Arab Academy for Science, Technology, and Maritime Transport
College of Computing and Information Technology
Smart Village

UNIMATCH

Software Engineering Project

A Thesis submitted in partial fulfillment of the requirements of
Software Engineering Project

By

Mohamed Tamer

Mahmoud El Sayed

Mahmoud Shaarawy

Ahmed Hossam

College of Computing and Information Technology, AASTMT, 2023

Supervised By

Ahmed Gmail

Cairo, 2024

Abstract

UniMatch is a comprehensive university admission system designed to empower students in their pursuit of higher education opportunities. With a user-centric approach, UniMatch provides a centralized platform where students can explore universities worldwide, access detailed information about programs, scholarships, and financial aid options, and receive personalized recommendations tailored to their academic background, interests, and career goals. By simplifying the university admission process and addressing common challenges such as complex application procedures and limited access to information, UniMatch aims to democratize access to education and foster diversity, equity, and inclusion in higher education. With a commitment to data security, privacy protection, and continuous improvement, UniMatch strives to provide a seamless and empowering experience for students navigating the university admission journey.

Contents

List of Figures

Chapter 1

Introduction

In this chapter, we embark on a comprehensive exploration of UniMatch, a revolutionary university admission system aimed at empowering students worldwide in their pursuit of higher education opportunities. Through a series of interconnected sections, we delve into the fundamental aspects of UniMatch, beginning with an examination of its underlying motivations. We then proceed to articulate the challenges addressed by UniMatch through a clear problem statement, followed by a delineation of its objectives, complexities, constraints, and standards. Finally, we elucidate the overarching vision and mission guiding UniMatch's endeavors, providing a holistic framework for understanding its strategic objectives and operational principles. Together, these sections form the foundation upon which UniMatch's transformative impact in the realm of higher education is built, underscoring its commitment to accessibility, innovation, and ethical excellence.

1.1 Motivation

In an era of dynamic educational choices, UNIMatch serves as a vital tool, driven by the understanding that navigating university admissions can be complex. Our system simplifies this process by offering students a comprehensive platform to discover universities that match their aspirations, preferences, and financial circumstances. UNIMatch provides essential insights into acceptance rates, expenses, discounts, and scholarships, empowering students to make informed decisions with confidence and ease.

1.2 Problem Statement

- Students face challenges in finding suitable universities and financial aid options after high school.
- Lack of centralized information leads to difficulty in accessing accurate and up-to-date data about universities and scholarships.
- Complex admission processes and varying eligibility criteria further complicate the university search and application process.
- UniMatch aims to address these challenges by providing a comprehensive platform that simplifies the university admission process and helps students find suitable options based on their preferences and circumstances.

1.3 Objectives

- Provide accurate and up-to-date information about universities, programs, scholarships, and financial aid options.
- Offer personalized recommendations based on users' academic background, interests, preferences, and career goals.
- Simplify the university admission process by providing guidance and support throughout the journey from exploration to enrollment.
- Foster diversity, equity, and inclusion in higher education by addressing barriers to access and supporting underrepresented student populations.
- Empower educators, counsellors, and institutions with tools and resources to enhance advising capabilities and improve student outcomes.
- Uphold the highest standards of data security, privacy, and ethical conduct to safeguard user trust and confidence.
- Continuously evaluate and enhance the UniMatch platform based on user feedback, emerging trends, and best practices in education technology.

1.4 Problem Complexity

- Comprehensive Database: UniMatch requires a robust database containing extensive information about universities, programs, admissions requirements, scholarships, and financial aid options.
- Personalized Recommendations: Developing algorithms and systems to provide personalized recommendations based on users' profiles and preferences is complex.
- Integration of Technologies: UniMatch integrates various technologies, such as data analytics, machine learning, and recommendation systems, to deliver personalized experiences and streamline processes.
- User Interface Design: Designing an intuitive and user-friendly interface that caters to diverse user needs and preferences requires careful consideration and testing.
- Compliance with Regulations: Ensuring compliance with legal and regulatory requirements, such as data protection laws and educational standards, adds complexity to the development and operation of UniMatch.

1.5 Constraints

- Contractual Agreements: Establishing clear agreements with universities and scholarship providers regarding data usage, revenue sharing, and other terms of partnership is crucial.
- Government Policies: Staying informed about government policies related to education, immigration, and technology is essential to ensure compliance and adapt to regulatory changes.
- Legal Compliance: Budgeting for legal expenses associated with compliance efforts, such as drafting agreements, conducting audits, and addressing disputes, is necessary to mitigate legal risks and maintain trust.

- Cost Management: Managing costs associated with platform development, maintenance, and operation requires careful budgeting and resource allocation to ensure sustainability and scalability.

1.6 Standards

- User-Friendly Interface: UniMatch prioritizes usability and accessibility, ensuring that the platform is easy to navigate and intuitive for users of all backgrounds and abilities.
- Comprehensive Database: The platform maintains a comprehensive database of universities, programs, scholarships, and financial aid options, ensuring that users have access to accurate and up-to-date information.
- Personalized Recommendations: UniMatch leverages user data and preferences to provide tailored recommendations that align with users' academic goals, interests, and circumstances.
- Security and Privacy: The platform adheres to industry standards and best practices for data security, privacy protection, and ethical conduct, safeguarding user information and ensuring trust and confidence.
- Continuous Improvement: UniMatch continuously evaluates and enhances its platform based on user feedback, emerging trends, and advancements in education technology, ensuring ongoing relevance and effectiveness.

