

# RMIT International University Vietnam

## Assignment Cover Page

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## 1. Executive Summary

In today's competitive job market, job seekers face significant challenges, including finding suitable opportunities, preparing professional resumes, interview skills, and acquiring the necessary skills for their dream jobs [1], [2]. The "MatchWorks" project addresses these issues by providing an all-in-one web platform designed to streamline the job application process. This platform is equipped with AI-powered job recommendations, resume analysis, virtual mock interview practice, and personalized career roadmaps. Developed using ReactJS for the front end, NodeJS and ExpressJS for the back end, MongoDB for data storage, and the Gemini API for AI-driven functionalities, "MatchWorks" ensures a seamless and user-friendly experience. To manage the project effectively, the team adopted the Scrumban methodology, combining agile flexibility with structured task prioritization to meet deadlines.

The project achieved several significant milestones throughout its lifecycle. During the planning phase, the team created a detailed product backlog based on a comprehensive Work Breakdown Structure (WBS) and implemented a Kanban board with work-in-progress (WIP) limits for efficient task tracking. In the design phase, cohesive UI/UX prototypes were created in Figma, while the API endpoints and database schema were meticulously planned to ensure alignment across all components. The implementation phase was concluded with a fully functional and deployed web application. This outcome included the successful integration of core features such as authentication, job recommendations, resume analysis, virtual mock interviews, and roadmap generation, ensuring a smooth and engaging user experience. The finalization phase included the delivery of comprehensive project documentation and a product demonstration video, showcasing the platform's capabilities.

Despite its successes, the project faced several significant challenges. In the design phase, inconsistencies between the UI/UX and API endpoints created integration difficulties, with mismatched data formats and redundant endpoints. This was addressed through collaborative reviews where team members refined designs and validated APIs to ensure alignment with front-end requirements.

During implementation, integrating the Gemini API posed challenges, as unexpected AI behavior required iterative debugging and testing. The team mitigated this by conducting regular testing cycles and leveraging external documentation to troubleshoot effectively. Additionally, front-end and back-end integration faced issues, particularly in data formatting and synchronization. Pair programming and rigorous testing helped resolve these integration challenges, ensuring a seamless connection between components.

With only three members and a 10-week timeline, the team also struggled with an overwhelming workload. Cross-training was essential, allowing members to take on multiple roles when needed, such as stepping in for absent colleagues or sharing responsibilities across tasks. Careful scope definition and task prioritization ensured that critical deliverables were completed on time despite external responsibilities. These combined efforts enabled the successful delivery of "MatchWorks" as a functional and impactful solution for job seekers.

"MatchWorks" successfully delivered a fully functional and deployed platform, empowering job seekers to enhance their application processes. The project exemplifies the importance of careful planning, effective collaboration, and adaptability. Users can explore the platform on the [MatchWorks](#) website and view the product demonstration on [YouTube](#).

## 2. Introduction

### 2.1. Background

In the modern job market, job seekers encounter various obstacles that hinder their ability to secure employment [3], [4]. These challenges include identifying suitable job opportunities, preparing professional resumes, excelling in interviews, and acquiring the necessary skills for their desired roles [5], [6]. With the demand for highly specialized skills on the rise, many candidates struggle to meet employers' expectations or effectively showcase their potential [7]. This often results in missed opportunities, extended job searches, and frustration among job seekers.

While numerous tools and platforms exist to support aspects of the job application process, they often address specific needs in isolation. For example, job boards like LinkedIn and Indeed focus on job discovery, while platforms such as Resume.io assist with resume creation. However, job seekers frequently lack a unified, all-encompassing solution that integrates these functionalities into a seamless experience. This fragmentation leaves many individuals overwhelmed by the need to use multiple tools, often without the guidance to utilize them effectively.

The "MatchWorks" project was conceived to bridge this gap by creating an all-in-one platform designed to empower job seekers throughout their application journey. Recognizing the importance of technology in addressing these challenges, "MatchWorks" leverages advanced features such as accurate job recommendations, AI-driven resume analysis, virtual mock interviews, and personalized career roadmaps. These features are designed to simplify the application process while providing actionable insights to improve users' confidence and competitiveness.

### 2.2. Objectives and Goals

The primary objective of the "MatchWorks" project is to empower job seekers with a comprehensive, user-friendly platform that enhances their chances of securing their dream jobs. The platform is designed to address key pain points in the job application process, equipping users with tools and resources that simplify and optimize each step. By combining advanced technologies with a user-centered approach, "MatchWorks" aims to transform the way job seekers navigate the competitive employment landscape. Here are specific goals of the project as follows:

- **Provide Accurate Job Recommendations:** The platform incorporates custom-developed matching algorithms to recommend job opportunities tailored to users' positions, skills, and interests. These algorithms analyze user profiles and job descriptions to identify compatibility, ensuring recommendations are highly relevant and aligned with users' career aspirations.
- **Enhance Resume Quality:** Through AI-powered resume analysis, the platform identifies strengths and areas for improvement in users' resumes. It provides actionable feedback on content, structure, and presentation, helping users craft professional and competitive resumes.
- **Offer Interactive Mock Interview Practice:** The virtual mock interview feature simulates realistic interview scenarios, enabling users to practice and refine their skills. With AI-driven feedback, users can identify weaknesses, improve confidence, and better prepare for real-world interviews.
- **Guide Skill Development with Personalized Career Roadmaps:** The roadmap generator creates tailored, step-by-step plans that guide users in acquiring the skills required for their target roles. By aligning these plans with job requirements, the platform helps users focus on meaningful and actionable career development.

- **Deliver a Fully Functional and Accessible Platform:** The project aims to produce a robust and user-friendly web application that integrates all key features into a cohesive experience. Accessibility and responsiveness are prioritized to ensure the platform meets the diverse needs of job seekers.

### 2.3. Project Management Approach

To ensure the "MatchWorks" project was executed effectively and completed within the tight 10-week timeline, the team adopted the **Scrumban** methodology, a hybrid approach combining the iterative structure of Scrum with the flexibility of Kanban [8]. This approach enabled the team to manage tasks dynamically while maintaining a focus on delivering incremental progress and meeting critical milestones.

At the foundation of the project management process was the development of a comprehensive **Work Breakdown Structure (WBS)**, which outlined all project tasks, their dependencies, and deliverables. This WBS served as the blueprint for task planning and prioritization. Using the WBS, the team designed a **Kanban board** to visually manage and track tasks through various stages: "To Do," "In Progress," "In Review," and "Done." The board also included work-in-progress (WIP) limits to prevent bottlenecks and ensure each team member focused on manageable workloads. A clear definition of done (DoD) was established for each task to maintain quality and consistency across deliverables.

The team utilized **Jira** for task management and tracking and **Microsoft Teams** for collaboration and communication. These tools facilitated seamless coordination, especially during remote work periods, and ensured all team members had visibility into project progress.

To promote effective communication and alignment, the team conducted **daily stand-up meetings**. These short meetings provided an opportunity for each member to share updates, discuss progress, and address any blockers. Additionally, the team held **weekly review and planning meetings** on Sundays to evaluate the outcomes of the previous sprint and plan tasks for the upcoming sprint. A **sprint retrospective meeting** was conducted every Wednesday, providing a platform to reflect on the team's performance, identify areas for improvement, and implement actionable changes.

By combining structured task management, regular communication, and continuous improvement practices, the Scrumban methodology ensured the project remained on track and adaptable to emerging challenges. This disciplined approach played a pivotal role in delivering "MatchWorks" as a robust and user-focused platform within the allotted timeframe.

## 3. Project Description

### 3.1. Scope Overview

The dedication and teamwork demonstrated during the development process have ensured that all initial project scopes were successfully integrated into the final product. The MatchWorks application was built with the intention of improving the job search process by providing a user-friendly interface which also includes creative features. By combining basic features existing on today's job application websites with innovative AI techniques which our platform provides job seekers with a more efficient way to navigate and apply around the job market. Key features including Profile Generation, Resume Builder, Virtual Interview Practice, and Roadmap Generation use third-party AI APIs, provided by Google's Gemini, to give targeted and efficient support to job searchers. The

website also aggregates job listings from other sources which allow users to find a variety of opportunities without having employers to maintain job advertisements directly on the site.

To keep its focus on job searchers, the project deliberately eliminates capabilities for employers and recruiters which make these tasks out of scope. Users are directed to apply for employment on employer websites or through external job platforms instead. This targeted approach simplifies the user's experience while emphasizing the application's fundamental goal. Furthermore, using third-party APIs for AI-driven features avoids the need to create proprietary AI models which also allow the project to offer high-value functionality on a reasonable timetable and budget.

Security considerations have been carefully addressed to protect user data and maintain platform integrity. Standard security protocols are implemented to ensure reliability, while more advanced compliance measures, often required for enterprise-level systems, are outside the project's scope. These clearly defined boundaries have helped the team project remain practical, focused which is also aligned with its mission to simplify and enhance the job search process for users.

### **3.2. Deliverables**

The MatchWorks project will deliver a comprehensive web application designed to assist job seekers in improving their job search experience. The application's front-end, developed using Vite, Shadcn UI, and Tailwind CSS, will feature fully responsive and interactive pages. These pages contain intuitive interfaces for basic and advanced features. Basic features include Authentication and User Profile while advanced features include Job Searching and Recommendation to help tailor user job searching process with personalized job matching, a Resume Builder for analyzing and improving resumes, a Virtual Interview Practice with AI-driven feedback, and a Roadmap Generator that lays out career trajectories with practical actions. The back-end, built with Node.js and Express.js, will support these functionalities through robust APIs, integrating with MongoDB to securely manage user data. This seamless integration which is between front-end and back-end ensures a smooth and reliable user experience.

Documentation will play a vital role in supporting both the use of the application and future development efforts. The front-end documentation which will include wireframes, UI/UX prototypes, and explanations of user interaction flows, while the back-end documentation will cover API endpoints, request/response formats, and a comprehensive database schema. To assist with deployment and maintenance, additional documentation such as README file located in GitHub repository was provided with a step-by-step guide for setting up the database, back-end environment, deploying the system using Docker containers, and troubleshooting potential issues. These deliverables ensure that the application is easy to set up, use, maintain and scale.

The final deliverables will include both a project report and a demonstration. The project report which will summarize the project's background, objectives and goals, project management approach, scope, deliverables, features and functionalities, design of application interface workflow and system architecture, project planning and project monitoring and control. It will also outline suggestions for future enhancements such as employer or recruiter user role to manually posting job data to the platform or more advanced AI integrations. To accompany this, a user manual will be provided for navigating the platform, while a technical manual will guide developers on setup and maintenance. The project's completion will be marked by a live demonstration of the application where we will showcase all implemented features. This demonstration will be supplemented by pre-recorded walkthroughs of critical functionalities and a presentation summarizing the development process and outcomes.



Together, these deliverables which aim to ensure a well-rounded, impactful product that fulfills its purpose of enhancing the job-seeking process for users.

