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AI-Driven Career Development Platform

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Abstract: *The process of finding a job is difficult enough, but when searching for professional assistance in the form of interview preparation or career counseling, the cost is usually prohibitive. This is why many individuals find themselves using multiple websites, applications and inputting the same information repeatedly. Therefore, we developed ARIA. ARIA is a completely free online platform that provides both interview practice and career guidance in a single location. ARIA utilizes artificial intelligence (AI) to simulate realistic mock interviews that include audio interaction with the user as well as provide immediate feedback based upon how the user presents him/herself. Additionally, ARIA will provide users with customized career guidance, resume reviews, and a learning plan tailored to each individual user. Users do not need to have any special technology to access ARIA; anyone who has internet can utilize the service regardless of their geographical location or income level. In this paper, we outline the process by which ARIA was designed, explain the technical components of ARIA, and discuss the major ethical issues surrounding AI in career development.*

Background: *The majority of career development products operate independently of each other and therefore do not communicate effectively, limiting a person's ability to navigate the career development process. Furthermore, the cost of these products as well as where a person resides limits the availability of effective career development resources.*

Objectives: *We sought to create a product utilizing artificial intelligence that would integrate the interview preparation process and the career development process into one product. Our objectives were to make our product accessible, to ensure the ethics of our product, and to remove traditional barriers to accessing career development resources.*

Methods: *ARIA was created using Next.js 15, React 19, and PostgreSQL on top of a microservice architecture. As for the brain of ARIA, we utilized Google Gemini 2.5 Flash for text-based AI [1] and Hume AI for the voice interview experience as well as the emotional feedback. To maintain accountability and to provide transparency to the users of ARIA, we ensured that humans remained involved in the process. Additionally, we maintained solid security measures to protect the integrity of the data provided to us by users of ARIA. Finally, we established communication between all of the various components of ARIA.*

Results: *ARIA currently offers two primary services—voice-based interview preparation with feedback from multiple angles and chat-based career development resources such as resume review, learning plan, and content creation.*

The users had a smooth and easy to use experience due to the intelligent feedback they received as a direct result of how everything was integrated. The fact that it is free and online makes it available to anyone who wishes to utilize this resource.

Conclusion: *ARIA demonstrates the potential of good design to combine several AI technologies and create an environment that supports people rather than hinders them. By utilizing user centered design along with commercial AI technology, we were able to improve access to career resources without sacrificing key issues such as fairness, clarity and user control.*

Keywords: *Artificial Intelligence (AI), Career Development, Interview Simulation, Voice Interaction, Human-Centered Design, Micro-Service Architecture, Ethical AI*

I. INTRODUCTION

A. Background

Finding a career today is difficult for almost everyone. Most likely, individuals are using multiple unconnected services to find help, i.e., some may be practicing interview questions at one website and then have to schedule time with a career advisor at another website for help. This creates chaos, and typically results in individuals inputting the same information into multiple places repeatedly and there is little or no integration. As a result, many individuals cannot leverage learning from one service to use in another area to assist them in advancing their careers. Money exacerbates the situation. Professional career advising is expensive, appointments range from \$100-\$300 per hour, and comprehensive advising is often well over \$1,000 [4]. Therefore, the availability of expert advice is limited for recent graduates, career changers and those operating on a tight budget, i.e., the very individuals who would benefit most from this type of assistance. Advances in AI, particularly in Large Language Models and Conversational AI, have the potential to significantly impact the accessibility of career advising [1]. AI does not require rest; maintains consistency in performance; and can provide scalable career assistance to thousands of individuals, at a fraction of the cost of traditional forms of career advising.

B. Problem Statement

There are three major shortcomings in current career development tools.

Firstly, the career development tools currently exist as isolated entities. This means there is no clear pathway for sharing user data and/or providing a seamless user experience across different services. As such, individuals will be required to re-input information previously inputted into one service within another service, and there is no capability to link the individual's preparation for an interview to their broader career objectives.