1.7 Feasibility Study and Business Canvas

Feasibility Study:

1. Introduction:

The feasibility study aims to assess the viability of UniMatch, a university admission system designed to streamline the application process for students worldwide. UniMatch seeks to address the complexities and challenges associated with university admissions by providing a user-friendly platform for exploring universities, accessing information, and receiving personalized recommendations. This study will evaluate the technical, marketing, and financial aspects of UniMatch to determine its feasibility and potential impact in the education technology landscape.

2. Objectives:

Evaluate the technical feasibility of UniMatch, including its compatibility with existing systems and infrastructure.
Assess the market demand for UniMatch and identify key stakeholders and competitors in the university admission space.
Conduct a cost-benefit analysis to determine the financial viability of developing and implementing UniMatch.

3. Technical Feasibility:

Assess the availability of resources, expertise, and technology required to develop and maintain UniMatch.
Evaluate the scalability, security, and performance of UniMatch to ensure compatibility with varying user demands and system requirements.
Identify any technical challenges or limitations that may impact the successful implementation of UniMatch.

4. Marketing Feasibility:

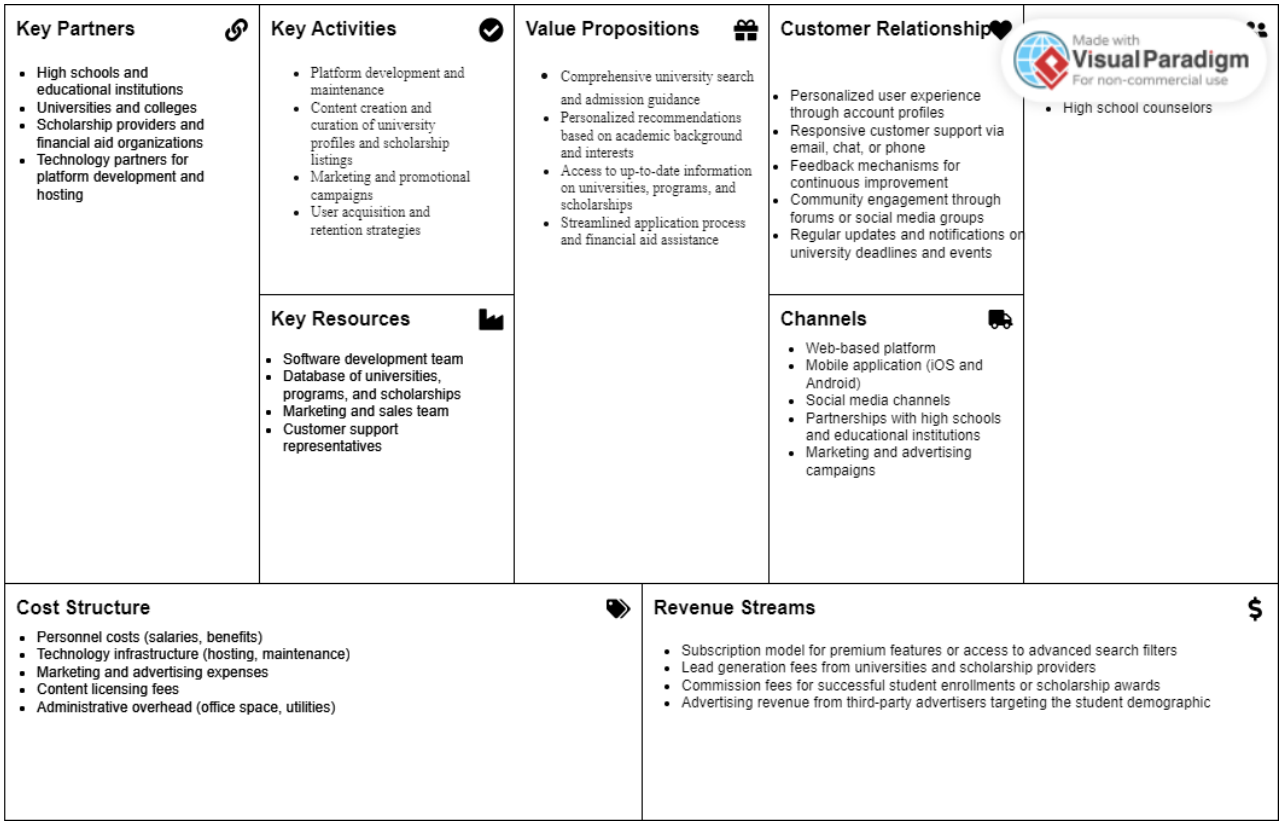
Analyze the target market for UniMatch, including prospective students, parents, educators, and university administrators.
Investigate the competitive landscape and assess UniMatch's unique value proposition and competitive advantages.
Determine the market demand for a university admission system like UniMatch and identify potential strategies for market penetration and growth.

5. Financial Feasibility:

Estimate the initial investment required to develop and launch UniMatch, including software development, marketing, and operational costs.
Evaluate potential revenue streams, such as subscription fees, advertising, or strategic partnerships, to determine the financial sustainability of UniMatch.
Conduct a comprehensive cost-benefit analysis to assess the return on investment and long-term financial viability of UniMatch.

