Delete project

Name	Delete project		
Actors	Brand		
Summary	The user shall be able to delete an existing project from the database.		
Pre-Conditions	The user must be logged in and the project must exist in the database.		
Post-Conditions	The system deletes the specified project from the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the “Projects” section.	2	The system displays all the projects of the user.
3	The user selects the specific project.	4	The system displays the project details.
5	The user clicks the delete icon.	6	The system displays a confirmation pop up.
7	The user clicks the “Confirm” button.	8	The system deletes the project from the database.
No Alternative Flow			

Table 4.14: Manage offers

Name	View project		
Actors	Influencer		
Summary	The user shall manage the offer by either accepting or rejecting.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system updates the offer status in the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the offers section.	2	The system retrieves the offers from the database and displays them.
3	The user clicks accept or reject icon in front of the specific offer.	4	The system updates the offer status in the database and confirms the successful update.
No Alternative Flow			

Table 4.15: Manage individual proposal

Name	Manage individual proposal		
Actors	Brand		
Summary	The user shall be able to accept or reject a specific proposal.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system updates the proposal status as accepted or rejected.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user selects the desired proposal.	2	The system retrieves the proposal details from the database and displays it.
3	The user clicks the accept or reject icon in front of the specific project.	4	The system updates the proposal status in the database and confirms the successful update.
No Alternative Flow			

Table 4.16: Offer collaboration

Name	Offer collaboration		
Actors	Brand		
Summary	The user shall send an offer to the influencer for collaboration.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system sends an offer to the specific influencer for collaboration.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user clicks a specific project.	2	The system retrieves the project details from database and displays it.
3	The user clicks the “Offer” button.	4	The system displays a list of influencers.
5	The user clicks the send icon in front of specific influencer.	6	The system sends an offer to the specific influencer and updates the database.
No Alternative Flow			

Table 4.17: Apply to project

Name	Apply to project		
Actors	Influencer		
Summary	The user applies to a project by submitting a proposal.		
Pre-Conditions	The user must be logged in and the project must be accepting proposals.		
Post-Conditions	The system saves the proposal against a project in the database.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user selects a specific project.	2	The system retrieves the project details from the database and displays it.
3	The user clicks the “Apply” button in front of the project.	4	The system displays a window for creating proposal.
5	The user creates proposal and clicks the “Submit” button.	6	The system stores the proposal in the database and notifies the user of successful submission.
No Alternative Flow			

Table 4.18: Report project

Name	Report project		
Actors	Influencer		
Summary	The user reports a project by providing reason.		
Pre-Conditions	The user must be logged in and working on that project.		
Post-Conditions	The project will be reported and admin will be notified.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user selects a specific project.	2	The system displays the project details retrieved from the database.
3	The user clicks the “Report” button.	4	The system displays a window for providing the reason.
5	The user provides the reason and clicks the submit button.	6	The system stores data in the database and notifies the user of successful submission.
No Alternative Flow			

Table 4.19: View all proposals

Name	View all proposals		
Actors	Brand		
Summary	The user shall be able to view all the proposals of a project.		
Pre-Conditions	The user must be logged in to the system.		
Post-Conditions	The system displays all the proposals submitted for a project.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	The user navigates to the proposals section of a specific project.	2	The system retrieves all the proposals from the database and displays them.
No Alternative Flow			

4.7 Hardware and Software Requirements

The hardware and software requirements of the application are mentioned below.

4.7.1 Hardware Requirements

The following are the hardware requirements for the project:

- Desktop PC/Laptop
- Internet connection is required.

4.7.2 Software Requirements

The following are the software requirements for the project:

- **Frontend:** Next JS
- **Backend:** Nest JS, Gemini API
- **Database:** MongoDB
- **Code Editor:** Integrated Development Environment (IDE) for development
- **Git:** Version control system

4.8 Graphical User Interface

This section displays GUI screenshots of application along with their description.