### Project Final Outcomes:

- Web Application: <https://matchworks-client.k-crowd.top/>
  - Login Credentials: Email: [cuongtran@gmail.com](mailto:cuongtran@gmail.com) | Password: 12345678
- Demonstration Video: <https://youtu.be/IusGAXtZYQQ?si=QMAxBqE-wUsXCCiG>
- Front-end Documentation: <https://matchworks-client-storybook.k-crowd.top/>
- Back-end Documentation: <https://documenter.getpostman.com/view/27360970/2sAYBbepYm>

## 3.3. Features and Functionalities

### 3.3.1. Included Features

- **Authentication & User Profile Management:** Authentication comprises login and logout functionality which allow users to access the platform using their registered credentials, which are required to use all the website's features. If users do not already have an account, they can create one by providing the essential information. Profile management allows users to change or update their profile information. During the registration, users can also choose to have this profile generated automatically by uploading their resume.
- **Job Recommendation, Searching & Filtering:** This feature provides complete options to improve job seeking experience. Users can search for specific jobs and refine results with advanced. A personalized recommendation engine analyzes user's profile to suggest tailored career prospects on the website's homepage. Users can see job details and a direct link to the employer's application website. They can also save jobs on a wish list which allows later application.
- **Resume Builder:** The resume builder allows users to upload their resumes or select uploaded ones, which include important information such as skills, education, and experience. With AI integration, the system analyzes uploaded resumes in aspects which include presentation, structure, content, skills, and language. Users receive detailed feedback and score, allowing them to modify and improve their resumes for better job opportunities. Previous resumes' analyses are available in the history tab.
- **Virtual Interview Practice:** The virtual interview practice provides AI-powered mock interviews via a conversational chat interface, allowing job seekers to improve their interview abilities. The system generates questions which relate to the input job descriptions for a practical environment. After interviewing, the AI assesses the user's responses which are delivered through feedback to help user improve their interview success. Users can also see their previous interview on both status complete and pending through history tab.
- **Roadmap Generator:** The roadmap generator generates a structured roadmap based on the input job description, highlighting important stages for improving their skills for targeted positions. The listed skills also contain appropriate courses to an external learning platform. Users can also keep track of their progress by marking the accomplished skills on a checklist, and progress bar will be updated dynamically. History tab also contains previously generated roadmaps.

### 3.3.2. Excluded Features

- **Resume Revise and Generate in Resume Builder:** Allow users to rapidly incorporate comments to their resumes. With a simple click, the system provides an updated resume with suggested adjustments to optimize it. This feature was excluded due to complexity of applying suggested adjustments to the ordinary style of the user's uploaded resume that would significantly reduce the user satisfaction.

- **Voice Interaction in Virtual Interview Practice:** Instead of an ordinary text-based chat interface, we considered designing a more interactive voice-based interface for this feature using text-to-speech and recording the user's response, but owing to time constraints, we decided to stick with the text-based chat interface.

## 4. Design

### 4.1. UI/UX and Software Workflow

#### 4.1.1. Authentication

If the user is not already logged in when they visit the website, they will be forwarded to the Login page where they may login using their registered credentials or create a new account by clicking the Register icon in the upper right corner of the page (Figure 1a). On the Register page, users are asked to provide basic credentials to establish a new account on page (Figure 1b), after which they will be sent to the following page to update their profile, which is optional because they may do so later on the Profile Management page. In this stage, users will be given two options: upload a resume to automatically generate their profile based on information that the AI can analyze in the resume on page (Figure 1c) or manually fill out the information sequentially from page (Figure 1d). The left side panel of the Login and Register pages displays a dynamic 3D environment made using the popular Three.js library of the word MatchWorks.

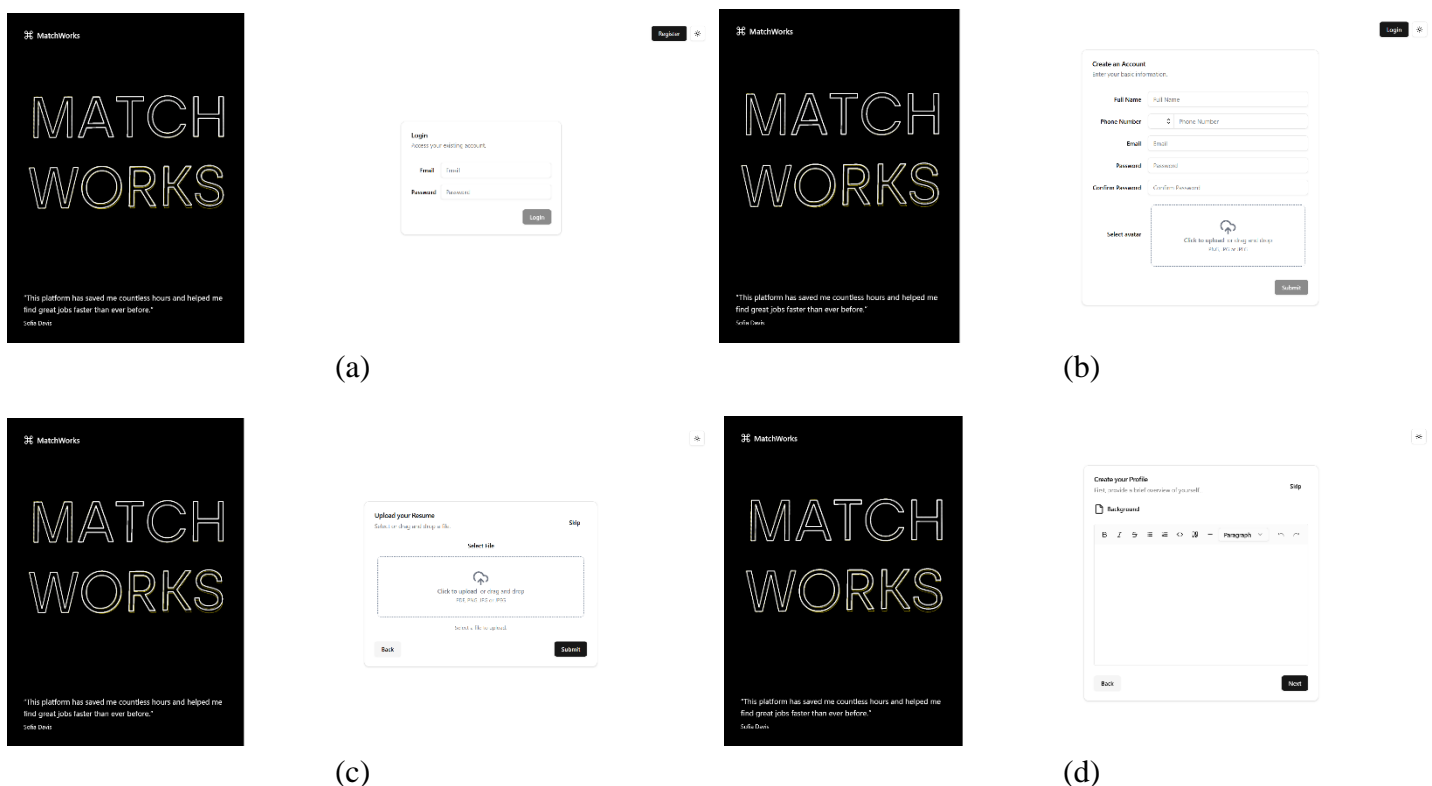


Figure 1: Authentication Pages

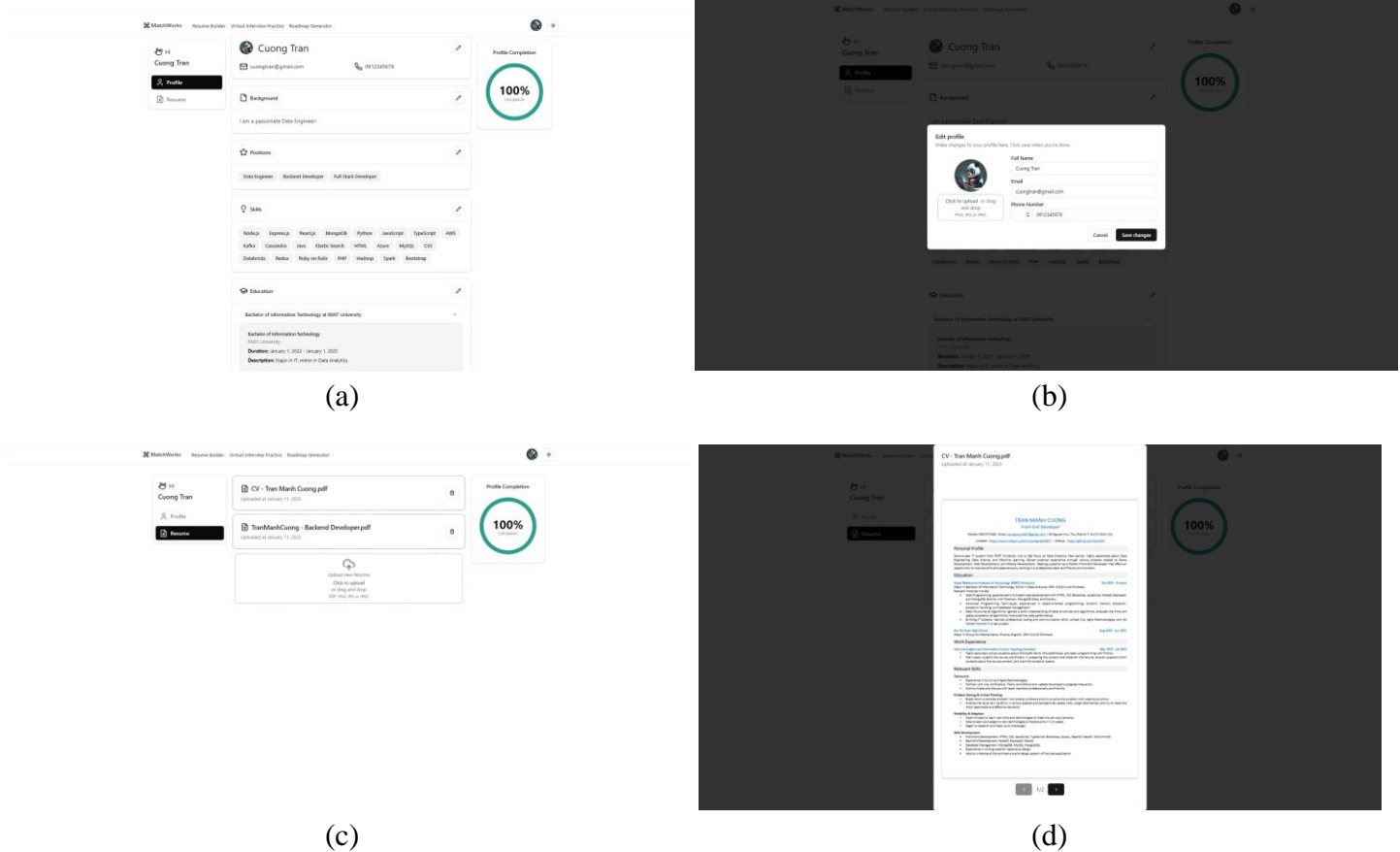
For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 1](#).