6. Conclusion:
The feasibility study for UniMatch has provided valuable insights into the technical, marketing, and financial aspects of developing and implementing the university admission system. Overall, the study indicates that UniMatch holds significant potential to address the challenges faced by students in the university admission process and provide valuable benefits to stakeholders across the education ecosystem.
Moving forward, further research and analysis will be required to refine the implementation strategy and ensure the successful launch and adoption of UniMatch in the education technology market.

Business Model Canvas:



(1)

1.8 Thesis Organization

At UniMatch, our vision is to empower every aspiring student worldwide to realize their full potential by providing seamless access to quality higher education opportunities. We envision a future where educational barriers are dismantled, and every individual has the opportunity to pursue their academic and career aspirations, regardless of their background or circumstances. To achieve this vision, our mission is to revolutionize the university admission process by leveraging technology to create a comprehensive, user-centric platform that simplifies and streamlines the journey from exploration to enrollment. Through continuous innovation and collaboration with educational institutions, scholarship providers, and stakeholders, we are committed to providing students with access to accurate and up-to-date information about universities, programs, scholarships, and financial aid options. We offer personalized guidance and support to help students make informed decisions that align with their academic interests, career goals, and financial circumstances. Our platform facilitates a transparent and efficient application process while promoting diversity, equity, and inclusion in higher education. Upholding the highest standards of data security, privacy, and ethical conduct is fundamental to safeguarding the trust and confidence of our users. We are dedicated to continuously evaluating and enhancing our platform based on user feedback, emerging trends, and best practices in education technology.

Chapter 2

Related Work and Similar Systems

2.1 Similar Systems

1. Admissions Portal X:
Admissions Portal X is a comprehensive university admission system that offers features such as online application submission, document management, and status tracking for applicants. It provides a user-friendly interface and robust backend functionality for administrators to manage admissions processes efficiently.

2. University Matcher Y:
University Matcher Y is a platform designed to help students discover and compare universities based on their preferences and academic profiles. It offers personalized recommendations, scholarship opportunities, and virtual campus tours to enhance the decision-making process for prospective students.

3. Admission Management System Z:
Admission Management System Z is a cloud-based solution tailored for educational institutions to streamline their admissions procedures. It includes modules for application management, fee collection, and reporting, allowing universities to automate and optimize their admission workflows.

Chapter 3

Analysis

Add introductory paragraph.

3.1 Software Process Models

1. As a prospective student, I want to easily navigate through the platform and access information about universities, programs, scholarships, and financial aid options so that I can make informed decisions about my higher education path.
2. As a user, I want to access comprehensive information about universities, programs, scholarships, and financial aid options so that I can make informed decisions about my educational journey.
3. As a user, I want to receive personalized recommendations based on my academic background, interests, preferences, and career goals so that I can discover universities and programs that align with my aspirations.
4. As a user, I want to be able to update my profile information, including my academic background, interests, and preferences, so that I can maintain an accurate and up-to-date profile on the UniMatch platform.
5. As a user, I want to securely log in to the UniMatch platform using my credentials so that I can access personalized features and information tailored to my needs.
6. As a user, I want to utilize the search functionality on UniMatch to quickly find universities, programs, scholarships, and other relevant information based on specific criteria such as location, field of study, and cost.
7. As a user, I want to provide feedback, suggestions, and report issues or concerns about the UniMatch platform so that I can contribute to its improvement and ensure a better user experience for myself and others.
8. As a user, I want to receive real-time notifications about important updates, such as application deadlines, scholarship opportunities, and profile updates, so that I can stay informed and never miss any crucial information.
9. As a user, I want to communicate with university representatives, scholarship providers, and other users within the UniMatch platform through an integrated messaging system so that I can ask questions, seek guidance, and connect with relevant stakeholders during my university search process.

10. As an administrator, I want to edit system settings in UniMatch to customize default search filters and notification preferences, ensuring the platform aligns with user needs and preferences.

3.2 Functional Requirements

1. Explore Universities:

Users can explore universities worldwide, including details about programs, admissions requirements, and campus facilities.

2. Access Information:

Users can access comprehensive information about universities, programs, scholarships, and financial aid options.

3. Receive Recommendations:

Users receive personalized recommendations based on their academic background, interests, preferences, and career goals.

4. Update Profile:

Users can update their profile information, including academic background, interests, and preferences.

5. User Authentication:

Users must be able to securely log in to the UniMatch platform using their credentials (e.g., username/email and password) to access personalized features and information.

6. Search Functionality:

UniMatch provides users with a search functionality that allows them to quickly find universities, programs, scholarships, and other relevant information based on specified criteria (e.g., location, field of study, cost).

7. Feedback Mechanism:

UniMatch incorporates a feedback mechanism that allows users to provide feedback, suggestions, and report issues or concerns about the platform's functionality, usability, and content.

8. Real-time Notifications:

Users receive real-time notifications about important updates, such as application deadlines, scholarship opportunities, and profile updates.

9. Integrated Messaging System:

Users can communicate with university representatives, scholarship providers, and other users within the platform

10. Edit System:

Allows administrators to modify system settings and configurations, including default search filters and notification preferences, to meet evolving user needs and preferences.