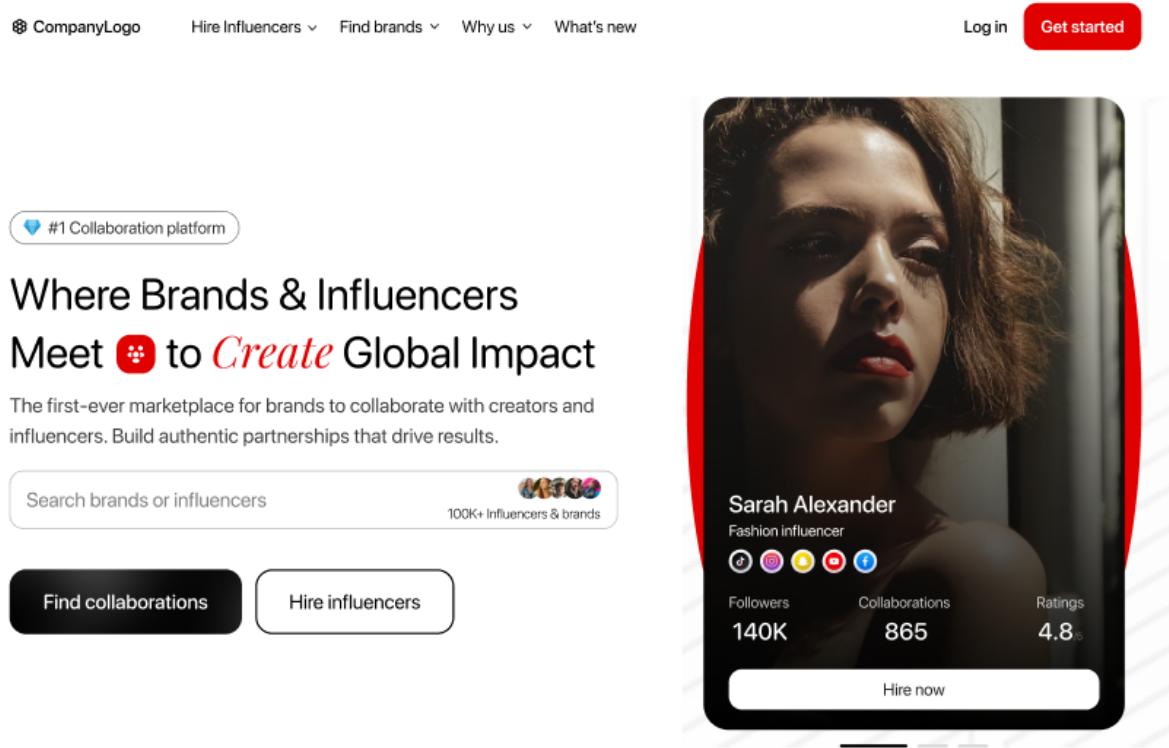


Figure 4.1: Landing Screen

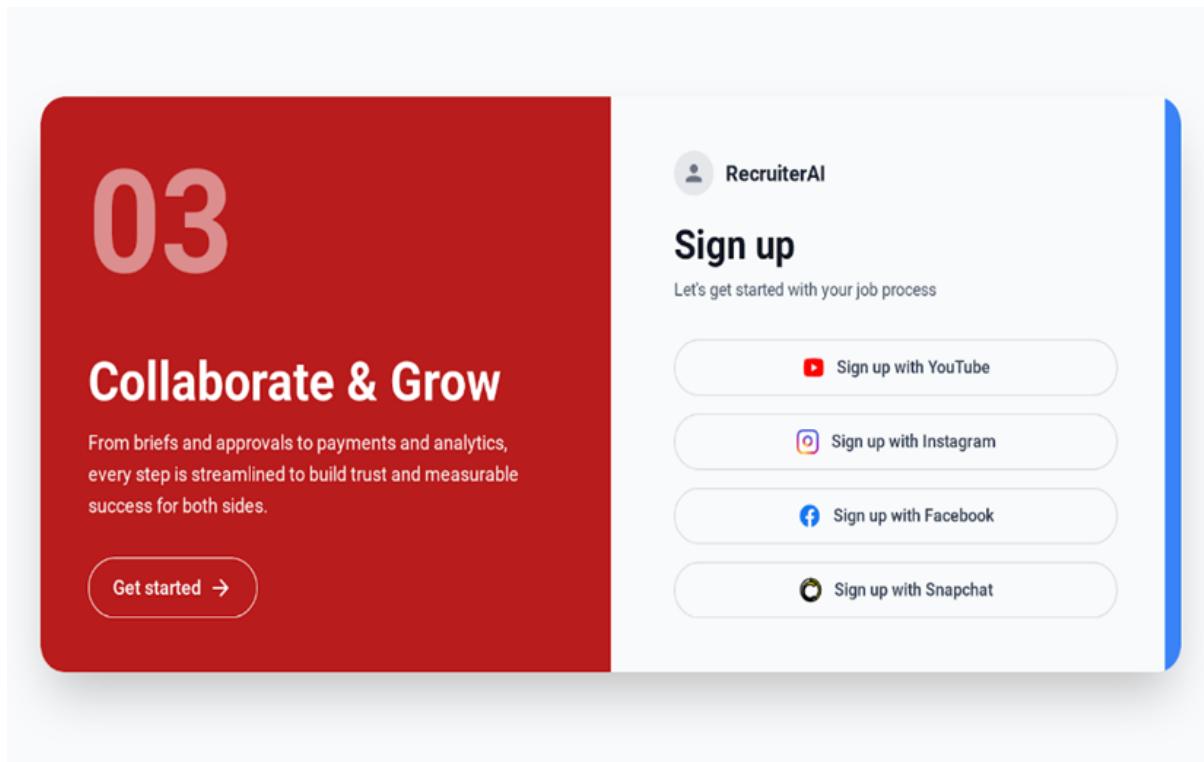


Figure 4.2: SignUp Screen

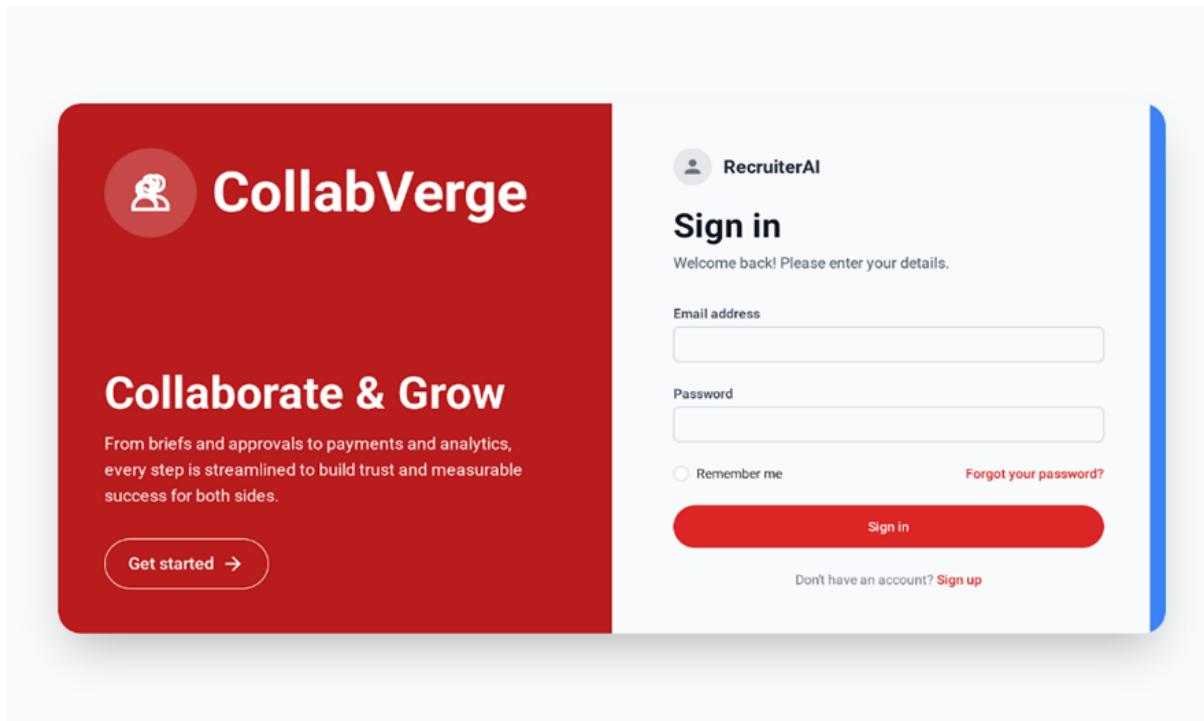


Figure 4.3: Login Screen

The image shows the influencer profile page for @jane_doe. At the top, there's a navigation bar with 'CompanyLogo', 'Influencers', 'Proposals', 'Offers', 'Messages' (with a notification count of 4), and a user profile for 'Anderson James Full-Stack Developer'. The main area starts with a 'Welcome back, Alex!' greeting and a message: 'Continue finding brand deals. Your next great collaboration is just a few clicks away.' Below this are four performance metrics: 'Active Deals 03', 'Total Earnings \$10K', 'Pending Requests 09', and 'Projects Completed 25'. The next section is titled 'Influencers for you' and features a search bar with placeholder text 'Search anything....'. A detailed profile card for @jane_doe is shown, including her profile picture, handle '@jane_doe', title 'Fashion & Lifestyle Creator', follower count '1.2M Followers', subscriber count '500k Subscribers', and platform links for Instagram, TikTok, and YouTube. It also shows a short bio about a summer running collection and a rating of '★ 4.9 (1.2k reviews) • USA'. A 'View Profile' button is at the bottom right of the card.

Figure 4.4: HomePage of Brand