#### 4.1.2. User Profile Management

Users can access this page by clicking their avatar on the right side of the navigation bar and updating their profile information. When they arrive at this page, they will see their information listed, which they can modify by



clicking on the pencil icon to the right of each information component (Figure 2b). On the left side of the page is a component with two buttons to navigate between two tabs: profile information (Figure 2a) and a page listing all the user's uploaded resumes (Figure 2c), where they can upload new resumes or delete all of them. The user can also view their uploaded resume by clicking on the resume name (Figure 2d). On the right side of the page, there is a component that displays the user's profile completion percentage. This component will vary dynamically depending on how many fields the user has already added.



*Figure 2: User Profile Management Pages*

For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 2](#).

#### 4.1.3. Job Recommendation, Searching, and Filtering (Homepage)

The MatchWorks homepage (Figure 3a) is intended to be the main hub within the application; the logo at the top-left corner and any login would point to this place. It includes recommended jobs based on the user's matched skills and gives details of the job clicked on by clicking on the right section (Figure 3a). Further down, there is a Qualifications section (Figure 3b) showcasing the matched and missing skills with an option to add new skills by way of a pop-up modal (Figure 3c). Users are then able to toggle between job recommendations or saved jobs (Figure 3d), where favorite jobs are listed and can be managed with options to apply, view the details of, or remove them. A search bar for exploring available jobs (Figure 3e) will take them to a results page with advanced filtering for exact searches (Figure 3f). This layout in itself will be intuitive, and users should experience little to no issues when it comes to managing their profiles and digging through the opportunities with ease.

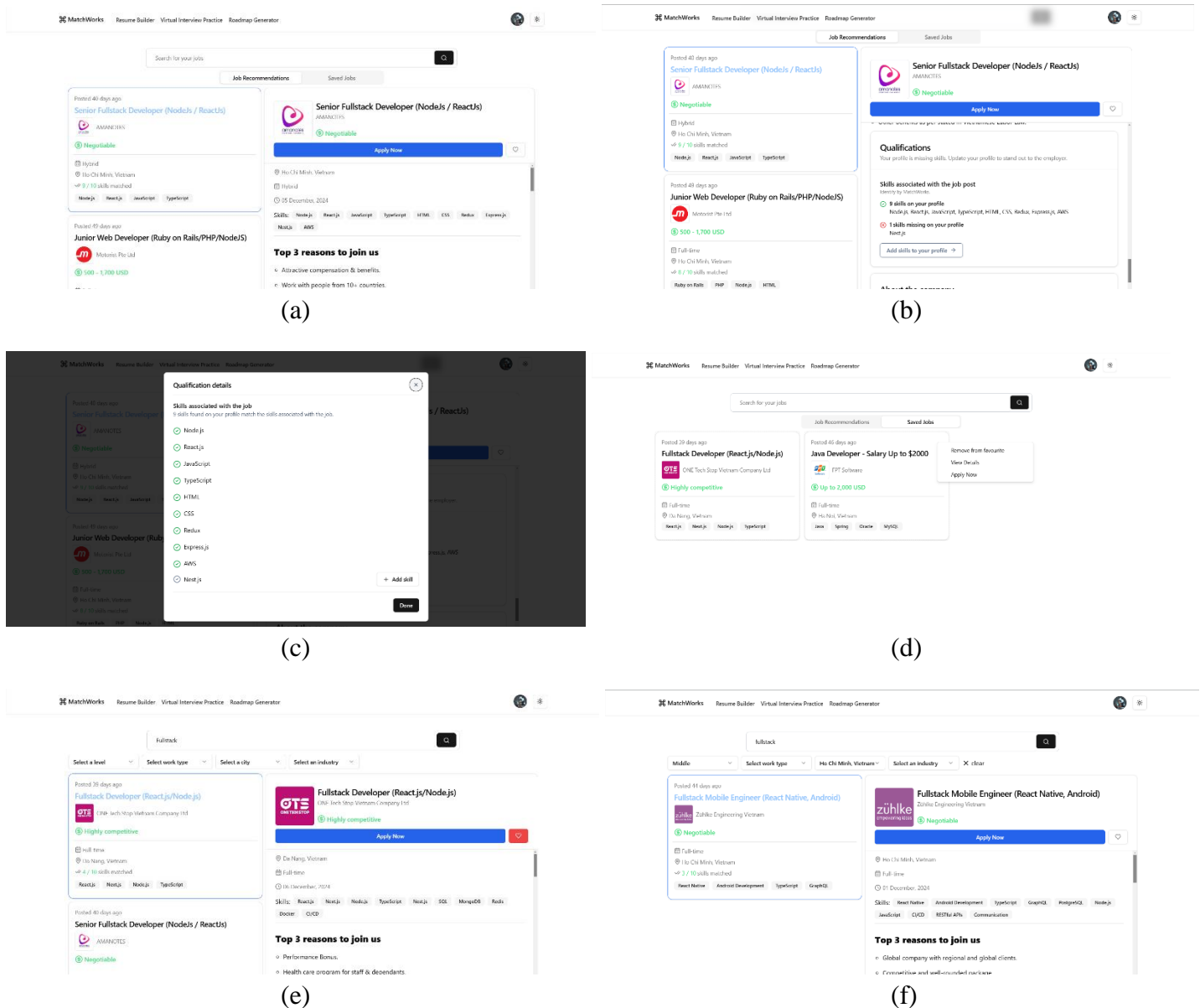
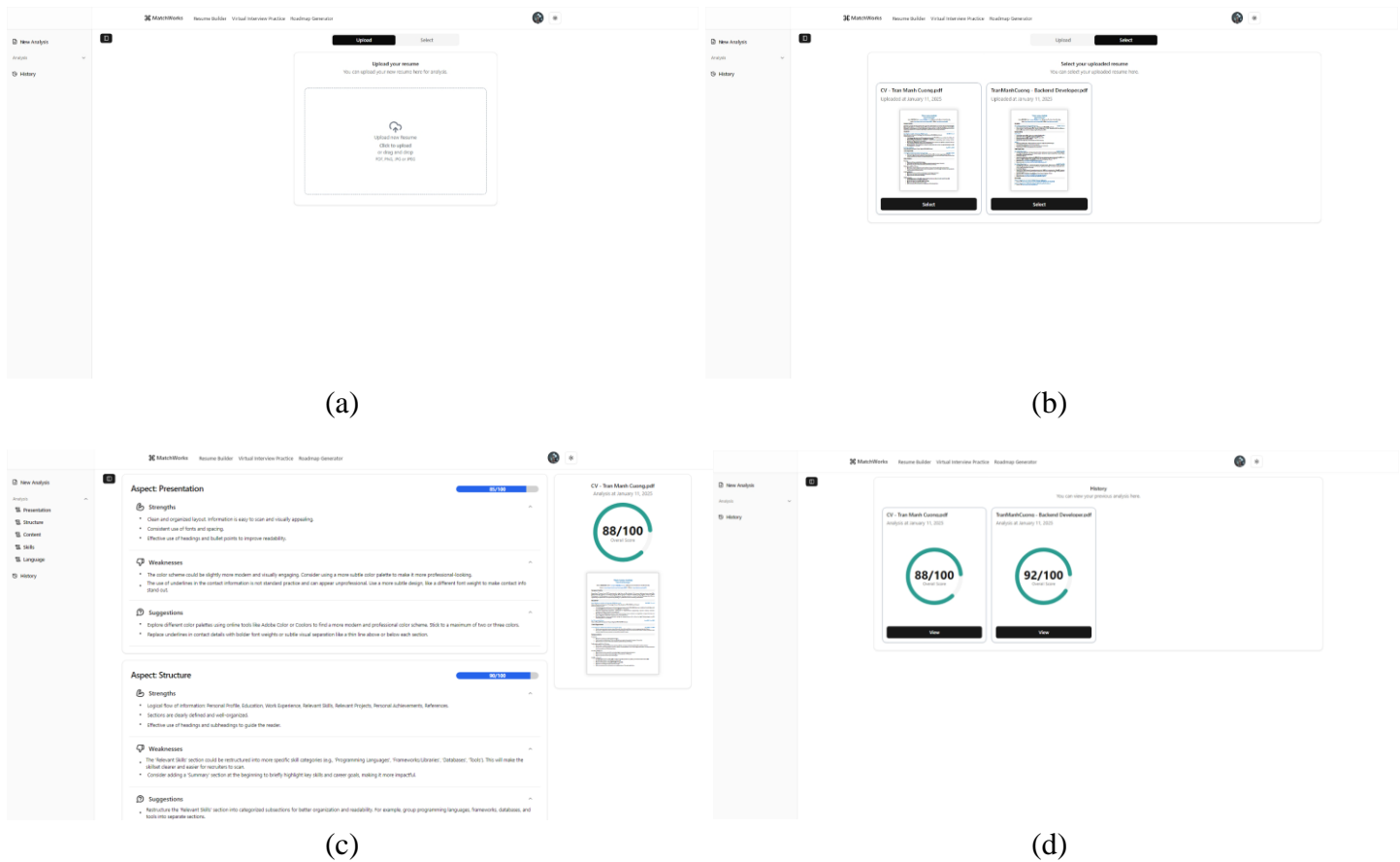


Figure 3: Job Recommendation, Searching, and Filtering Pages

For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 3](#).

#### 4.1.4. Resume Builder

This page allows users to upload their resume (Figure 4a) for AI analysis or select from previously posted resumes (Figure 4b) from the Profile Management page. After successfully uploading or selecting, the user is navigated to the analysis tab (Figure 4c). We are currently examining five aspects of the resume including presentation, structure, content, skills, and language. Each facet has its own score, strengths, weaknesses, suggestions, and the overall resume score on the right side of the page. The navigation panel on the left side of the page allows the user to return to the new analysis page, cycle through each component of the analysis, or find the history of previously analyzed resumes (Figure 4d). When the user clicks on any of the resume preview, the PDF viewer opens the dialog viewer, as shown on the Profile Management page (Figure 2d).



*Figure 4: Resume Builder Pages*

For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 4](#).

#### 4.1.5. Virtual Interview Practice

Users can practice their interviews using AI-generated questions and receive feedback. On the New Interview tab (Figure 5a), users are required to add job information such as the job title, level, number of questions to be asked, and job description. After filling out all of these sections, selecting Create interview will take the user to a chat interface with the AI (Figure 5b), where the chat bot will show the questions in order and the user can respond by entering in the box at the bottom of the page. After answering the final question, visitors will be directed to the Feedback tab (Figure 5c), where they can see the overall feedback, including strengths, problems, and suggestions. When scrolling down and enlarging the tab, the user can see feedback on each question. Finally, previously created interviews can be viewed on the History tab (Figure 5d), along with their details, status as completed or pending and the option to view and delete.