.Non-functional Requirements

1. Performance:

- **The system should be responsive, providing quick search results and recommendations.**
- **Response times for user interactions (e.g., searches, loading pages) should be within acceptable limits, even during peak usage periods.**

2. Scalability:

- **The system should be able to handle a growing user base and data volume without significant degradation in performance.**
- **It should support concurrent user sessions without experiencing resource constraints.**

3. Reliability:

- **The system should be available 24/7, with minimal downtime for maintenance or updates.**
- **It should have mechanisms in place to recover gracefully from failures, ensuring data integrity and continuity of service.**

4. Security:

- **User data should be securely stored and transmitted using encryption protocols to prevent unauthorized access.**
- **Access to sensitive information should be restricted based on user roles and permissions.**
- **The system should implement measures to protect against common security threats such as SQL injection, cross-site scripting (XSS), and session hijacking.**

5. Usability:

- **The user interface should be intuitive and easy to navigate, catering to users with varying levels of technical proficiency.**
- **Accessibility standards should be followed to ensure that the platform is usable by individuals with disabilities.**

6. Compatibility:

- **The system should be compatible with a wide range of devices and web browsers to accommodate diverse user preferences.**
- **It should adhere to industry standards and protocols to facilitate integration with other educational platforms and services.**

7. Maintainability:

- **The codebase should be well-organized and documented to facilitate future updates and modifications.**
- **Changes to the system should be implemented with minimal disruption to existing functionality.**

8. Regulatory Compliance:

- **The system should comply with relevant laws and regulations governing data privacy, security, and accessibility in the regions where it operates.**
- **Regular audits and assessments should be conducted to ensure ongoing compliance with applicable standards.**

9. Performance Testing:

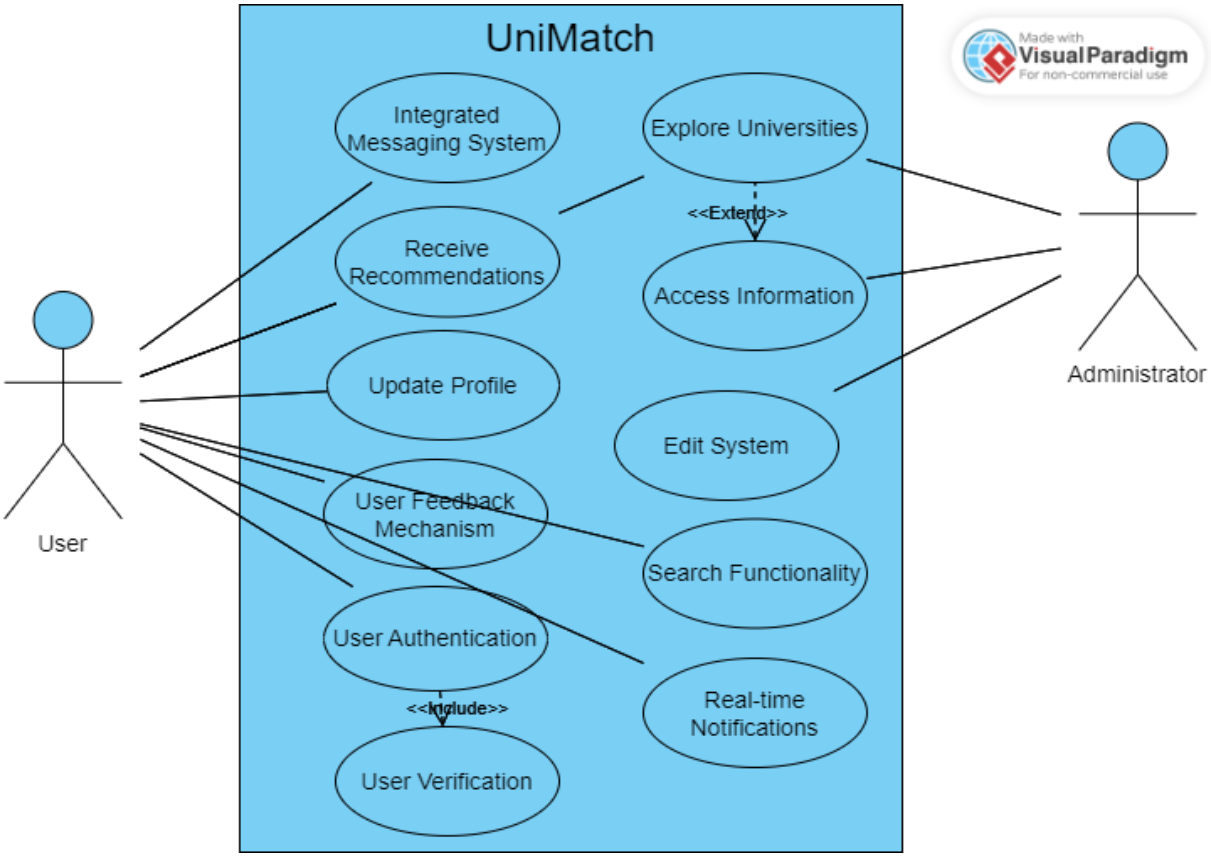
- **The system should undergo comprehensive performance testing to identify and address bottlenecks, ensuring optimal performance under various load conditions.**
- **Performance testing should include stress testing, load testing, and endurance testing to assess system behavior under different scenarios.**

10. Data Management:

- **Data storage and retrieval should be efficient, with mechanisms in place to archive or purge outdated information.**
- **Backup and disaster recovery procedures should be implemented to protect against data loss or corruption.**