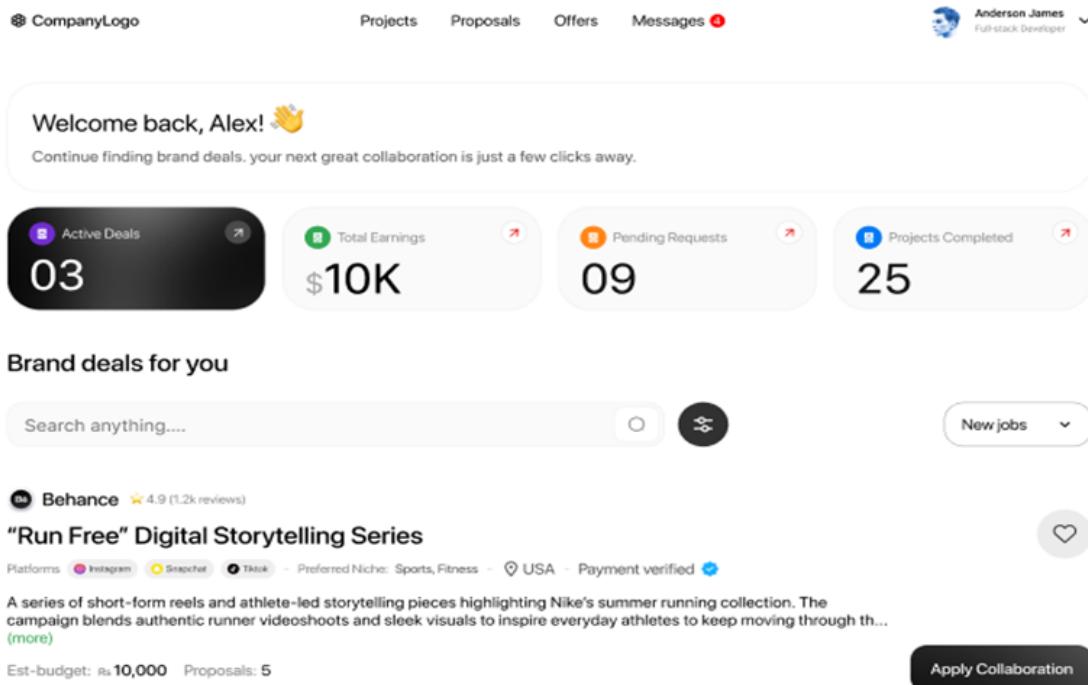


Figure 4.5: HomePage of Influencer

Posted 5 hours ago

"Run Free" Digital Storytelling Series

Deadline: Jan-25-2025 | Joining date: Jan-25-2025 | Location: USA

Description

Nike is seeking passionate fitness and lifestyle influencers to promote our Summer Running Collection 2025. This campaign focuses on authentic, high-energy content that inspires audiences to embrace movement and outdoor workouts.

Creators will produce short-form videos and engaging social media posts across Instagram, TikTok, and YouTube Shorts to showcase Nike's latest running shoes and apparel in real-life, motivating scenarios.

Influencers will be expected to:

- Create workout reels, running vlogs, or lifestyle content featuring Nike products
- Share personal stories or routines that align with the theme "Run Free"
- Post content in line with Nike's brand values of energy, freedom, and authenticity
- Deliver content according to the agreed-upon timeline and format

Behance

★★★★★ 4.8 (482 reviews)

Payment verified | Contact details verified

3 brand deals posted | 34% hire rate

Budget spent: \$50,000 | Member since 2025

Apply Collaboration

Figure 4.6: Project Screen

4.9 Database Design

This section provides an overview of our database design including ER diagram and data dictionary.