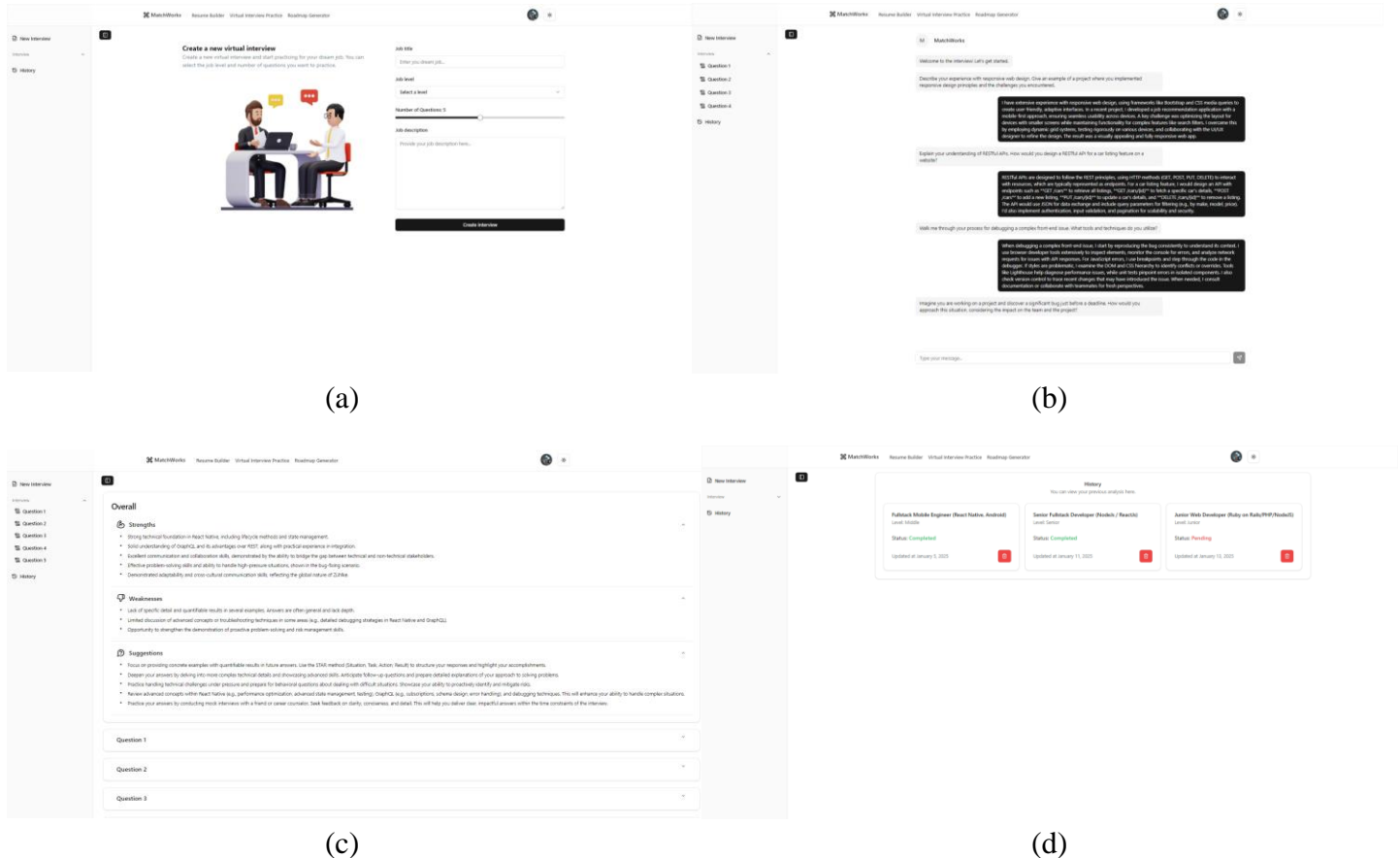
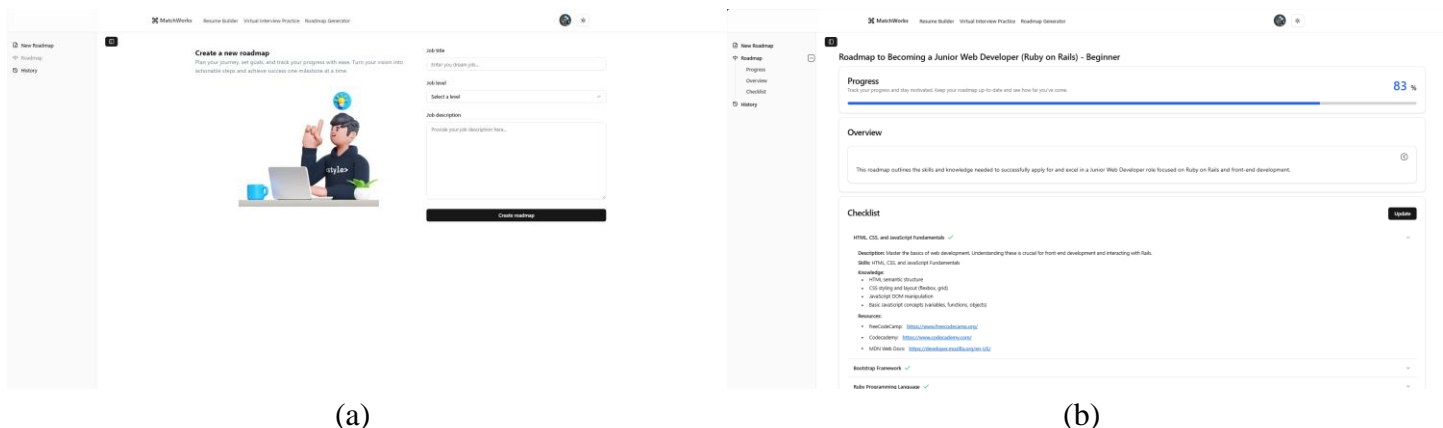


Figure 5: Virtual Interview Practice Pages

For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 5](#).

#### 4.1.6. Roadmap Generator

The Roadmap Generator helps users to create structured roadmaps based on the job they want. On the New Roadmap tab (Figure 6a), users can enter job information such as job title, level, and description. After pressing the Create roadmap button, users will be sent to the newly constructed roadmap tab (Figure 6b), which includes a progress bar to measure the percentage of checklist completion below. When clicking the Update button, the Checklist component will display check boxes for each of the skills listed (Figure 6c); as user checks each box, the progress bar will alter dynamically based on the checked boxes. Finally, under the History page (Figure 6d), users may view previously produced roadmaps, as well as their state and the opportunity to view or remove them.



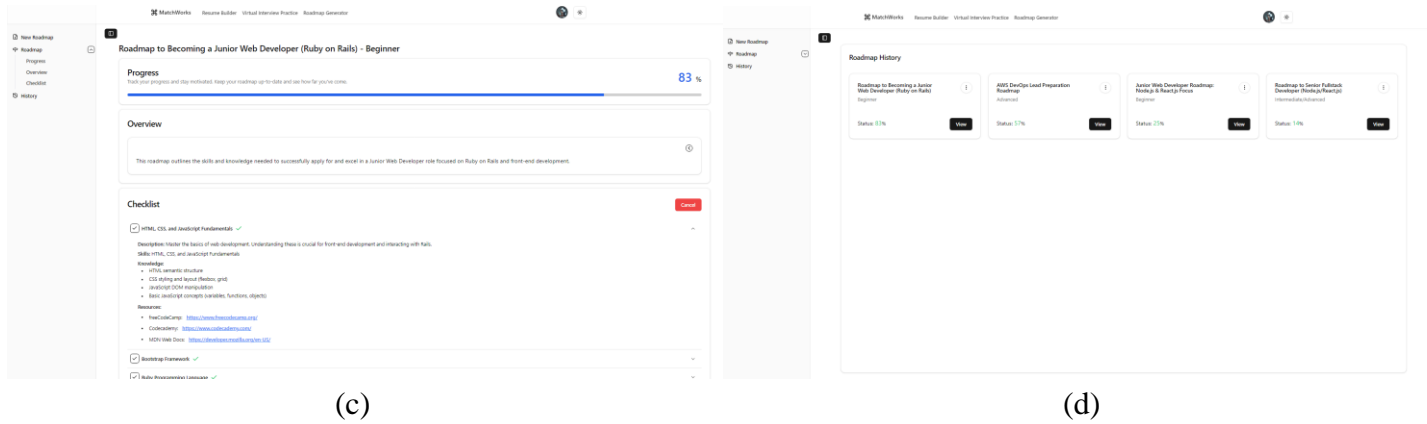


Figure 6: Roadmap Generator Pages

For a clearer visualization of the feature workflow, the activity diagram is provided in [Appendix 6](#).

## 4.2. System Architecture

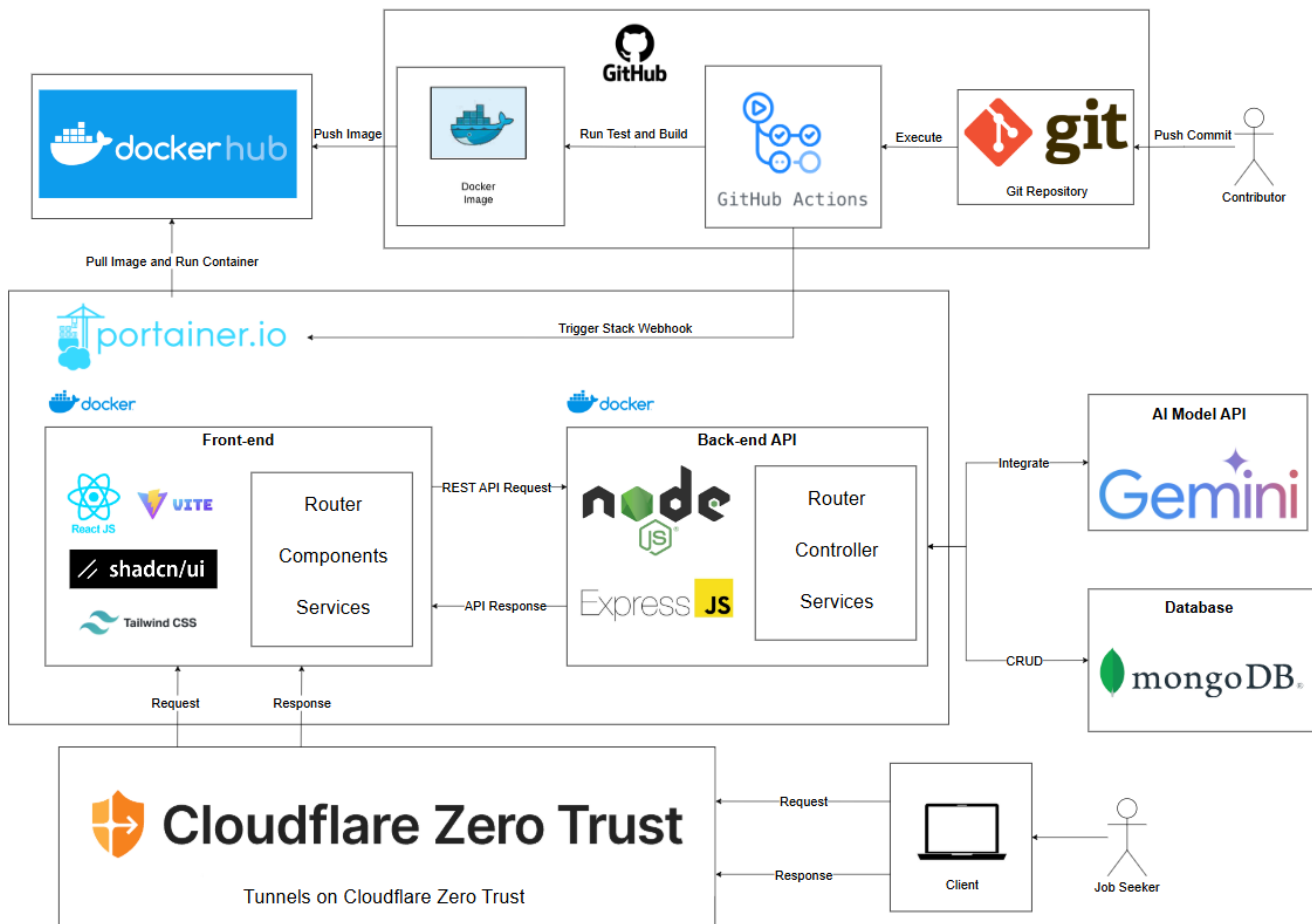


Figure 7: MatchWorks System Architecture Diagram

**CI/CD Development:** To streamline the process of testing and building applications, a CI/CD pipeline with GitHub Actions was created to automatically test and build Docker images depending on the code of contributors who push commits to the Git repository. Following successful testing and building, the Docker image will be published to Docker Hub, and the Portainer Stack Webhook will be triggered to grab the newly built image from Docker Hub and redeploy the containerized applications.