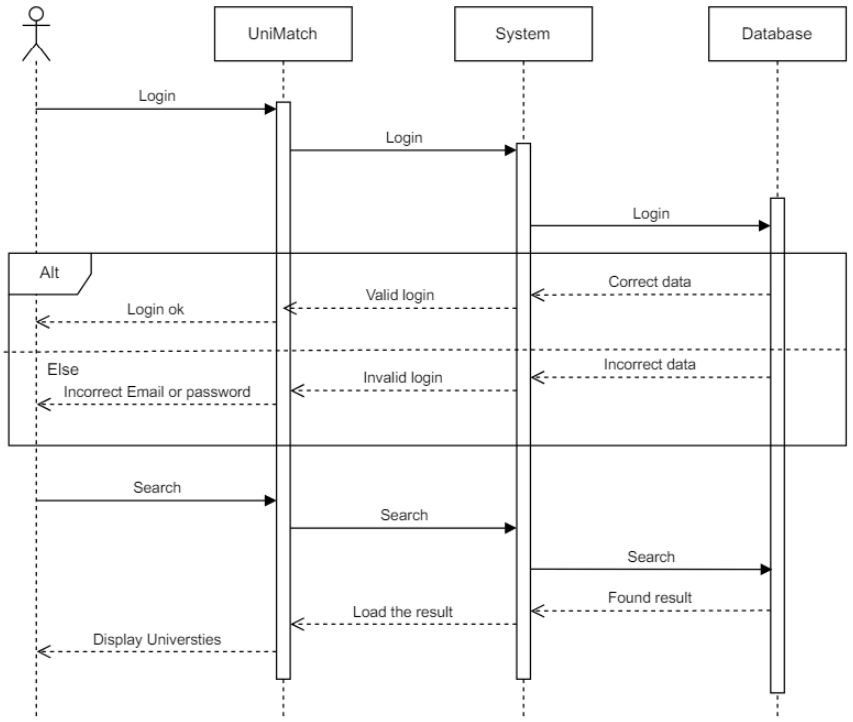
3.3 UML Diagrams

Use-Case Diagram:



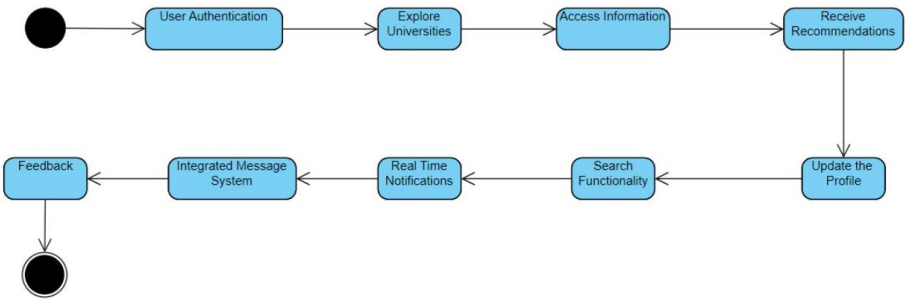
(2)

Sequence Diagram:



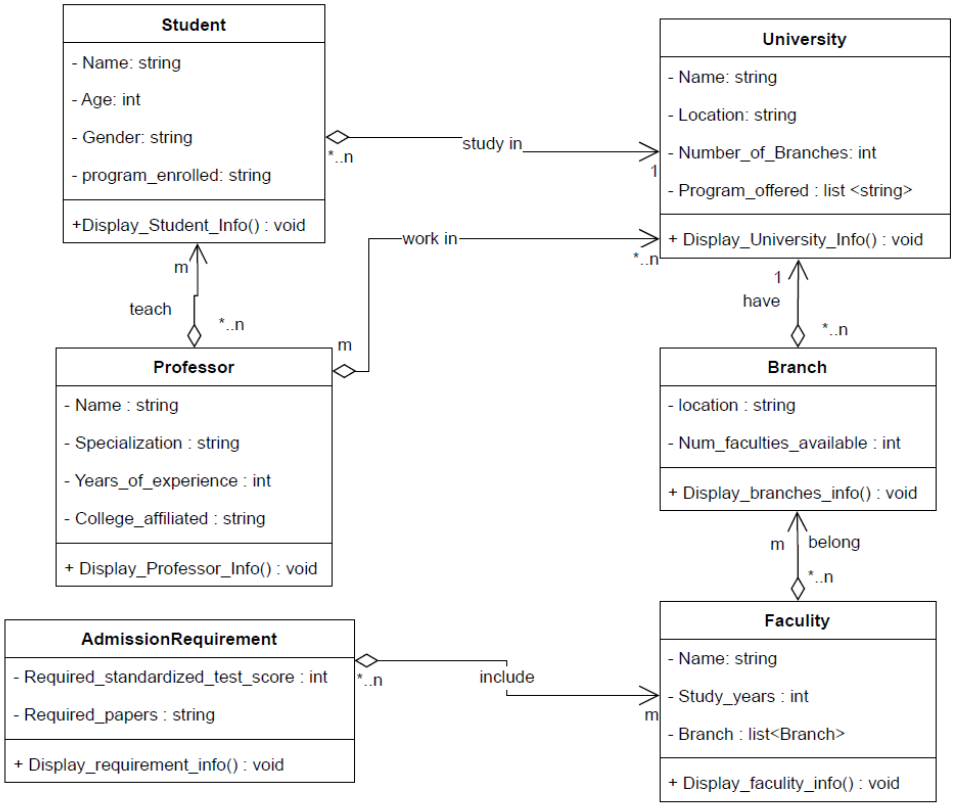
(3)

State Machine Diagram:



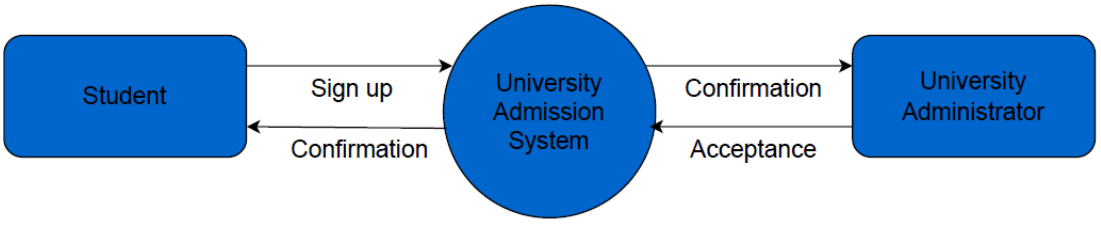
(4)

Class Diagram:



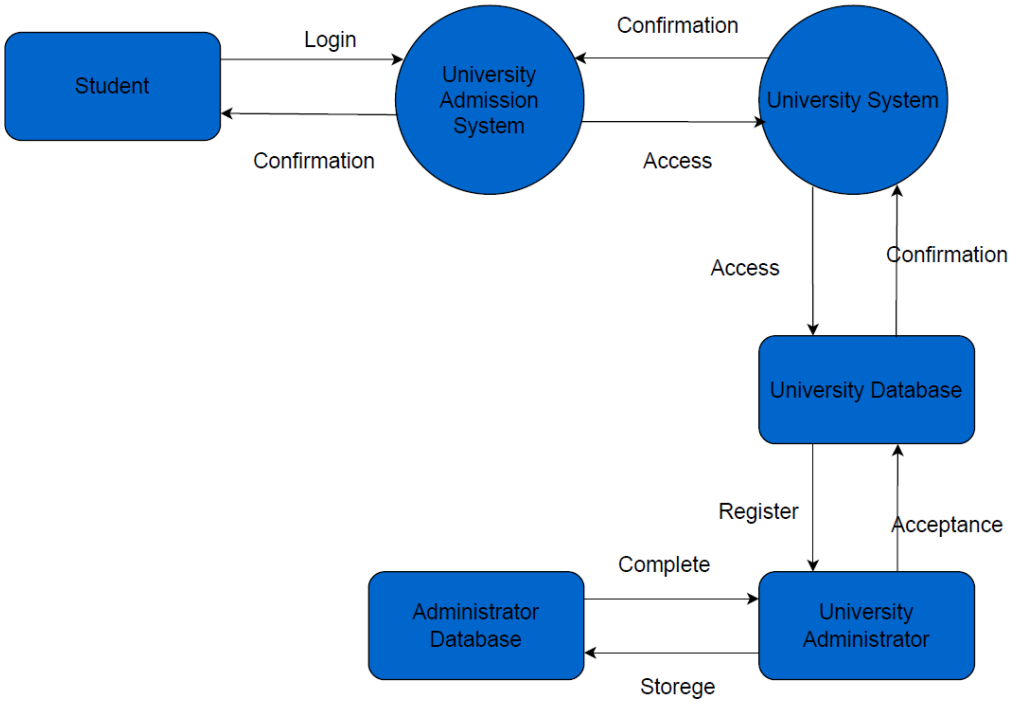
(5)

Data-Flow Diagram (level0):



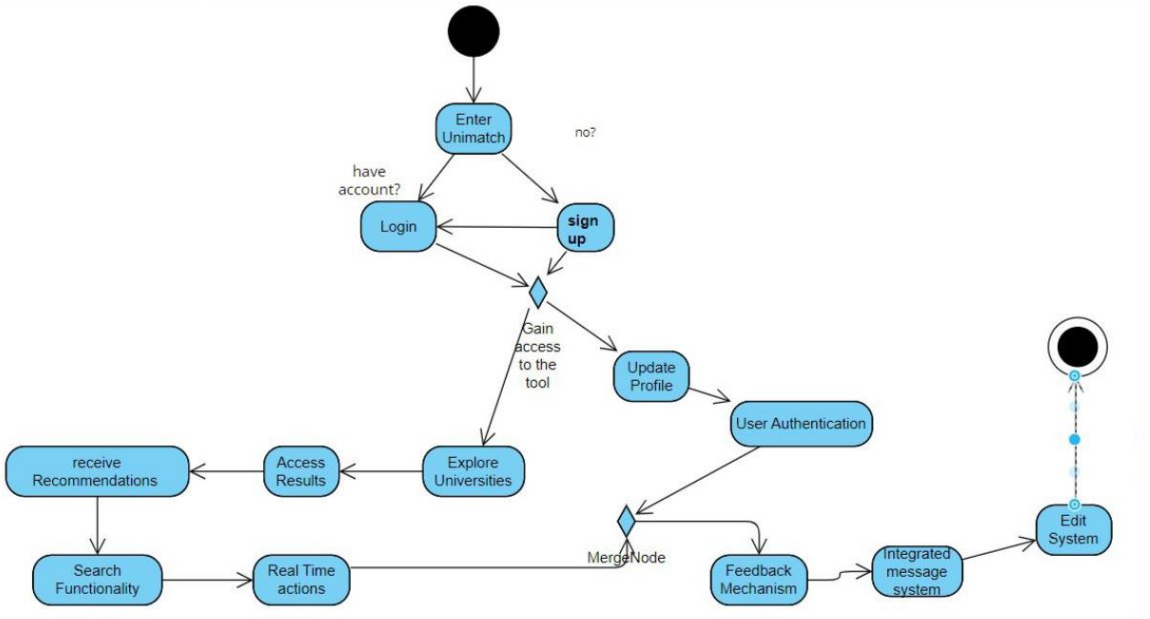
(6)