4.9.1 ER Diagram

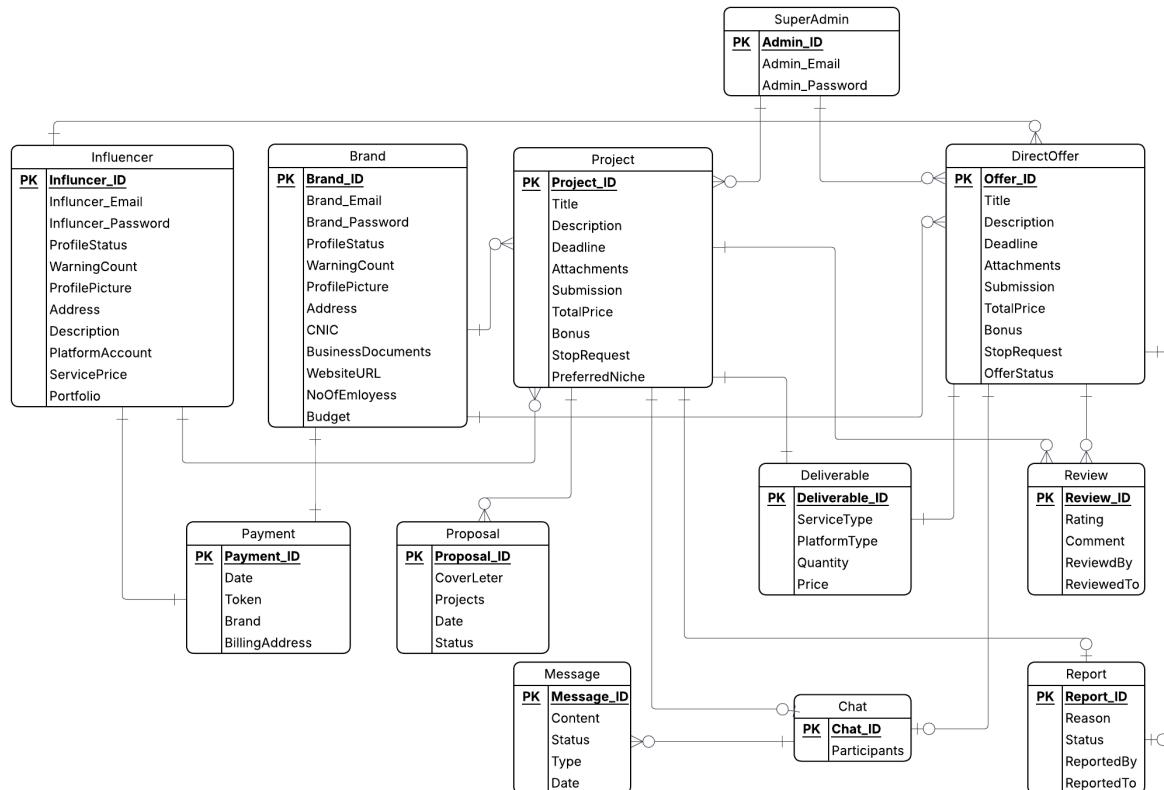


Figure 4.7: Entity Relationship Diagram

4.9.2 Data Dictionary

Table 4.20: Data Dictionary

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
SuperAdmin	Admin_ID	String	No	Project, DirectOffer	1 to M, 1 to M	ID of Super Admin (Primary Key)

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	Admin_Email	String	No	-	-	Email address of Super Admin
	Admin_Password	String	No	-	-	Password of Super Admin
Influencer	Influencer_ID	String	No	Project, Payment	1 to M, 1 to 1	ID of influencer (Primary Key)
	Influencer_Email	String	No	-	-	Email address of influencer
	Influencer_Password	String	No	-	-	Password of influencer
	ProfileStatus	String	No	-	-	Status of profile (e.g., active, suspended)
	WarningCount	Integer	No	-	-	Number of warnings
	ProfilePicture	String	Yes	-	-	Profile picture of influencer
	Address	String	No	-	-	Address of influencer
	Description	String	No	-	-	Description about influencer

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	PlatformAccount	Object	No	-	-	Linked social media accounts (e.g., YouTube, Facebook)
	ServicePrice	Object	No	-	-	Price of services (e.g., reel, post)
	Portfolio	Object	Yes	-	-	Portfolio of influencer
Brand	Brand_ID	String	No	Project, Payment	1 to M, 1 to 1	ID of brand (Primary Key)
	Brand_Email	String	No	-	-	Email address of brand
	Brand_Password	String	No	-	-	Password of brand
	ProfileStatus	String	No	-	-	Status of profile (e.g., active, suspended)
	WarningCount	Integer	No	-	-	Number of warnings
	ProfilePicture	String	Yes	-	-	Profile picture of brand
	Address	String	Yes	-	-	Address of brand

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	CNIC	String	No	-	-	CNIC of brand owner
	BusinessDocuments	Object	No	-	-	Legal documents of brand
	Budget	Integer	No	-	-	Budget of brand
	WebsiteURL	String	Yes	-	-	Website of brand
	NoOfEmployees	Integer	No	-	-	Number of employees
Project	Project_ID	String	No	SuperAdmin, Influencer, Brand, Proposal, Chat, Report, Deliverable, Review	M to 1, M to 1, M to 1, 1 to M, 1 to 1, 1 to 1, 1 to 1, 1 to M	ID of project (Primary Key)
	Title	String	No	-	-	Title of project
	Description	String	No	-	-	Details of project
	Deadline	Date	No	-	-	Deadline of project
	Attachments	Object	Yes	-	-	Attached documents
	Submission	String	No	-	-	URL of uploaded work
	TotalPrice	Integer	No	-	-	Total price of project

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	Bonus	Integer	Yes	-	-	Bonus of project
	StopRequest	Object	Yes	-	-	Request to stop project
	PreferredNiche	String	No	-	-	Preferred niche for project
DirectOffer	Offer_ID	String	No	SuperAdmin, Influencer, Brand, Chat, Report, Deliverable, Review	M to 1, M to 1, M to 1, 1 to 1, 1 to 1, 1 to 1, 1 to M	ID of offer (Primary Key)
	Title	String	No	-	-	Title of offer
	Description	String	No	-	-	Details of offer
	Deadline	Date	No	-	-	Deadline of offer
	Attachments	Object	Yes	-	-	Documents attached
	Submission	String	No	-	-	URL of uploaded work
	TotalPrice	Integer	No	-	-	Total price of offer
	Bonus	Integer	Yes	-	-	Bonus of offer
	StopRequest	Object	Yes	-	-	Request to stop offer

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	OfferStatus	String	No	-	-	Status of offer (accepted/rejected)
Payment	Payment_ID	String	No	Brand, Influencer	1 to 1, 1 to 1	ID of payment (Primary Key)
	Date	Date	No	-	-	Date of payment
	Token	String	No	-	-	Token of payment
	Brand	String	No	-	-	Name of payment brand
	BillingAddress	String	No	-	-	Address of payment
Proposal	Proposal_ID	String	No	Project	M to 1	ID of proposal (Primary Key)
	CoverLetter	String	No	-	-	Cover letter of proposal
	Projects	Object	Yes	-	-	Highlighted projects
	Date	Date	No	-	-	Date of submission
	Status	String	No	-	-	Proposal status (accepted/rejected)

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
Deliverable	Deliverable_ID	String	No	Project, DirectOffer	1 to 1, 1 to 1	ID of deliverable (Primary Key)
	ServiceType	String	No	-	-	Type of service (reel, post)
	PlatformType	String	No	-	-	Type of platform (YouTube, Facebook)
	Quantity	Integer	No	-	-	Quantity of deliverables
	Price	Integer	No	-	-	Price of deliverable
Review	Review_ID	String	No	Project, DirectOffer	M to 1, M to 1	ID of review (Primary Key)
	Rating	Integer	No	-	-	Review rating
	Comment	String	No	-	-	Review comment
	ReviewedBy	String	No	-	-	ID of user submitting review
	ReviewedTo	String	No	-	-	ID of collaboration reviewed
Report	Report_ID	String	No	Project, DirectOffer	1 to 1, 1 to 1	ID of report (Primary Key)