- **Git:** Developers (contributors) push their code commits to a GitHub repository.
- **GitHub Actions:** Executes tests and builds the application whenever a new commit is pushed. Automates the creation of Docker images from the codebase.
- **Docker Hub:** Stores Docker images built from the application code. It serves as a repository for containerized applications.

**Front-end Development:** Our Front-end is built with ReactJS – a JavaScript library for building user interfaces, Vite – a build tool for faster development, Shadcn UI and Tailwind CSS for styling and UI component design. These frameworks and tools simplified front-end development, allowing for the creation of visually appealing designs that are both practical and user-friendly.

**Back-end Development:** Node.js and Express.js are used to build the backend, which includes routing, controllers, and service layers for processing incoming REST API requests and responding to them. It connects two important parts of the system:

- **MongoDB:** A NoSQL database to handle data storage and CRUD operations for the application. All the system data is stored on this database such as user information, job posting, and others.
- **Gemini:** Google’s AI model API is integrated into the backend to provide AI-driven features for the application (Profile Generation, Resume Builder, Virtual Interview Practice, Roadmap Generator).

**Deployment:** Portainer Stack Webhook will retrieve and redeploy containerized applications from Docker Hub following each successful test and build. The containerized applications use Cloudflare Zero Trust Tunnels to connect localhost containers to a public domain name maintained by Cloudflare. The end users are able to use that tunnel to access the application on the public domain name, which improves security and performance thanks to Cloudflare features like caching, image optimization, rocket loader, and protocol optimization.

- **Docker:** Used to containerize the application (front-end, back-end). This maintains consistency across environments and streamlines update deployment. Docker also helps to scale the application as customer demand increases.
- **Portainer.io:** Manages and monitors Docker containers of both front-end and back-end. Automatically triggers stack updates (via webhooks) when a new image is available in Docker Hub through successful test and build from GitHub Actions.
- **Cloudflare Zero Trust:** Provides secure tunnels from server to user for accessing the web application and protects requests and responses between the client and the application backend.

## 5. Project Planning

### 5.1. Scope Definition

Here is the actual project's scope definition, outlining the key functionalities of our platform:

Feature	Priority	Description
Manage User Account		
Login & Logout	High	Users can log in and log out using registered credentials.
Register	High	Guests can create new accounts by providing valid credentials.
Profile Management	Medium	Users can view and update their profile information.



Profile Generation	Low	Users can generate profile information from uploaded resumes, overriding previous data while allowing review and edits before saving.
<b>Job Application</b>		
Job Searching and Filtering	High	Users can search and filter jobs by level, work type, location, and industry.
Job Recommendation	High	A recommendation engine suggests jobs based on users' profile information, including skills, positions, and interests.
Job Details	High	Users can view job details, including title and location, with a link to apply on the employer's website.
Job Saving	Low	Users can save jobs to their wish list for future review and application.
<b>Resume Builder</b>		
Upload Resume	High	Users can upload resumes containing relevant information such as skills, education, and experience.
Resume Analysis	High	AI analyzes resumes based on presentation, structure, content, skills, and language, providing scores and feedback.
<b>Virtual Interview Practice</b>		
Virtual Interview Practice Generation	High	AI-powered mock interviews in a chat interface help job seekers improve their interview skills
Interview Analysis	High	AI assesses users' interview performance and provides feedback.
<b>Roadmap Generator</b>		
Roadmap Generation	High	Generates a step-by-step career roadmap based on the user's resume, helping them improve skills and qualify for desired jobs.
Progress Tracking	Medium	Users can track progress by marking completed skills or tasks, advancing their progression meter.
Learning Resources Navigator	Low	Suggests relevant courses on external platforms like LinkedIn Learning and Udemy based on users' skills and career goals.

## 5.2. Work Breakdown Structure (WBS)

The Work Breakdown Structure (WBS) for the “MatchWorks” project is structured into five key phases, ensuring systematic development and project execution:

- **Requirement Specification:** Defines the project's core features, non-functional requirements, and product backlog. This phase establishes a clear scope, ensuring alignment with user needs and technical constraints.
- **Design:** Develops the UI/UX, API structure, system architecture, and database schema. This phase ensures seamless user experience, efficient data flow, and well-structured backend architecture.
- **Implementation:** Focuses on developing and integrating front-end and back-end functionalities, database management, and project coordination. This phase ensures the platform's functionality and responsiveness.
- **Testing:** Validates system reliability and performance through unit testing, integration testing, and user acceptance testing, ensuring a robust and error-free application.

- **Deployment:** Involves hosting, launching, and maintaining the application, ensuring smooth front-end, back-end, and database deployment for a fully functional and accessible platform.

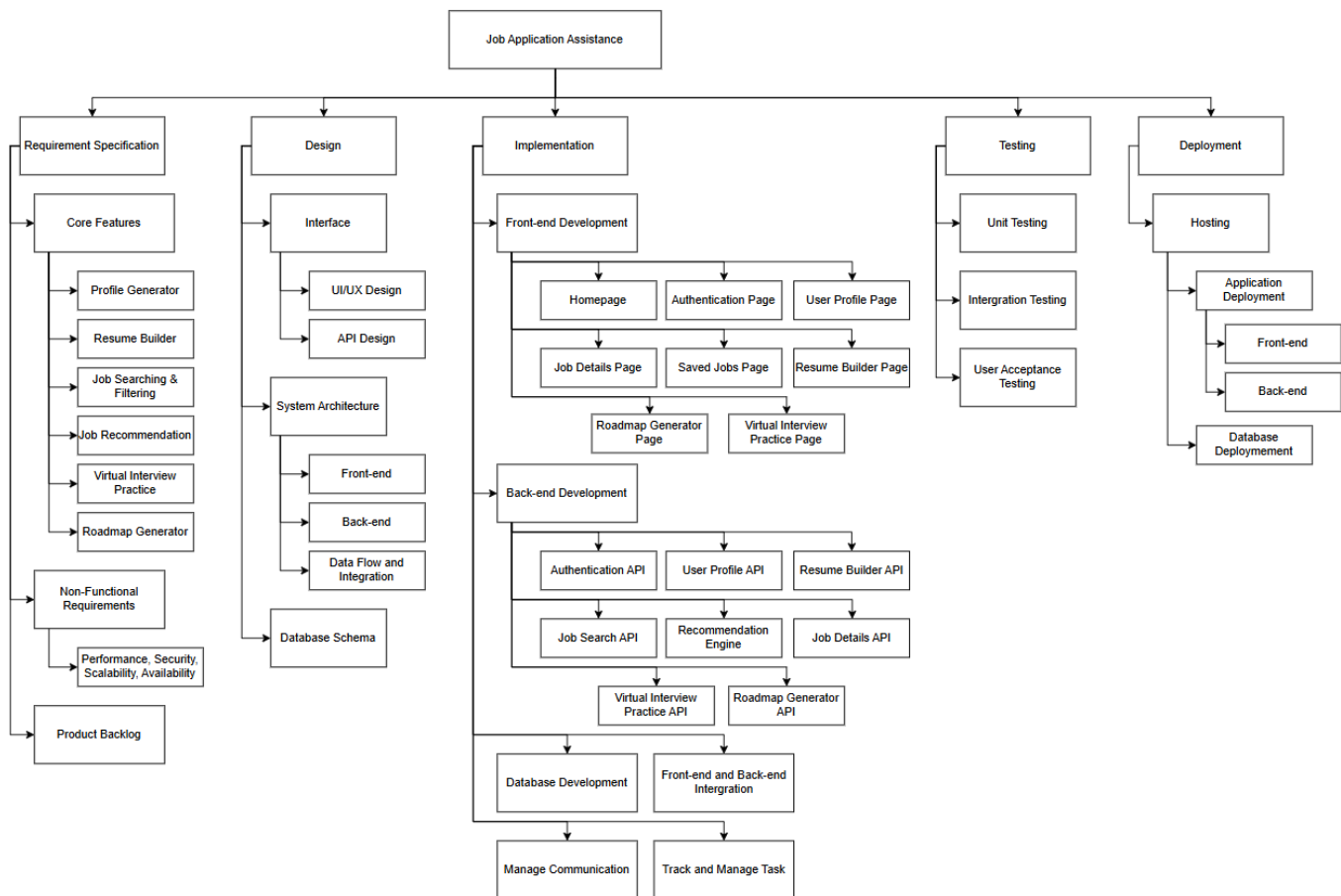


Figure 8: Work Breakdown Structure (WBS)

### 5.3. Project Timeline

Sprint	Week	Activity	PIC	Deliverables	Milestone
1	1-3	Requirement specification, system architecture design, product backlog identification	Project Manager, Scrum Master, Developers	Project scope and requirements, system architecture diagram, product backlog	Project initialization completion
2	4	UI/UX design, API endpoints design, database schema design	UI/UX Designer, Developers	UI/UX prototypes, list of API endpoints, ERD	System design completion
3	5	Authentication features and homepage development and testing	Developers, QA Engineers	Completed authentication features and homepage, test report	Basic features development completion
4	6	User profile management, job recommendation,	Developers, QA Engineers	Completed user profile management, job recommendation,	

		searching, and filtering development and testing		searching, and filtering features, test report	
5	7-8	Resume builder and roadmap generator development and testing	Developers, QA Engineers	Completed resume builder and roadmap generator features, test report	Advanced features development and website deployment completion
6	9-10	Virtual interview practice feature development and testing, website deployment	Developers, QA Engineers, DevOps Engineer	Completed virtual interview practice feature, fully functional and deployed website	
7	11-12	Project documentation and demonstration video preparation.	Project Manager, Developers	Documentation, final report, demonstration video.	Project finalization completion

## 5.4. Risk Management

- **Likelihood scale:** Low (<30%), Medium (30-70%), High (>70%).
- **Impact scale:** 1 (Negligible, minor inconvenience), 2 (Low, affects one feature), 3 (Moderate, affects multiple features), 4 (High, critical delays to core functionality), 5 (Severe, threatens project completion).

