

Cloud Computing Project Proposal

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1 Introduction

The research presented by M. Saatç̄ı et al. [1] proposes the use of Natural Language Processing with Jaccard Similarity as a means of measuring the suitability of candidates for a given job listing. However, as stated in the abstract, the application was developed with employers as the main beneficiary and thus offers a very limited feature set that fails to fully utilise the strengths of NLP. It focuses exclusively on automating the resume screening process, with the purpose of addressing the difficulties employers face in screening the large volume of applications received daily [1].

Our project aims to develop an AI-powered Career Guidance Platform as an expansion upon the methods discussed in this paper; to offer a wider set of features that would benefit students and early-career professionals seeking positions in the tech industry. The system will analyse user profiles to recommend career paths, learning opportunities, and events that improve employability and readiness for target roles. Features we intend to incorporate for this platform include:

- CV & Questionnaire Analysis: Generate personalized career, internship, and job recommendations.
- Skill Matching & Scoring: Compare user skills with job requirements and identify missing skills.
- Smart Recommendations: Suggest relevant courses, hackathons, and workshops to strengthen candidate profiles.
- Regional Insights (Google Maps API): Recommend local or remote events, hackathons, and opportunities.
- Live Job & Market Analytics: Provide real-time insights on trending skills, roles, and regional demand.
- Dynamic Dashboard: Offer an intuitive interface for tracking progress, opportunities, and analytics.
- Career Roadmapping Assistant (Non-essential Feature): Help users visualise long-term career growth and learning paths.

Our application will also feature cloud integration to improve the user experience and facilitate a more efficient approach to development. Resource-intensive NLP processes such as semantic analysis and similarity measurement will occur entirely within a heavy-duty cloud environment, improving accessibility by fully alleviating users of the processing cost involved in data processing; powerful hardware is not a requirement for use. Furthermore, we will use highly scalable, cloud-based databases that can easily adapt to the volatility of job listings and experience-building opportunities while remaining cost-effective.

2 Project Motivation

In the current competitive job market, students and early-career professionals face increasing challenges in securing meaningful employment. Many companies now expect candidates to have extensive prior experience for entry-level and graduate roles. Students often struggle to gain “relevant experience” while still at university. Existing career recommendation systems often fail to provide relevant or dynamic insights related to opportunities and technologies students should aim to learn to secure a position in the turbulent tech landscape. The study presented by Yahui et al. [2] empirically supports these observations, stating that ”graduate unemployment arises from high expectations, limited practical experience and inadequate career guidance”[2].

Our system attempts to resolve this issue by interfacing with leading hiring sites and using semantic comparison algorithms to deliver personalised recommendations for active learning experiences such as coding competitions, hackathons, or networking events — all of which are vital for holistic professional development.

3 Beneficiaries

This project is targeted towards early careers and student applicants interested in pursuing a career in the tech industry. It will focus primarily on software engineering and graduate scheme roles; for the purpose of testing the usability, accuracy, and impact of the platform within a well-defined domain where skill-based matching and technical upskilling are critical. However, expansion into other roles and industries is naturally supported by the versatility of NLP techniques such as semantic analysis, and will be considered following the successful validation of this initial implementation.

4 Planned Methodology

Sprint No.	Month / Weeks	Focus	Deliverables
1	October (Weeks 3-4)	Setting up the development environment and cloud infrastructure	<ul style="list-style-type: none">• Google Cloud project setup (Firestore/BigQuery, Functions, Vertex AI setup)• GitHub repo + collaboration workflow
2	November (Weeks 1-2)	Building data ingestion and backend services	<ul style="list-style-type: none">• Connection with external APIs• Backend endpoints for user profile, CV upload, and job data retrieval• Database schema for user and opportunity storage
3	November (Weeks 3-4)	Developing machine learning models for recommendations	<ul style="list-style-type: none">• Skill-matching algorithm• Initial recommendation engine working with mock data• Basic dashboard UI for viewing recommendations
4	December (Weeks 1-2)	Connecting backend, frontend, and cloud components	<ul style="list-style-type: none">• Dynamic Dashboard with analytics, regional insights and real-time alerts (if possible)
5	December (Weeks 3-4)	Testing, debugging, optimization, and presentation readiness	<ul style="list-style-type: none">• End-to-end system testing• Model fine-tuning for fairness & bias detection• Cost optimization on GCP + logging setup• Final demo version deployed on Google Cloud• Video presentation

Figure 1: Table describing the planned approach to implementation.