Continued on next page

Entity	Attribute	Data Type	Nullable	Relationship To	Relationship Type	Description
	Status	String	No	-	-	Status of report (open/close)
	Reason	String	No	-	-	Reason for report
	ReportedBy	String	No	-	-	ID of user submitting report
	ReportedTo	String	No	-	-	ID of project being reported
Message	Message_ID	String	No	Chat	M to 1	ID of message (Primary Key)
	Content	String	No	-	-	Message content
	Status	String	No	-	-	Message status (pending/seen)
	Type	String	No	-	-	Message type (text/file)
	Date	Date	No	-	-	Date of message
Chat	Chat_ID	String	No	Message	1 to M	ID of chat (Primary Key)
	Participants	Object	No	-	-	IDs of sender and receiver

4.10 Risk Analysis

In this section, some of the risks that are associated with the development, maintenance and scalability of the project are highlighted.

4.10.1 Technical Risks

Working on AI based recommendation algorithms, it is likely that there would be changes and advancements in it in the future that could possibly lead to the application requiring updates. Furthermore, working with third party APIs and development kits of the current age, it is likely that these will become obsolete in the future and have to be replaced. Additionally, the requirements of the application could change in the future, thus asking for a product revamp.

4.10.2 Business Risks

The application might need financing in case it needs to be hosted on the server or cloud. Additionally, there will be need for developers and other resources in the future in order to maintain the application and scale up its scope to add other functionalities.

4.11 Conclusion

In conclusion, this chapter covers the project's Software Requirements specifications in detail. It covers the necessary features, functional and non-functional requirements along with the quality attributes of the application to make it an effective collaboration tool. There is a special emphasis on the key characteristics of the application that it should be easy-to-use, flexible and secure. Use cases and use case description tables illustrate the system's functionalities and user interactions. The ER diagram and data dictionary included in the chapter provides a structured view of the system's data management. The technology stack to be used for building the application is discussed. Furthermore, the potential risks from both the technological and business aspect are discussed.

Chapter 5 High-Level and Low-Level Design

This chapter contains the High and Low level design of the system using various methods. This includes diagrammatic representations of the system through Architecture Diagrams. It will also include an overview of the system and its different components.

5.1 System Overview

CollabVerge is an online platform that is meant to facilitate and fulfill influencer-brand partnerships. It is all about transparency, trust, and efficiency as the system incorporates user validation, AI-driven influencer discovery and escrow-verified payments. It gives both the influencers and the brands the controlled environment in which they can negotiate, interact and carry out marketing campaigns with confidence.

5.1.1 Influencer Discovery and Matching

The platform takes advantage of AI-powered suggestions to match the brands with the most suitable influencers. Combining sophisticated filters based on the data of niche, engagement rate and demographics, one can search and find the influencers based on needs.

5.1.2 Collaboration and Communication

In CollabVerge, communication is done in real-time between the influencers and the brands within the platform. Users are able to talk about the projects, negotiate terms and exchange files. This aspect reduces the third-party reliance and makes all interfaces stay within the platform.

5.1.3 Project Management and Payment Security

This application has a process of inbuilt project management and escrow payment to bring fairness and accountability. Brands can initiate payments after they are sure that their project requirements are met. The influencers will only get the money when the project is completed, which will prevent suspicion between both groups, and minimize payment disputes.

5.1.4 Transparency and Feedback

CollabVerge incorporates an open feedback and rating system in order to uphold credibility and accountability. Since the influencers and brands are able to review each other on the completion of the project,

it builds a trust based ecosystem. Admin verifies the identity of the brands, resolve the disputes in the collaborations.

5.2 Design Considerations

This section describes many issues that should be considered before finalizing a complete design solution. These are essential to ensure that the end user does not face any problem while using the application.

5.2.1 Assumptions and Dependencies

The design of CollabVerge is predicated on several assumptions and dependencies.

5.2.1.1 Related Software and Hardware

It is assumed that users will have access to basic computer hardware and stable internet connection. They would also be having stable versions of common browsers like Google Chrome/Mozilla Firefox or Safari in their devices.

5.2.1.2 Operating Systems

The application is designed to be compatible with major operating systems such as Windows, macOS, and Linux.

5.2.1.3 End-User Characteristics

It is supposed that users have basic digital literacy and the knowledge of navigating web application. The presence of active and verifiable social media accounts is a requirement to act as an influencer, whereas the brands need to provide valid business documentation during registration.

5.2.1.4 Possible and Probable Changes in Functionality

The Social Media Platforms are constantly changing and social media APIs and digital marketing are constantly being updated. CollabVerge architecture will be modular and flexible, enabling the addition of multiple other platforms, analytics solutions or other features in the future without affecting the existing functionality.

5.2.2 General Constraints

The system possesses a number of constraints and requirements that are very significant to the system design and functionality. The constraints will ensure that there is reliability, security, and efficiency in the application which will further ensure that the application is not disruptive towards the standards and the expectations of the users.

5.2.2.1 Hardware or Software Environment

The system requires a stable internet connection and supported browser version. A good machine is necessary to ensure speed and efficiency. The application's performance is dependent on the consistent availability of these resources and any fluctuations could affect the system's functionality and user experience.

5.2.2.2 End-user Environment

The users should possess a browser that is up to date either on a computer or mobile. The basic ability in the field of web application use is required.

5.2.2.3 Interoperability Requirements

The system should also be well integrated with other external features like APIs, databases and authentication systems. It should integrate into third party platforms as easily as possible where needed.

5.2.2.4 Security Requirements

Everything involves data transmission via HTTPS. The user personal information is protected and data is not accessed by unauthorized users. Information that is critical is coded to ensure the privacy of the users.

5.2.2.5 Network Communication Requirements

The internet connection should also be stable since this system will rely on external APIs and cloud-services. Any issue could affect the performance of the platform.

5.2.2.6 Verification and Validation Requirements

The system also needs to undergo frequent testing such as functionality test, integration as well as user acceptance test to verify that all is working properly and efficiently.