Risk	Description	Mitigation Strategy
<b>Underestimated Core Features Complexity</b> Likelihood: Medium Impact: 4	Developing core features may take longer than expected, leading to rushed implementation, incomplete functionalities, or missed deadlines.	Begin core feature development early and track progress to recalibrate estimates if needed. Conduct regular reviews and deprioritize non-essential tasks to ensure timely completion of critical functionalities.
<b>Team Members Availability Issues</b> Likelihood: Low Impact: 4	Unexpected unavailability of team members due to illness or personal reasons could slow down implementation, especially in a small team of three.	Assign secondary team members to critical tasks as a backup plan. Implement cross-training so all members have basic knowledge of each other's responsibilities, ensuring continuity in case of absences.
<b>Data Security and Privacy Breaches</b> Likelihood: Medium Impact: 5	The application handles sensitive user data, including personal information and resumes, making it vulnerable to breaches if security measures are inadequate.	Implement data encryption, secure authentication, and conduct regular security audits. Store API keys securely and follow best practices for handling sensitive data.
<b>API Cost and Usage Constraints</b> Likelihood: High Impact: 5	Heavy reliance on ChatGPT/Gemini API for key features (resume builder, mock interviews) may lead to unexpected costs or usage limitations, affecting functionality.	Establish a usage budget and monitor API consumption closely. Explore cost-effective alternatives and develop simplified rule-based fallback solutions to ensure feature availability.
<b>Deployment Difficulties</b> Likelihood: Medium Impact: 3	Potential issues with Docker configurations or system compatibility could delay deployment.	Prepare alternative Docker configurations and establish backup deployment strategies to mitigate compatibility issues and ensure flexibility.

## 6. Project Monitoring and Control

### 6.1. WBS and Timeline Implementation

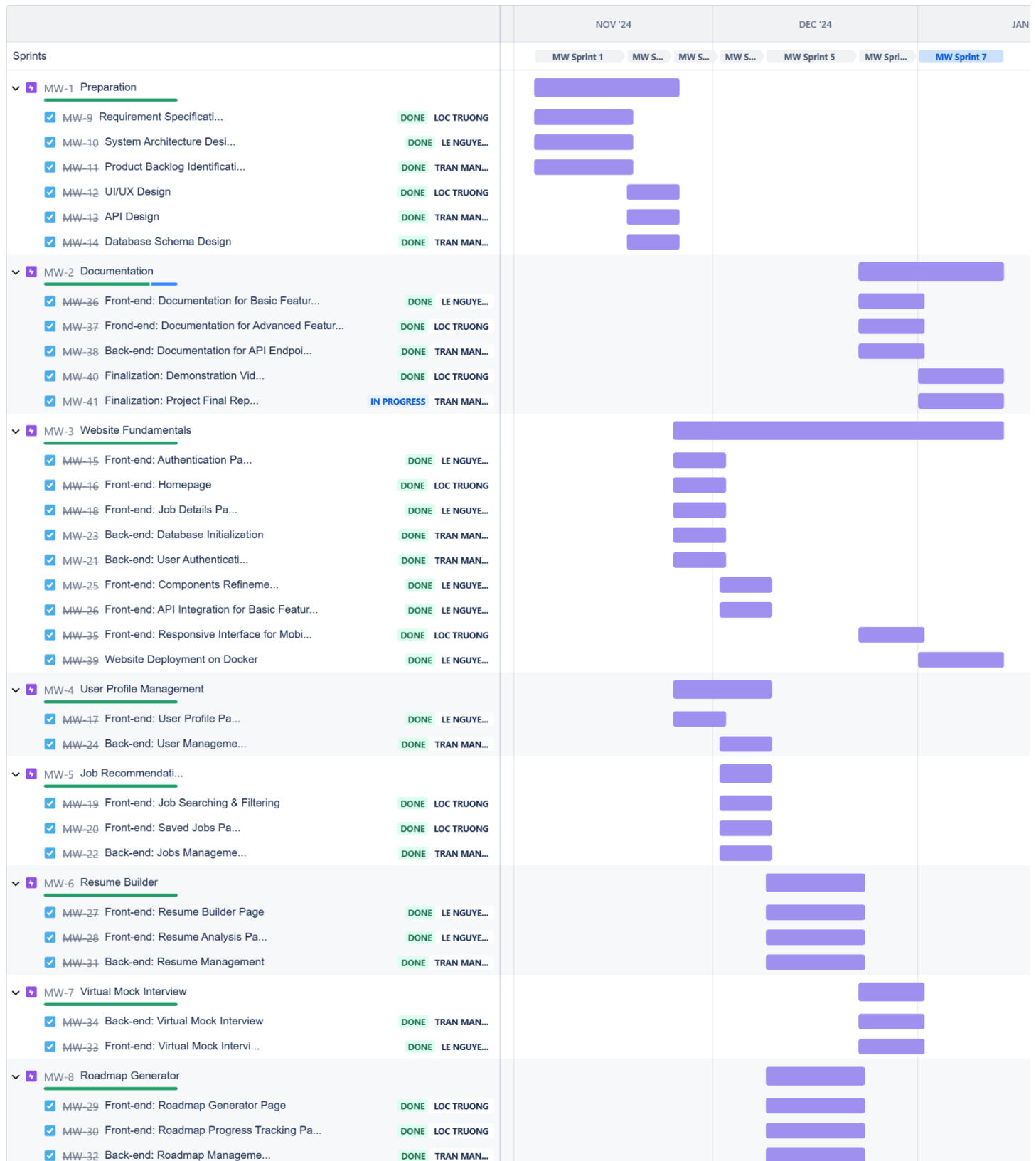


Figure 9: MatchWorks Project Timeline on Jira

Our team utilized Jira as the central project management tool to implement the Work Breakdown Structure (WBS) and align it with the project timeline. The eight key epics, including Preparation, Documentation, Website Fundamentals, User Profile Management, Job Recommendation, Resume Builder, Virtual Mock Interview, and Roadmap Generator, provided a clear structure for organizing the project's deliverables. Each epic represented a major module of the project and was broken down into detailed tasks, categorized by specific areas such as front-end development, back-end development, and documentation. For example, the "Preparation" epic included tasks like "Requirement Specification," "System Architecture Design," and "Database Schema Design," which were critical for laying the groundwork. Similarly, the "Website Fundamentals" epic comprised tasks such as "Front-end: Authentication Page" and "Back-end: User Authentication," ensuring both the user interface and server-side components were addressed. This detailed breakdown enabled clarity, focus, and comprehensive coverage of all activities.

The project timeline was implemented in Jira through sprints, each lasting approximately 1 to 2 weeks. During sprint planning meetings, the team selected tasks from the product backlog for the upcoming sprint, ensuring a balanced workload. Each team member was assigned 2 to 3 tasks per sprint, promoting equal task distribution and efficient progress. Team members were responsible for managing the statuses of their tasks on the Kanban board, which included columns for "To Do," "In Progress," "In Review," and "Done." If a task was too complex, members could create subtasks to break it into manageable parts, ensuring effective execution. For instance, a task such as "Back-end: Resume Management" might be divided into subtasks like "Database Integration" and "API Development." This flexibility allowed the team to address complexity without losing momentum.

The Kanban board also played a vital role in tracking real-time progress and maintaining adherence to the Definition of Done (DoD) for each column. Tasks moved from "In Review" to "Done" only after being reviewed and approved during the sprint review meeting, ensuring quality standards were met. For example, foundational tasks like "UI/UX Design" and "API Design" in the Preparation epic were completed smoothly, while ongoing tasks such as "Finalization: Project Final Report" in the Documentation epic remained in "In Progress" until all requirements were satisfied.

## **6.2. Performance Evaluation**

### **6.2.1. Efficiency**

The team followed a structured sprint-based approach using Jira to track progress and manage tasks. However, not all sprints were completed within the planned timeframe, as some challenges required additional iterations. In Sprint 3, front-end and back-end integration encountered data formatting and synchronization issues, leading to delays. The affected tasks were moved back to the product backlog and carried forward into the next sprint to ensure proper implementation. Similarly, in Sprint 5, integrating the Gemini API proved challenging due to unexpected AI behavior. The team had to spend additional time learning and troubleshooting, while also managing workload pressures from external coursework and jobs. This led to delays in AI-powered features and required adjustments in task prioritization. Sprint 6 also faced delays as the team had to learn how to implement a real-time chatbot for the Virtual Mock Interview feature. Due to time constraints, the original plan to implement voice interaction was adjusted to a text-based chat interface to ensure feature completion within the sprint.

Despite these challenges, the agile approach allowed the team to adapt dynamically, reschedule tasks, and successfully complete all essential features within the project timeframe. The use of sprint retrospectives and backlog adjustments helped the team manage workflow disruptions without compromising overall project quality.

### 6.2.2. *Effectiveness*

The project maintained a balanced task distribution, with each team member assigned 2-3 tasks per sprint. The Kanban board in Jira enabled real-time tracking, and sprint planning meetings helped adjust workloads as needed. However, unexpected difficulties in API integration, AI debugging, and real-time chatbot implementation required more effort than initially estimated. Task carryovers from Sprint 3 and Sprint 5 slightly impacted effectiveness, requiring the team to make trade-offs in feature development. To ensure the completion of critical functionalities, some planned features were excluded:

- **Resume Revise and Generate in Resume Builder:** Initially, the system was designed to allow users to automatically revise and generate improved resumes based on AI-suggested feedback. However, applying AI-driven modifications to a variety of resume formats proved too complex. It was determined that such an approach could negatively impact user satisfaction, as it might alter the resume's original formatting.
- **Voice Interaction in Virtual Interview Practice:** The initial plan was to integrate voice-based interactions where the AI would use text-to-speech and analyze recorded user responses. Due to time constraints and the complexity of real-time voice processing, this feature was simplified to a text-based chat interface to ensure delivery within the project timeframe.

Although these features were excluded, the team effectively prioritized core functionalities, ensuring that essential job application assistance tools, including job recommendation, resume analysis, virtual interview, and roadmap generation, were fully developed and deployed.

### 6.2.3. *Quality of Project Outcome*

The MatchWorks platform was successfully deployed with all core features fully functional and validated through unit testing and user acceptance testing. The testing process confirmed that the system had no critical bugs and performed reliably across different user scenarios.

The UI/UX design was developed with a user-friendly, interactive, and responsive interface, ensuring seamless navigation across key features. Feedback from user acceptance testing indicated that users found the platform intuitive, with a well-structured layout that made job searching, resume analysis, and interview practice straightforward. The design was optimized for both desktop and mobile devices, ensuring accessibility across multiple screen sizes.

Performance testing showed that the system's loading and processing times were acceptable, allowing smooth transitions between features. However, some AI-based functionalities required slightly longer processing times. While the current performance meets usability standards, further optimizations in data processing and API response times could enhance user experience in future updates. Moreover, the security of the platform was robust, implementing secure authentication, encrypted data storage, and role-based access controls to protect sensitive user information. Resumes and job application data were securely stored, minimizing risks related to unauthorized access or data breaches.

The result of AI-powered features also performed accurately and provided valuable insights. The Resume Builder effectively analyzed uploaded resumes, offering detailed suggestions for improvement. The Virtual Interview Practice AI-generated relevant questions based on job roles and provided insightful feedback to help users refine their responses. The Roadmap Generator successfully created structured career paths, guiding users in skill development based on industry demands.