5 Technological Stack

Layer	Technology	Purpose
Frontend (Web)	React.js + Tailwind	Server-rendered web UI for users
Backend (API Layer)	FastAPI	REST API for recommendations and data logic
Cloud Platform	Google Cloud (GCP)	Scalable hosting and Pub/Sub for event streams
Database	Firestore / BigQuery	Store user profiles and job data
AI Layer	TensorFlow / Vertex AI	Machine learning models for personalization
APIs	LinkedIn, Devpost, Google News, Coursera	External data integration
Alerts System	Cloud Functions + Firebase Notifications	Real-time push alerts

Figure 2: Table outlining the technological stack of the Career Guidance Platform application.

6 Block Diagram

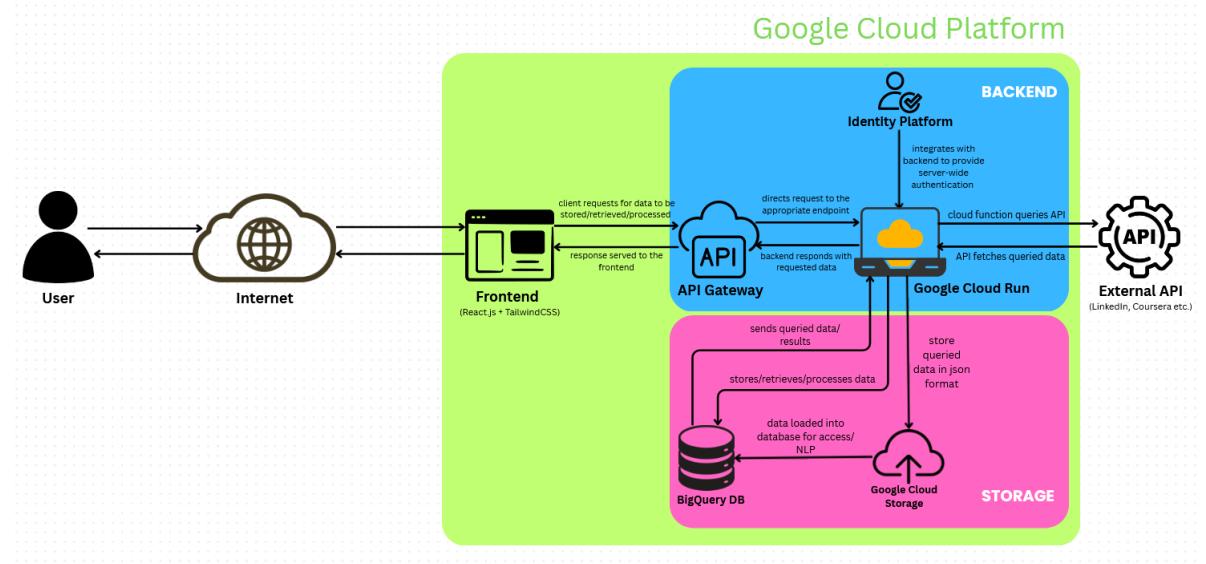


Figure 3: Block diagram depicting the infrastructure of the Career Guidance Platform and the data flow between systems.