5.2.3 Goals and Guidelines

To ensure the efficiency, reliability, and usability of the system, the application is based on the multiple important objectives and principles. It is a system that is designed in the principle of KISS (Keep It Simple, Stupid). This contributes to reducing the complexity of writing and maintaining the application as well as in its usage. The interface is maintained to be simple and easy to use by end users so that they can navigate and perform tasks with ease. The idea is to give it a smooth and comfortable experience. This system pays attention to quick responsiveness as well as optimal utilization of resources. It is designed in a way that is able to support an increment in the number of users and data without compromising the performance. The code is well organised in such a way that additions and changes can be easily implemented in the future without breaking the current features.

5.2.4 Development Methods

The system is built on the combination of the existing software development models to make it highly dynamic. Agile methodology is implemented to help to facilitate the support of the iterative creation and appropriate regulation of the arising demands. Scrum framework will be used to break down the work into sprints, the team work process is supported and work progress is communicated through frequent meetings. This will guarantee that the communication and provision of working modules is also transparent. The next significant portion of the process that needs to be ensured further is Continuous Integration and Continuous Deployment to have the new features and changes integrated into the process and deploy them without imposing any impact on the user experience. By joining these together, the nature of the development process is well-organized and user-friendly in a way that the resulting product in the end is scalable and aligned to the project goals.

5.3 System Architecture

CollabVerge is developed with a modular and layered architecture that ensures flexibility, scalability, and smooth interaction between its various components. The system's design covers both internal modules and external integrations. A clear architecture diagram is provided to show how different parts of the system connect and work together.

5.3.1 High-Level Partitioning

The system has been decomposed into major four layers, each responsible for specific functions.

- **Presentation Layer:** In Front-end we would use Next.js, for user interactions and session maintenance.

- **Business Logic Layer:** The backend will be built on Nest JS, for implementing all of the application logic.
- **Data Persistence Layer:** MongoDB is used for data storage.
- **Integration Layer:** This layer would include the usage of LLM and social media platforms and payment APIs.

5.3.2 Component Collaboration

All the layers are interconnected in the system. Presentation Layer shares the same data with the Business logic layer through RESTful APIs. Business Logic Layer is associated with the Database where the information is stored and read and communicates with the third-party services of social media and payment. Integration Layer supports the real-time data transfer, thus providing a sound functionality and coordination of each of the modules.

5.3.3 Rationale for Decomposition

The chosen architecture helps maintain modularity which makes the system easy to update, expand, and operate. Each of the layers will be assigned a particular task that the layer is intended to make sure that in the future, an update or replacement could be made without causing interference to the overall system. The complexity of such a structure is selected because it will provide a clearly divided scope of work and help in its successful integration with AI and external APIs.

5.3.4 System Architecture Diagram

The interaction between the main layers of CollabVerge is demonstrated through the diagram. It also illustrates the data movement between the end user interface and the backend including database and other services.

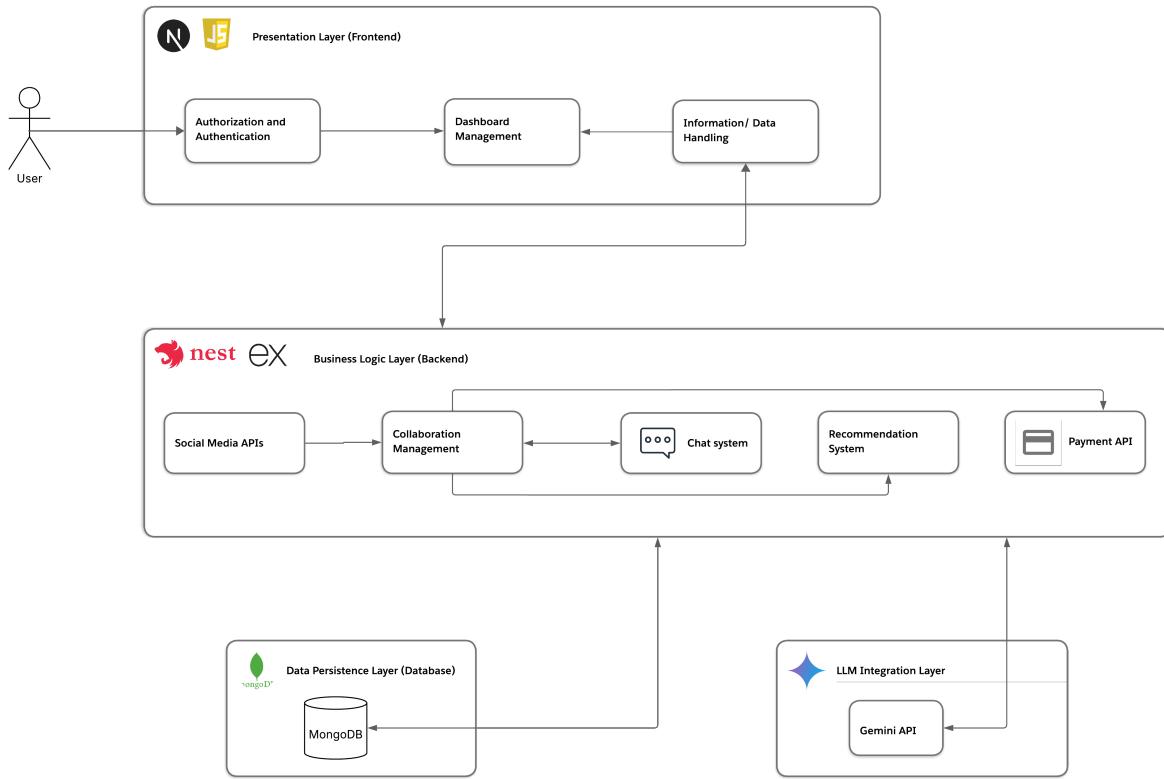


Figure 5.1: System Architecture Diagram

5.3.5 Subsystem Architecture

The following explains the details of the Low-Level Components in each Layer.

5.3.5.1 Presentation Layer Subsystem

The frontend is developed based on Next.js (React) and serves as a user interface. It enables influencers, brands and administrators to connect with the system. In this subsystem identity of the user and presentation of information and communication is identified. It interoperates with the backend via added security over RESTful application and in real-time via Web Socket.

5.3.5.2 Business Logic Layer Subsystem

The backend is built with Node.js serving as the core of the application. It manages all the business logic and bridges the database, APIs, and AI integration. Authentication, Authorization and communicating is also done by this subsystem.