### 6.3. Corrective Actions

Throughout the project, several challenges were identified, requiring corrective actions to maintain progress and ensure successful delivery. The team implemented the following strategies to address issues, adjust schedules, and optimize resource allocation:

- **Prioritizing and Managing Tasks Strictly:** Task prioritization was reinforced to ensure essential features were completed on time. Tasks were reviewed in sprint planning meetings, and high-impact tasks were given priority. Tasks that exceeded estimated effort were broken into subtasks, and non-critical features were deprioritized when necessary to prevent project delays.
- **Regular Communication:** The team enhanced communication by conducting daily stand-up meetings to track progress, identify blockers, and provide quick resolutions. Sprint review and retrospective meetings were used to reassess task completion, adjust workloads, and refine workflows to improve efficiency.
- **Cross-Training Team Members:** To mitigate availability risks, cross-training was introduced, allowing team members to develop competencies beyond their primary roles. This ensured that tasks could be reassigned smoothly in case of unexpected absences, preventing bottlenecks and ensuring continuous progress.
- **Pair Programming for Complex Features:** Pair programming was used for challenging tasks such as Gemini API integration and front-end/back-end synchronization. This approach improved code quality, reduced debugging time, and accelerated problem-solving by allowing two developers to collaborate on a single feature.

## 7. Conclusion

### 7.1. Key Findings and Achievements Summary

The MatchWorks project successfully delivered a fully functional and deployed job application assistance platform, meeting all predefined objectives. The system provides users with AI-powered job recommendations, resume analysis, virtual interview practice, and career roadmap generation, enhancing their job search and professional development. The platform ensures seamless, interactive, and responsive user experience, with efficient performance and secure data handling.

All core functionalities were developed, tested, and deployed within the project timeline. The job recommendation engine effectively suggests roles based on users' profiles, while the resume analysis feature provides structured feedback on key resume elements. The virtual interview practice simulates real interview scenarios, offering AI-driven insights to improve user responses. The roadmap generator creates personalized career pathways, guiding users toward skill development and job readiness.

Throughout the project, all deliverables were successfully completed, including technical documentation, API specifications, system architecture designs, and a final demonstration video. The system was validated through unit testing and user acceptance testing, ensuring reliability, usability, and security. Performance benchmarks confirmed that the system maintains acceptable response times, while security measures, including secure authentication and encrypted data handling, effectively protect user information. The final deployment was stable, making the platform fully accessible and operational.

### 7.2. Project Management Reflection

The project followed a structured and adaptive project management approach, combining Scrumban methodology with Jira-based tracking. The use of Kanban boards, sprint planning, and backlog refinement allowed our team to

effectively prioritize tasks and manage workflows. Daily stand-ups, sprint reviews, and retrospectives facilitated communication, enabling the team to address blockers and optimize performance. While the framework provided structure, the team members quickly learned that flexibility and continuous adjustments were essential for successfully managing tasks and timelines.

Throughout the project, the team encountered technical challenges, such as data formatting inconsistencies, AI integration complexities, and workload balancing. Early sprints revealed gaps in time estimation for certain tasks, leading to carryovers and schedule adjustments. The team learned the importance of realistic task estimation and gradually improved sprint planning by incorporating insights from previous sprints. Midway through the project, the team adopted corrective measures, including pair programming for complex development tasks, cross-training to improve adaptability, and stricter prioritization of deliverables. These improvements enhanced efficiency, reduced development bottlenecks, and improved problem-solving capabilities.

One of the key takeaways from this project was the importance of proactive risk management and flexible task allocation. Initially, unforeseen technical difficulties and workload fluctuations disrupted task progression. However, by anticipating potential delays, dynamically adjusting sprint priorities, and reallocating tasks based on team availability, the project was kept on track. Another key learning was the importance of strong communication and collaboration in a small team. With only three members, maintaining a clear understanding of task progress and dependencies was critical. Regular discussions, shared accountability, and knowledge sharing helped the team remain aligned.

In conclusion, the project management process provided valuable lessons in agile execution, adaptability, and continuous improvement. All team members gained practical experience in managing workflows, optimizing resource allocation, and refining sprint execution. While some challenges required real-time problem-solving, the structured approach combined with agile flexibility ensured the successful delivery of a high-quality product within the project timeline.

### 7.3. Recommendations for Future Projects

Throughout the project, several areas for improvement were identified, providing valuable insights for future projects. The following recommendations focus on enhancing efficiency, optimizing task management, and improving risk mitigation strategies to ensure smoother project execution:

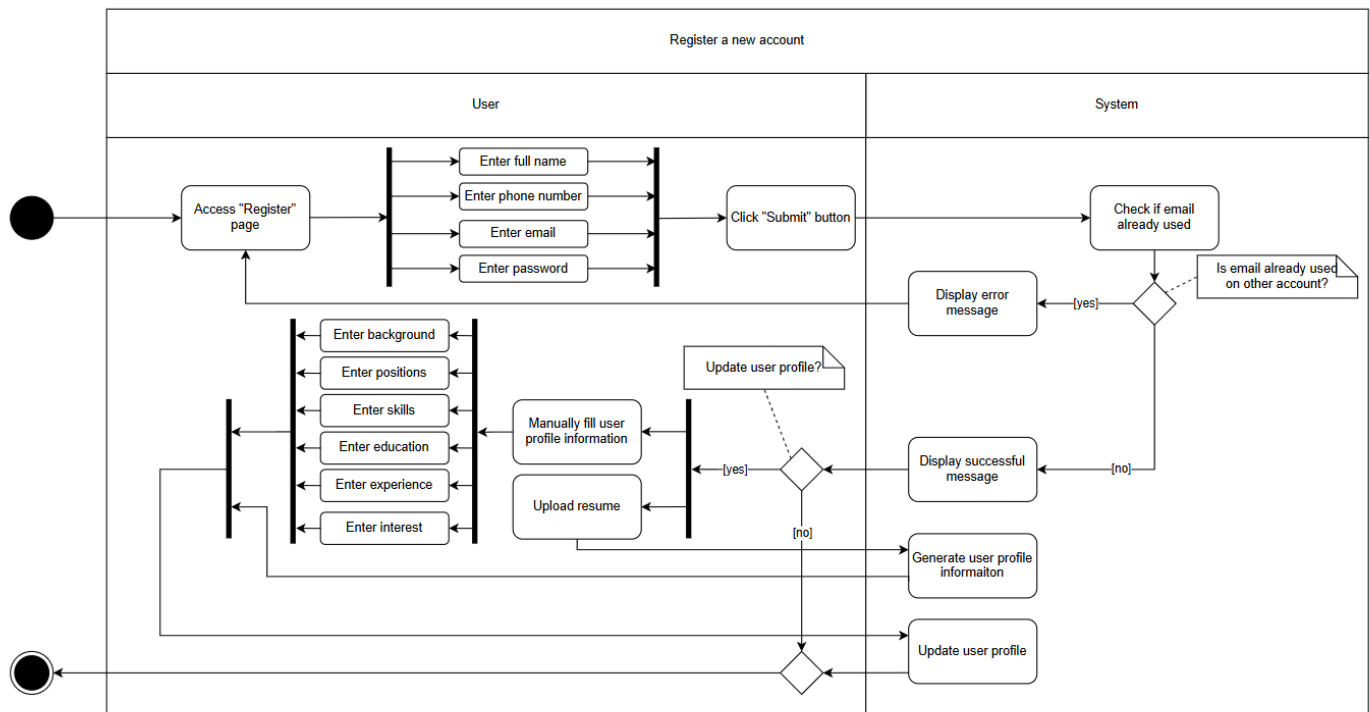
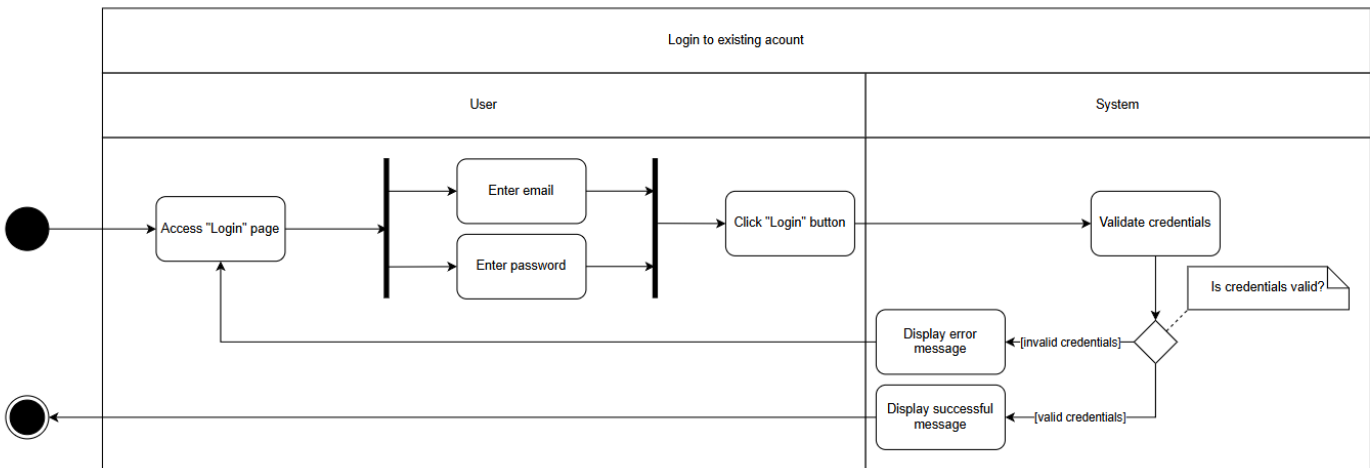
- **Improving Time Estimation Accuracy:** Task effort estimation should be refined by leveraging data from past sprints. Historical sprint analysis can help improve prediction accuracy, reducing task carryovers and ensuring better alignment with project timelines.
- **Enhancing Risk Management Strategies:** Potential challenges should be identified early in the project lifecycle, with contingency plans integrated into the development schedule. Regular risk assessments and progress checkpoints should be conducted to proactively address technical and resource-related risks.
- **Strengthening Cross-Training Initiatives:** Expanding cross-training programs will improve team adaptability and reduce dependency on specific individuals. Ensuring all team members have fundamental knowledge of multiple areas will allow smoother task reallocation and prevent bottlenecks.
- **Optimizing Sprint Workflows:** Backlog management and prioritization methods should be refined to enhance sprint efficiency. Breaking down complex tasks into smaller, manageable subtasks will improve tracking and execution, reducing the likelihood of incomplete work at sprint deadlines.