7 Risks

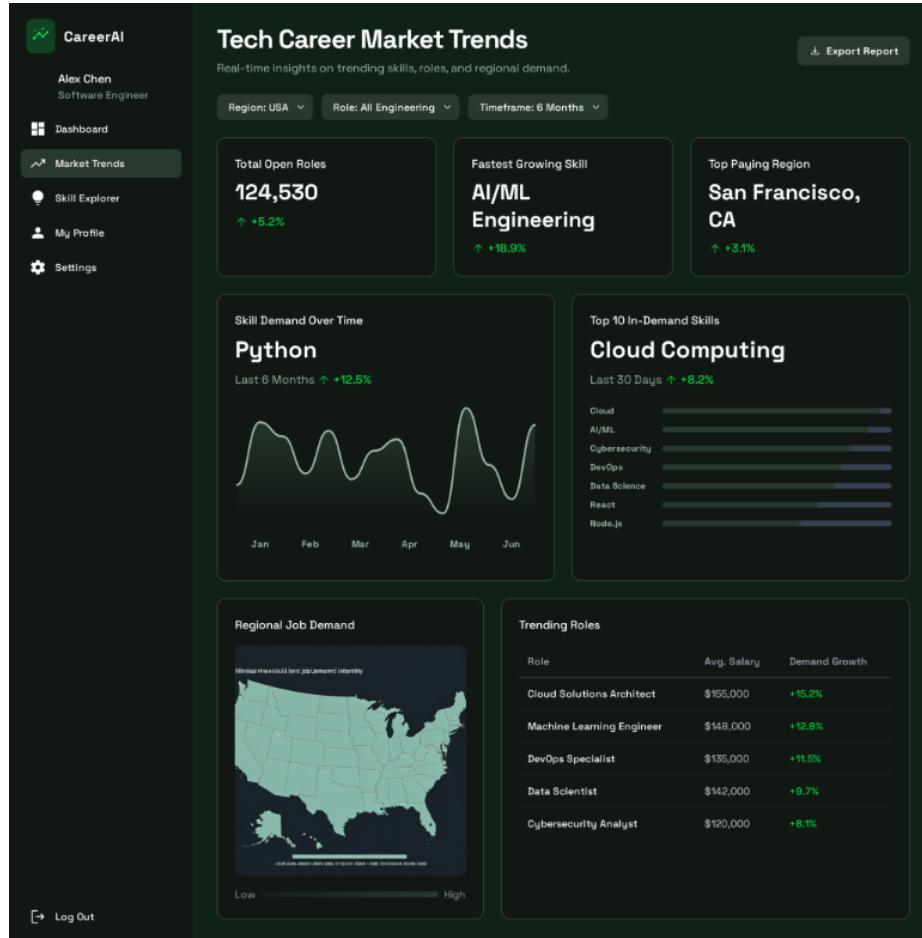
No.	Risk Description	Risk Level	Proposed Solution / Mitigation
1	Unauthorized access to user or company data stored on the cloud.	High	Implement strong authentication (Identity Platform, OAuth 2.0), use encryption for data at rest and in transit, and conduct regular security audits.
2	External APIs (e.g., job feeds, recommendation systems) may fail or change endpoints.	Medium	Error handling + Feature flagging to prevent users from encountering interruptive error pages.
3	The recommendation model may favor certain roles or companies due to biased training data.	Medium	Train models with diverse datasets, different classification thresholds, and include consistent human reviews to ensure transparency.
4	Resource usage on Google Cloud may exceed budget limits due to scaling or storage.	Medium	Use GCP cost monitoring tools and set budget alerts to regularly review usage analytics.
5	Continuous addition of non-essential features may delay delivery and affect quality.	Low	Scale back extra features (e.g career roadmapping assistant, additional verification of false job postings) to focus on implementing the core functionality.

Figure 4: Table outlining development risks alongside their solutions and mitigative plans.

8 UI Wireframe

The wireframe displays the following components:

- Header:** CareerPilot AI logo, search bar ("Search for skills or jobs..."), and notification icons.
- Sidebar:** Navigation menu with "Dashboard" (selected), "Roadmap", "Resources", "Profile", and "Settings".
- Welcome Message:** "Welcome back, Alex!"
- My Career Roadmap:** Shows "Next Milestone: Build Portfolio" with a progress bar at 65%.
- Skills Analytics:** "Skill Proficiency" section featuring a sunburst chart and "Skills In-Demand" section showing:
 - Python: 90%
 - TensorFlow: 75%
 - Cloud (AWS): 50%
- Current Goals:** List of tasks:
 - Complete 'Python for Data Science' module (checked)
 - Update GitHub portfolio with a new project
 - Network with 3 AI professionals on LinkedIn
- Recommended Jobs:** Two job cards:
 - AI/ML Intern at Google (Python, AI)
 - Data Science Intern at OpenAI (SQL, Tableau)
- Suggested Learning:** Two course/cards:
 - Advanced TensorFlow Coursera Course
 - Optimizing ML Models Towards Data Science Article
- Upgrade Plan:** A green button.
- User Profile:** Avatar of Alex Chen, "Aspiring AI/ML Engineer".