Data-Flow Diagram (level 1):



(7)

Activity Diagram:



(8)

Chapter 4

Design

Designing UniMatch involves a meticulous process aimed at crafting a comprehensive system that caters to the diverse needs of students, educators, and universities. It encompasses the utilization of various tools and technologies to translate requirements into tangible solutions while navigating through constraints and considerations. UniMatch's engineering design revolves around iterative ideation, rigorous analysis, and informed decision-making to ensure the delivery of a high-quality platform. The process entails selecting optimal programming languages such as Java and SQL, harnessing the power of cloud platforms like Microsoft Azure, and embracing modern development practices with tools like Azure DevOps. Additionally, the design chapter delves into the creation of visual representations, including pictures and prototypes, to envision and refine the user experience. These efforts are guided by a comprehensive understanding of constraints such as cost, usability, and sustainability, ensuring that UniMatch emerges as an innovative and user-centric solution in the realm of university admissions.

4.1 Technologies and Tools Used

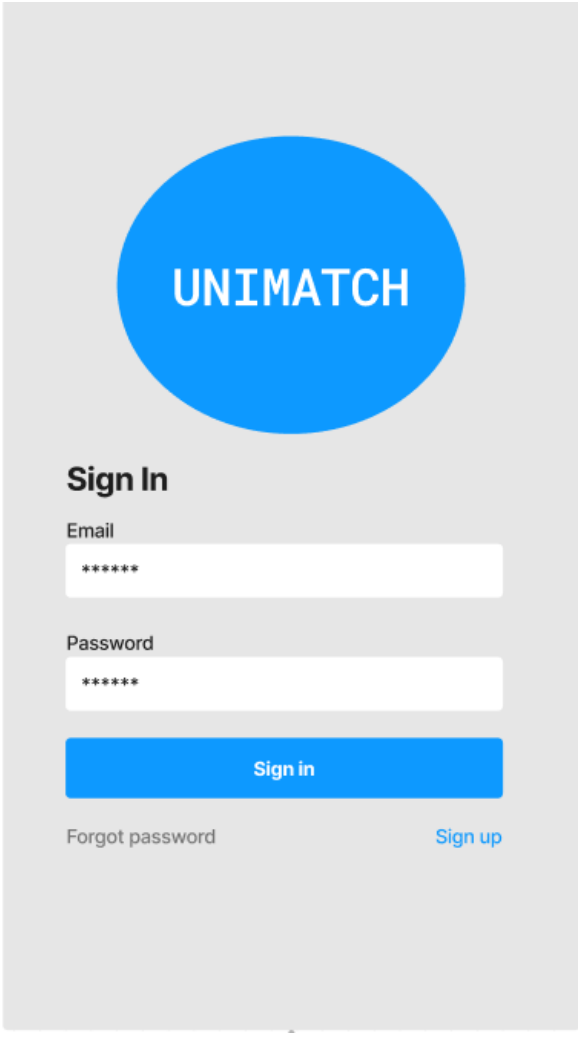
1. Programming Languages:
. Java: For backend development and business logic.
. JavaScript: For frontend development and interactive features.
. HTML/CSS: For designing and styling the user interface.

2. Database Management:
. SQL (Structured Query Language): For database management and querying.
. MySQL: Open-source relational database management system.
. PostgreSQL: Open-source object-relational database system.

3. Testing Frameworks:
. JUnit: Framework for writing and running unit tests in Java.
. Selenium: Automation testing framework for web applications.
. Jest: JavaScript testing framework for React.js applications.

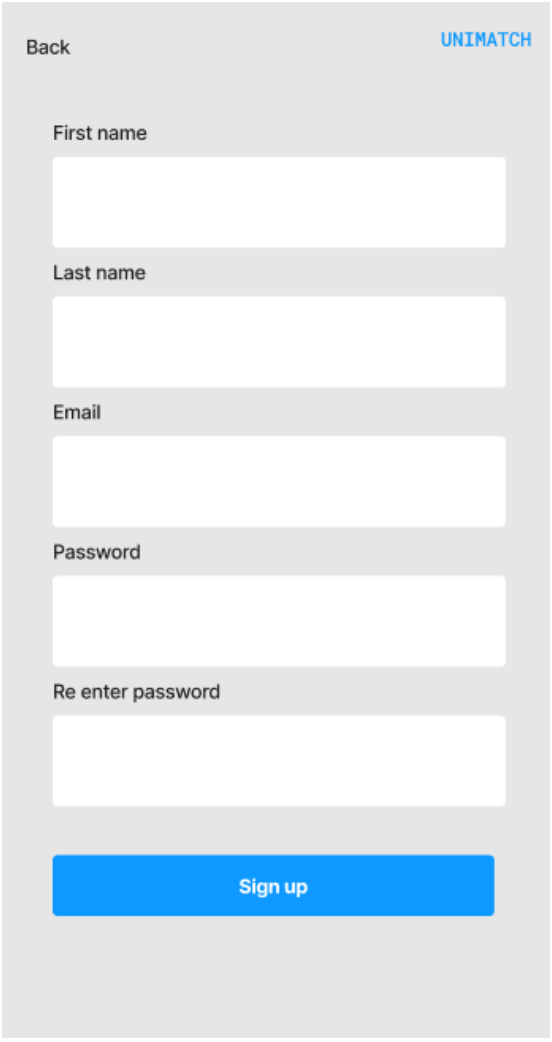
4.2 Prototype

Sign in Page:



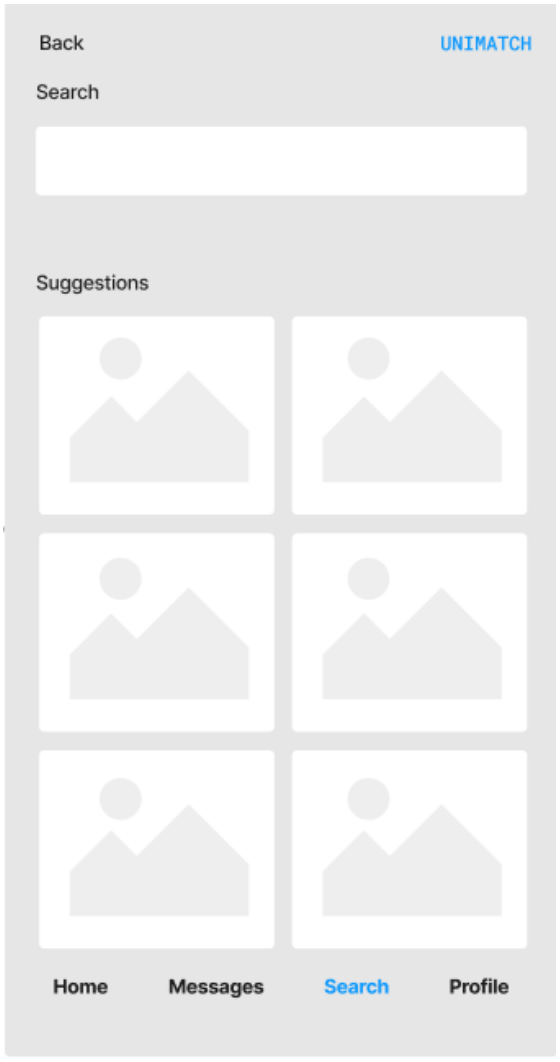
(9)

Sign-up page:



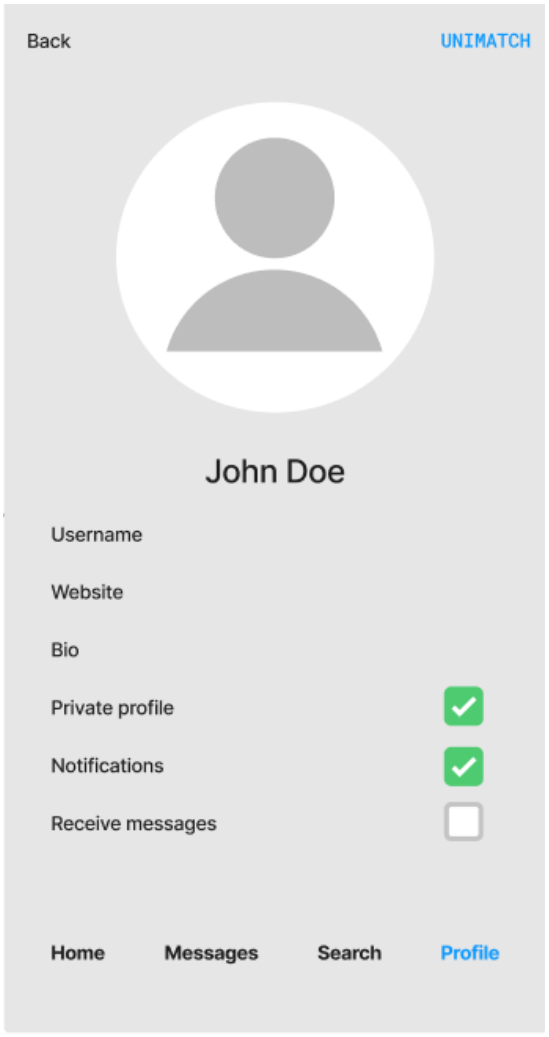
(10)

Search Functionality Page:



(11)

Update Profile Page:



(12)

Integrated Messaging System Page:

(13)

Chapter 5

Conclusion and Future Work

In conclusion, the Software Requirements Specification (SRS) for UniMatch encapsulates a comprehensive blueprint for the development of a cutting-edge university admission system. Through meticulous analysis and detailed documentation, we have outlined the motivation behind UniMatch, identified key problem statements in the university admission process, and established clear objectives for the system. Additionally, the SRS delves into the complexities of the project, considering technical, marketing, and financial feasibility while adhering to relevant standards and constraints. With a focus on user-centric design and innovative features, UniMatch is poised to revolutionize the university admission experience and empower students worldwide.

Looking ahead, future work on UniMatch will focus on continuous improvement and innovation to further enhance its functionality and usability. This includes implementing advanced personalization features, expanding partnerships with educational institutions and scholarship providers, and staying abreast of emerging technologies and industry trends. Moreover, UniMatch will prioritize user feedback mechanisms and usability testing to ensure ongoing refinement and optimization. By embracing a culture of innovation and collaboration, UniMatch will remain at the forefront of university admission technology, driving positive change and empowering individuals in their educational journey.