## 8. References

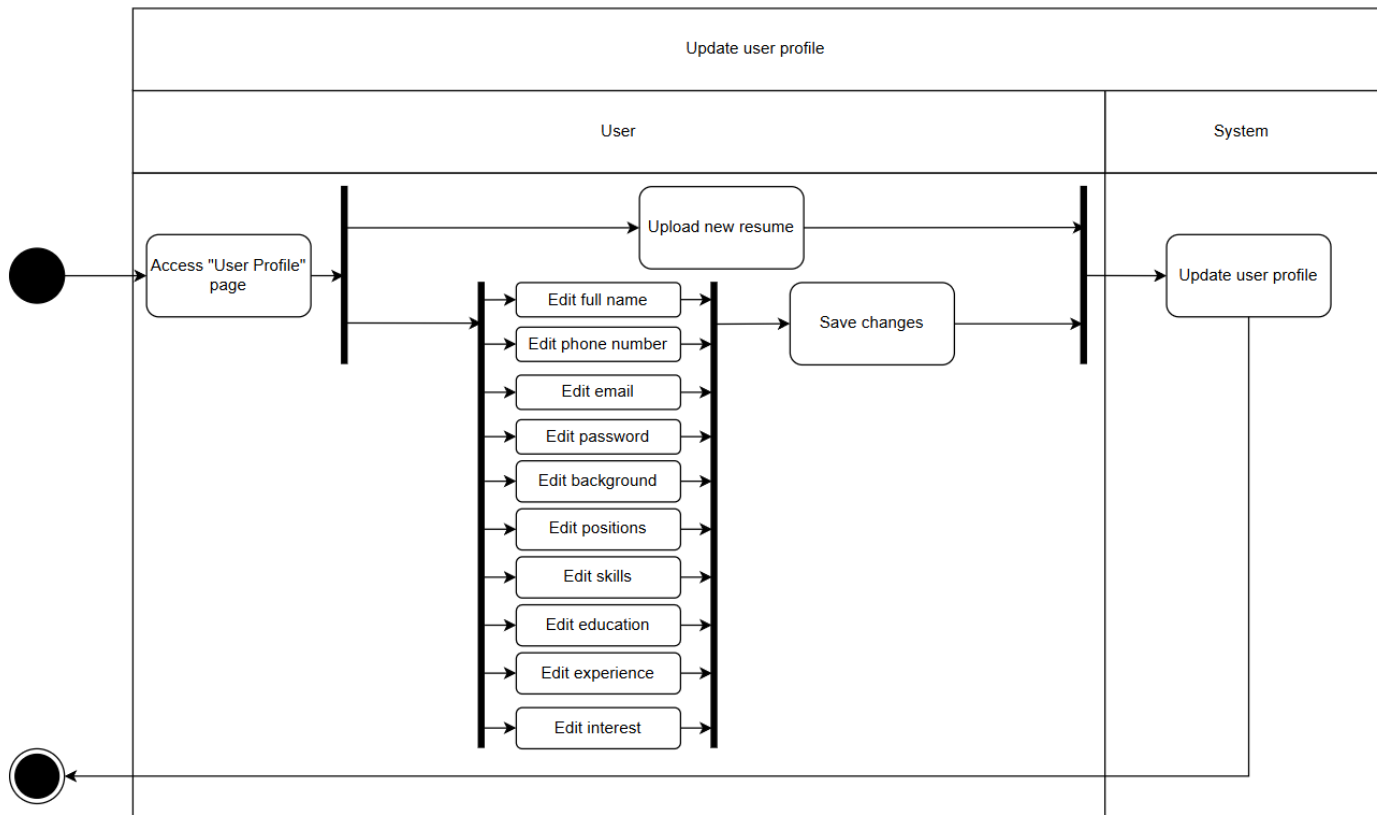
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## 9. Appendix

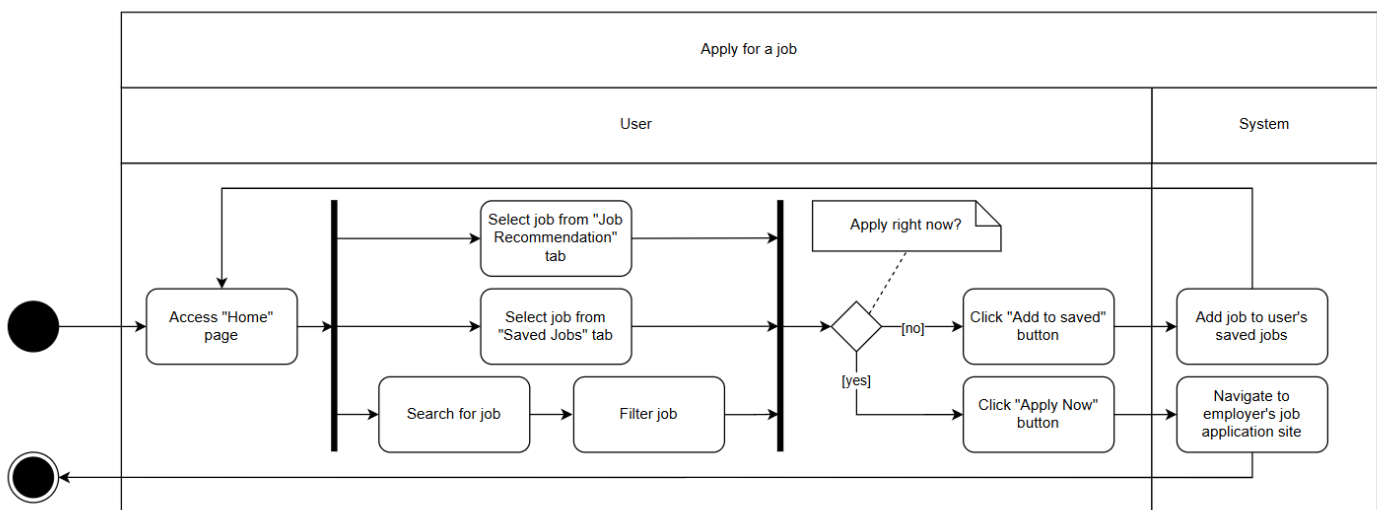
### Appendix 1: Activity Diagram for Authentication Features



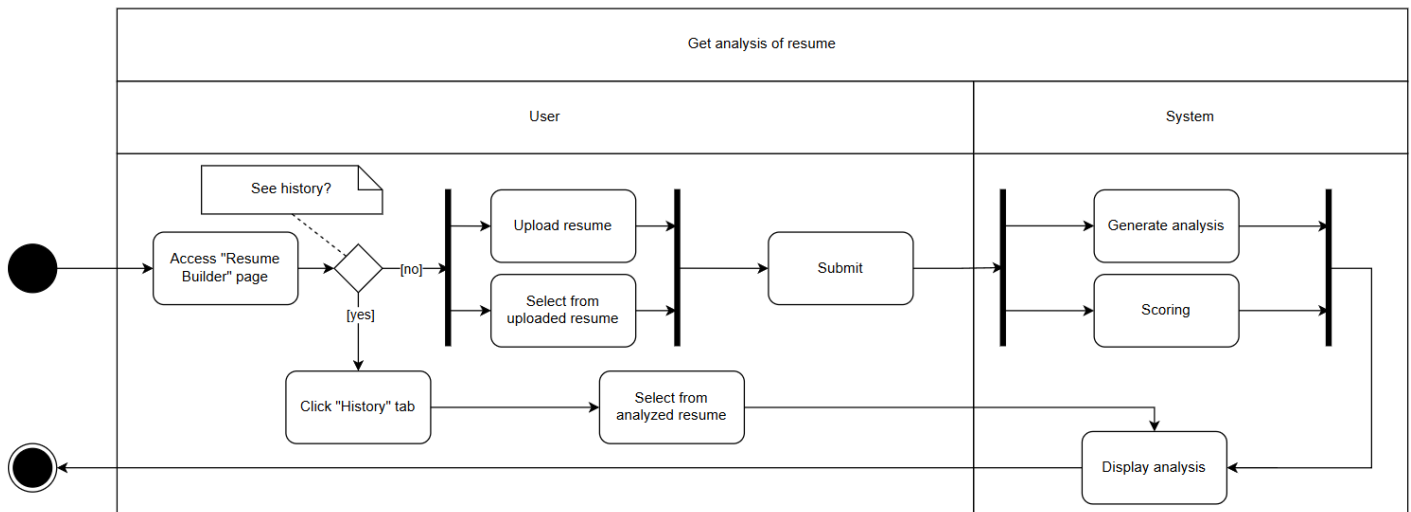
## Appendix 2: Activity Diagram for User Profile Management Feature



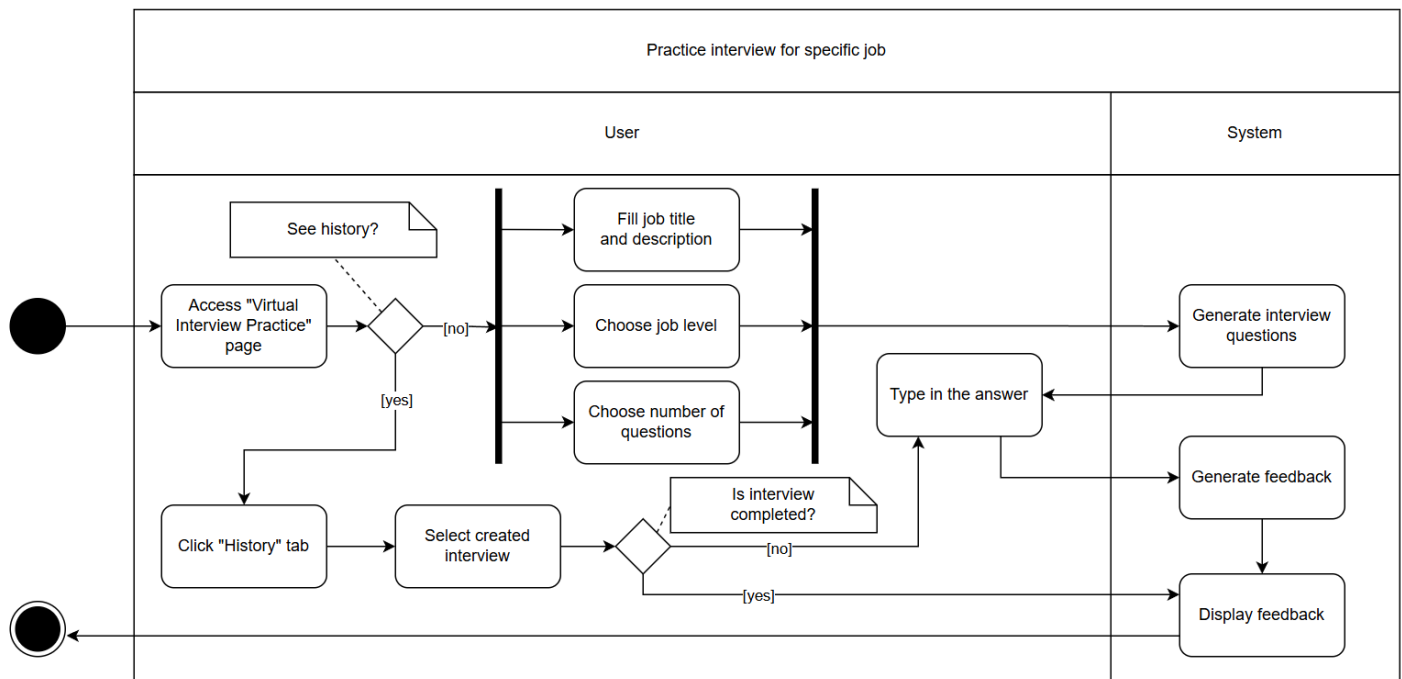
## Appendix 3: Activity Diagram for Job Application Features



## Appendix 4: Activity Diagram for Resume Builder Feature



## Appendix 5: Activity Diagram for Virtual Interview Practice Feature





## Appendix 6: Activity Diagram for Roadmap Generator Feature