CareerGenie

Dashboard My Profile Recommendations Log Out

Alex Doe
Software Engineer

Upload CV Questionnaire Review Save for Later

Let's Start with Your CV

Upload your CV to automatically fill in your details and get a head start.

Drag & drop your file here
Supports PDF, DOCX.
Browse Computer

Personal Details

Full Name: Alex Doe Email: alex.doe@example.com

Education: e.g., B.Sc. in Computer Science Years of Experience: e.g., 3

Skills & Technologies

Add your skills (e.g., Python, React, AWS)

JavaScript Node.js Type a skill and press Enter

Work Preferences

Preferred work environment?

Fully Remote Hybrid In-Office

Next: Review

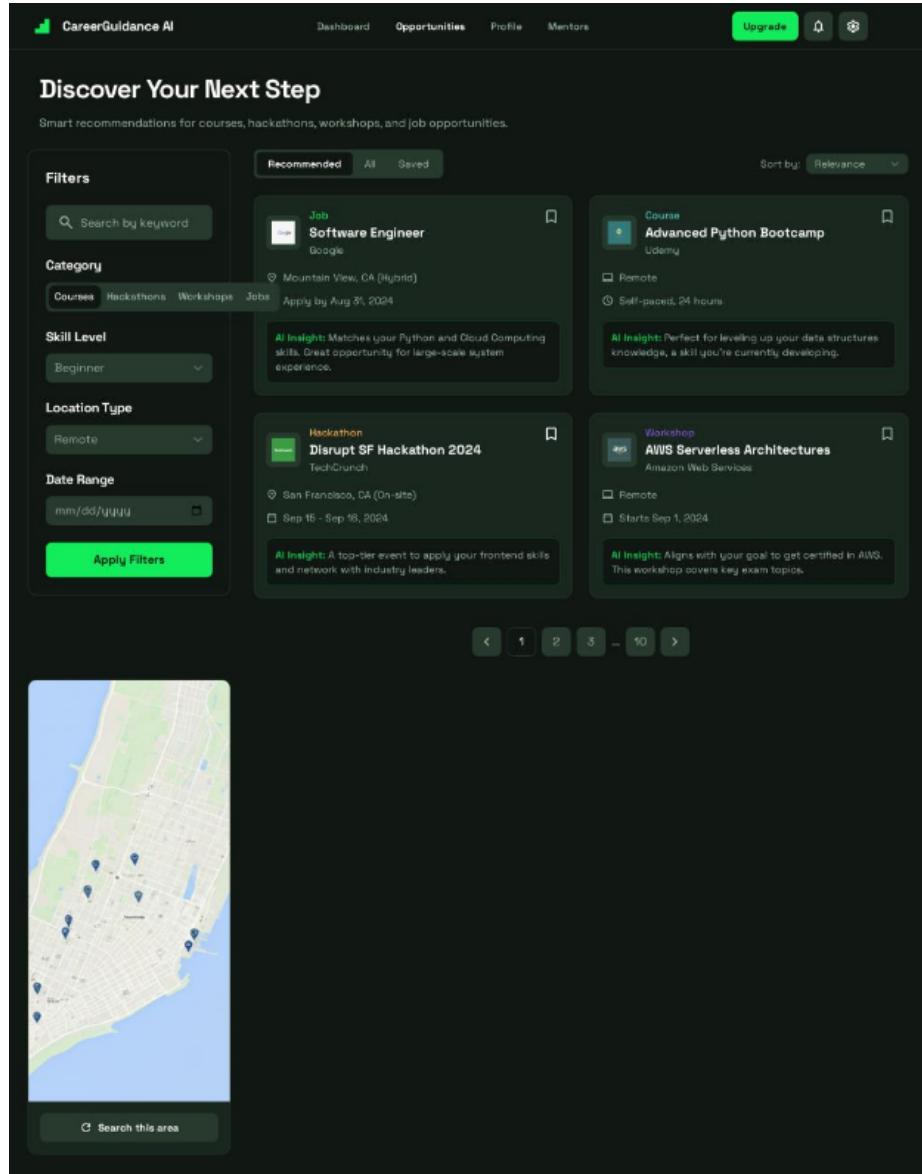


Figure 5: Wireframes for the UI of the Career Guidance Platform application.¹

¹Designed with the assistance of Figma Make.