5.3.5.3 Database Subsystem

The database system is also a sub system, which is utilized to handle structured and unstructured information in the database system such as user profile, chat discussions, campaign information and analytics using MongoDB database. The Mongoose is an ORM that is deployed to simplify the process of working with the data and the information which is to be maintained. The data are grouped into sets that can be searched in a short amount of time supporting the scalability as the system grows.

5.3.5.4 LLM Integration Subsystem

The subsystem addresses the relationship with the third party API of Gemini. It is responsible for the processing of data obtained from the backend, using Large Language Model to give output that is required.

5.4 Architectural Strategies

The section includes the strategies that affect the overall organization of the system and its higher-level structures.

5.4.1 Choice of Technologies

- **Next.js for Front-end:** Next.js will be the one that will be preferred as a front-end because it is used in order to create a fast, dynamic, and responsive web interface. It provides server-side rendering and routing applications, which augment its performance and search engine optimization.
- **NestJS for Back-end:** The backend is developed using NestJS because of its fantastic clean and modular architecture. Due to the fact that it supports TypeScript, it can be easily integrated with APIs and databases. It can be maintained and scaled as well for effective management of many user requests.
- **MongoDB Database:** The reason behind the choice of MongoDB is flexibility and the opportunity to operate with unstructured data of large scale. It reads and writes quickly and it is coded with the modern web applications.

5.4.2 Future Plans for Extension or Enhancement

It is scalable and modular and more social media platforms may be easily added to the system in the future. The SOLID principles, specifically, the Open-Closed Principle that permits the introduction of new functionality without the requirement to make any alterations to the existing code.

5.4.3 Version Control

Project codebase management involves the use of Github repositories. Team members make the contribution to the branches and pulling requests and all changes must be reviewed by at least two developers before they can be merged. It will result in clean, safe and well checked code.

5.4.4 Concurrency and Synchronization

In the front-end, the background task such as API call is asynchronous function calls which ensures that the background task does not interrupt the user. Parallel processing also enables multiple users to do multiple tasks simultaneously in the background. NestJS js offers automatic features for effective handling of the simultaneous requests.

5.5 Domain Model/Class Diagram

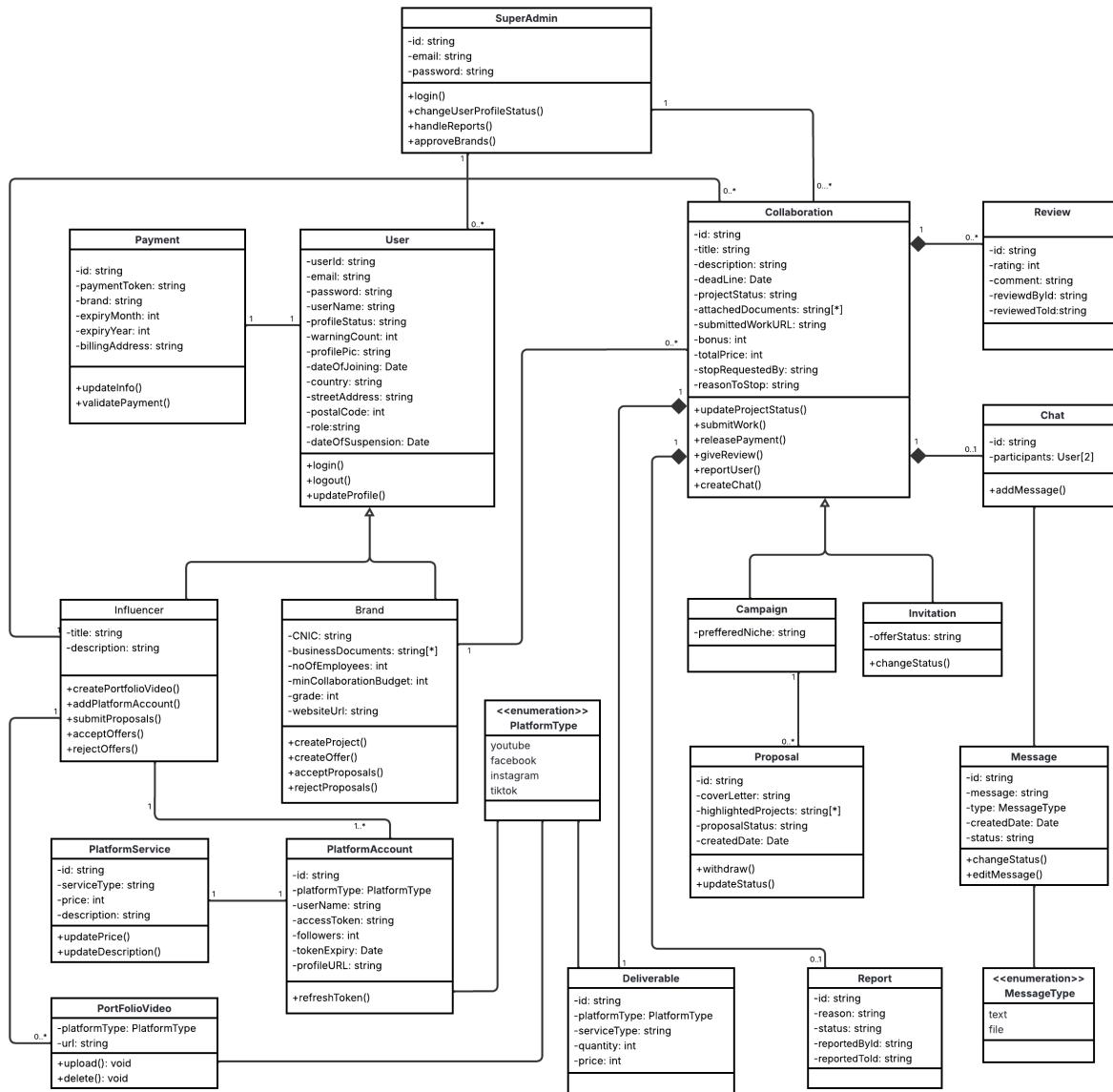


Figure 5.2: Class Diagram

5.6 Policies and Tactics

To ensure scalability, maintainability, and performance of the system, several industry-standard practices and design policies are followed throughout the software development life cycle. These practices aim to improve code quality, ensure reliability, and streamline collaboration among developers.