9 Member Contribution

Name	Project Section in Charge Of	Detailed Contributions
Roinee Banerjee	Cloud Infrastructure & Documentation	<ul style="list-style-type: none">Initiated project direction and coordinated team meetings to finalize topic selection and task distribution.Conducted extensive literature review on cloud-based career guidance systems.Drafted and structured the initial and final versions of the proposal, including introduction, motivation, and methodology sections.Identified and analysed potential project risks and their possible solutions.Defined the overall technology stack and architecture outline for the project.Participated in final editing and formatting.
Kyron Caesar	AI Integration & Backend Development	<ul style="list-style-type: none">Conducted literature review focusing on AI models and graduate underemployment.Created the project block diagram and defined system communication flows between frontend, backend, and cloud services.Improved clarity of the introduction, project motivation and beneficiary sections.Assisted with planning mitigative steps and solutions for identified risks.Collaborated with Roinee on formatting and proofreading problem statements and tech stack implementation.Led final checks on report editing, proofreading, and formatting checks prior to submission.
Princewill Okube	Frontend Development & System Integration	<ul style="list-style-type: none">Designed wireframes and developed the UI/UX layout for the career guidance dashboard.Researched papers focusing on user experience and interface in cloud applications.Contributed to risk identification and mitigation planning with Roinee.Selected project research paper and problem area.Participated in literature review and documentation editing for the project motivation and beneficiary sections.

10 Appendix

Appendix A: Use of Generative AI Tools in Proposal Preparation	
Prompt	Result (GPT -4o)
I am trying to design a sprint planning table for cloud app development and deployment. Give me suggestions regarding what I can include as a focus for each sprint, on bullet points.	<p>✖ Suggested Main Focus for Each Sprint (2 bullets per sprint)</p> <ul style="list-style-type: none">• Sprint 1:<ul style="list-style-type: none">▪ Set up cloud development environment (e.g., AWS/GCP/Azure)▪ Define app architecture and core components• Sprint 2:<ul style="list-style-type: none">▪ Develop core backend services (APIs, databases)▪ Implement authentication and authorization• Sprint 3:<ul style="list-style-type: none">▪ Design and build the frontend interface▪ Integrate frontend with backend APIs• Sprint 4:<ul style="list-style-type: none">▪ Configure CI/CD pipelines for automated deployment▪ Perform cloud infrastructure testing and monitoring setup• Sprint 5:<ul style="list-style-type: none">▪ Finalize testing (unit, integration, end-to-end)▪ Prepare documentation and release to staging/production
What are some common issues students and early career applicants face when approaching role and internship applications? Please give 5 bullet points and possible articles to read up further on the topics.	<p>Here are 5 common issues that students and early-career applicants often face when applying for roles or internships — along with suggested articles to read up further:</p> <ul style="list-style-type: none">• Generic or unfocused applications — Many applicants submit the same resume or cover letter to multiple roles without tailoring it to each position, making it difficult for employers to see their fit.<ul style="list-style-type: none">▪ Suggested reading: "The problem of finding an internship" (ISE) — discusses how unclear job descriptions and mass applications create challenges. [ISE]• Lack of relevant experience or clear value proposition — Employers increasingly expect some form of practical experience or demonstrable skills, but students may struggle to show this. [Pew Research]• Poor preparation for modern recruitment processes — With automated screening tools, video interviews and online assessments becoming common, many early-applicants are underprepared for these formats. [Workforce]• Overwhelming competition and scarce opportunities — The number of applicants per role is rising, and entry-level roles/internships are being reduced or more selective. [Pew Research]• Lack of network or limited access to information/support — Applicants without strong professional networks or who do not know how to access career-services support may be at a disadvantage. [Selling Life] <p>Feel free to ask and I can pull together more full-length articles or a reading list on any of these.</p>

References

- [1] Mehtap Saatçi, Rukiye Kaya, and Ramazan Ünlü. “Resume Screening with Natural Language Processing (NLP)”. In: *Alphanumeric Journal* 12.2 (2024), pp. 121–140.
- [2] Sun Yahui and Bunengi Henry Dagogo. “University Graduates and Employment Challenges: Causes, Impacts, and Countermeasures”. In: *Peta International Journal of Social Science and Humanity* 4.3 (2025), pp. 63–78.