5.6.1 Coding Guidelines and Conventions

The project involves two significant parts that involve the backend and the frontend. Backend is built using the best practices of TypeScript, and is written using NestJS. The frontend is built using Next.js and follows standards for readability and reusability. Industry Conventions and best practices are employed to ensure that the code written is well documented, quality and clean code. The IDE choice shall be VS Code due to the cross-compatibility and lightweight run time

5.6.2 Testing Strategies

We will implement all types of testing which would include unit testing, integration testing, and end-to-end testing. This would ensure complete testing coverage of the application at different levels. We will use both white and black box testing techniques such as decision tables for black box and white box techniques such as UI, API and Unit testing.

5.6.3 Continuous Integration and Deployment

CI/CD pipelines are utilized for frequent code integration and automating testing and deployment, enhancing development cycle efficiency. GitHub will be used as the code repository with continuous additions of code to it and merges in the main branch whenever the code is reviewed to ensure that the new code is continuously integrated in the main stream.

5.6.4 Error Handling and Recovery

Robust error handling and logging mechanisms are implemented to ensure system stability and quick recovery in case of failures.

5.6.5 User Interface Design

Responsive design principles using Next JS is adopted to ensure a seamless experience across different devices. The web application is made responsive for different screen sizes to ensure a smooth user experience and seamless experience for user irrespective of the device used to access the application.

5.6.6 Database Management

ORM in MongoDB is used for database interactions, simplifying queries and reducing SQL injection vulnerabilities.

5.7 Conclusion

CollabVerge is a web based application designed to facilitate the various stages of the collaboration process between brands and influencers. Application will be built while considering multiple design considerations, industry standards and policies to ensure ease of use, ease of learning. Furthermore, carefully designed architecture ensures modularity in the system.

Chapter 6 Implementation and Test Cases

This chapter focuses on the development aspect of our application. We have integrated several major functionalities into the prototype, each focusing on an important factor of the collaboration process between brands and influencers.

6.1 Implementation

The implementation details of the components designed in the application are given below.

6.1.1 Authentication

The Authentication component is an integral part of the system. This is the component that ensures secure access for users and prevents the application from unauthorized users. This system is to ensure that the user data remains safe, and the integrity of the system remains intact. The front end for this is built using a Next.js component for the Login screen, while the back end is in Nest.js and the database being used is MongoDB. For influencers, the system uses social media platform APIs to authenticate their accounts. For brands, official business documents are uploaded securely to cloud storage after verification from admin. The user credentials are stored in the database in an encrypted form to ensure that no one can have unauthorized access to them.

6.1.2 Collaboration Management

The Collaboration Management module facilitates end-to-end collaboration process between brands and influencers. Brands can create campaigns by providing campaign details or send direct invitations to specific influencers through the frontend form developed in Next.js. This information is then stored in a MongoDB collection. Influencers interact through the frontend to submit proposals and accept or reject the invitations which is handled by server-side endpoints. The system ensures that brands cannot go below the minimum budget and influencers cannot exceed their maximum allowed rates. These rates are set up by the system using the rule-based approach depending on the type of the platform, number of followers and other profile metrics. Once a collaboration is finalized, the module triggers a third-party payment API, where funds are held in an escrow account until project completion. Upon completion of the collaboration, the funds are transferred to the respective party's account. Both brands and influencers can also submit feedback after concluding the project improving the transparency.

6.1.3 Recommendation System

The recommendation system allows the influencers and brands to access personalized dashboards. Using the hybrid approach that combines content based filtering and collaborative filtering, the system first retrieves the data of projects, brands and influencers from MongoDB database. For collaborative filtering, the system also creates a matrix to map the users to their previous projects. This data is then converted into vector embeddings using transformer based embedding model. To find recommendations the system finds the cosine similarity between user embedding and project embedding stored in the vector database and then combines both similarity scores.

The hybrid approach is used because content based filtering solves the cold start problem for new users and collaborative filtering improves accuracy by discovering patterns that may not be obvious from content filtering alone. By combining both methods, the system provides context aware and more accurate recommendations. Finally, the projects are ranked on the basis of the final hybrid similarity score, and the top results are displayed on the dashboard.

6.1.4 Communication

The Chat module in CollabVerge enables real time communication between brands and influencers. It is implemented using WebSockets, which provides full duplex communication channels over a single, long-lived connection. This enables real-time message exchange without the need for continuous page refreshes. A WebSocket client is integrated into the Next.js component. When a user sends a message, it is emitted to the server, and any responses are immediately received and displayed in the chat window. On the back end, Nest.js with Socket.IO is used to handle web socket connections. To ensure security, the system uses json web token authentication for validating users before allowing them to join chat. Messages sent within the chat are stored in a MongoDB database to maintain chat history.

6.2 Conclusion

The major functionalities provided by our application include user authentication, collaboration management, fair compensation standards, secure communication, escrow-based payment system and a recommendation system. To ensure proper implementation, the procedural details of these components are provided, especially related to the backend algorithms.

Chapter 7 Conclusion and Future Work

Our web-based application CollabVerge is being designed to streamline the collaboration process between brands and influencers by harnessing the capabilities of web development technologies and machine learning. The major task is to streamline the end-to-end collaboration process at various stages like collaboration management, fair compensation standards, secure communication, escrow-secured payment, and feedback mechanism. Our goal is to make the entire process efficient and transparent. In this phase, we have developed a prototype and successfully implemented some important functionalities of the application.

The prototype aligns well with our initial objectives. Features like brands and influencers authentication, collaboration management, and fair compensation standards are included. However we have limited the scope of our application to a simple responsive web application, and we have excluded mobile application as it is not a part of our scope. One of the major challenges faced was establishing a fair compensation standard to ensure that price demands of both brands and influencers are according to their profile metrics.

Looking forward, in FYP-2, our plan is to expand the application's features and implement all of the functional requirements including the conflict resolution functionality of the admin, escrow-secured payment system, and chatbot. We also aim at conducting extensive testing for robustness, and other parameters focusing on improving the overall user experience.

In conclusion, we have formed the proof of concept needed before building the entire application. The work done so far has helped us to understand the potential complexities that could be faced and the different strategies that could be deployed to solve them. The goals and objectives of the application are clear, and the prototype helps in demonstrating the practical feasibility of using web development and machine learning for the collaboration process.