Secondly, most of the current platforms have limited capabilities regarding artificial intelligence (AI). While many platforms utilize various forms of AI, few, if any, utilize the full potential of multi-modal AI systems that can accommodate the unique needs and situations of each individual [9].

Lastly, the accessibility of the best career development tools are severely limited by cost, geography, and level of technical expertise required by users. Therefore, a large number of individuals do not have access to the best career development tools.

C. Research Objectives

The objective of this research is to introduce ARIA (AI-Driven Recruitment and Interview Assistant), a career development platform designed to address the issues noted above. More specifically, ARIA is expected to achieve the following: (1) provide a services architecture that connects services, yet allows them to maintain their independence, (2) create a multi-model AI system that integrates text, voice, and emotional intelligence, and (3) ensure that AI acts as a support tool for real-world judgments made by humans, rather than replace human judgment entirely [7].

II. RELATED WORK

A. AI-Enhanced Career Guidance

The application of AI in career guidance has become increasingly popular over recent years. Initially, AI was utilized to create relatively rigid rule-based systems to match candidates to categories based on predefined characteristics. Recently, however, the development of machine learning has allowed researchers to analyze vast amounts of data to develop customized recommendations for individuals [8].

Several platforms use student-related data (e.g., GPA, coursework, and extracurricular activity participation, etc.) and/or students' expressed interests to generate recommendations for students. Such systems can process large numbers of users, reduce the presence of human bias, and provide users with data-driven recommendations. They are overlooking one of the most important aspects: empathy. Deciding on a career is an analytical decision, but it is also an emotional decision. Many individuals require support as opposed to numbers alone. Additionally, the collection of these large amounts of data has raised many concerns over privacy; the algorithms will likely repeat many of the same biases and prejudices found in their historic data [2].

B. Interview Preparation Systems

Interview preparation is another area in which AI is gaining popularity. In general, interviewees prepare by conducting mock interviews with friends or a counselor. However, due to the cost of preparing and scheduling, and availability, interviewees rarely receive feedback on their performance. Researchers have recently developed several computerized systems to analyze the responses provided to interview questions [5].

These systems utilize machine learning techniques to assess the verbal (what you said) and non-verbal (how you said it) components of your response [10] and provide you with feedback on areas such as clarity and confidence. A problem exists with many of the current systems. Although many of the systems do provide you with post-practice feedback, most of the systems only evaluate your performance after the practice session, therefore they may be less effective in helping you develop the skills necessary to improve your performance during future interviews.

A new and exciting area of development in voice-based conversational AI is allowing users to engage in practice sessions in real-time, including conversing in a natural way with the AI, receiving instant feedback and identifying any potential issues with tone, speed, inflection related to emotional cues, confidence and emotional state, rather than simply assessing your spoken words.

C. Personalized Learning Systems

There is considerable research being conducted using AI in the field of personalization in education and specifically around lifelong learning. The majority of the research is being conducted in China, India and the United States, and is primarily focused on higher education and not work place learning [10].

Individuals have categorized AI powered learning tools into three primary categories: adaptive learning environments and generative language models [1]. Adaptive systems adjust the content and instruction based on the individual's performance in real time. Generative models take this concept to a new level by providing customized learning materials based on an individual's specific needs.

D. Research Holes

There were many gaps found in the original research. Most importantly, the majority of the research only looked at one variable at a time. Interview platforms only allow you to practice interviewing, while guidance systems give you recommendations based on the information you provided. No one has combined these two types of variables (practicing interviewing and using data from this practice to guide career recommendations). In addition to no one combining these two types of variables, most of the new AI-based career guidance systems utilize only one type of AI model. Combining multiple specialized AI models for an integrated career development system has not been researched. Lastly, most career guidance systems rely on AI to make all of the decisions; very little research has focused on allowing the user to maintain control – to continue to provide input in their career development [7].

III. SYSTEM ARCHITECTURE

A. Design Philosophy

ARIA is built upon four primary principles. The first principle is that everything will be connected. As you practice interviews, this data will flow directly into your career guidance. The second principle is that AI will assist you, but ultimately you will still remain in control of your own career. The third principle is that ARIA will be for anyone who has access to the internet, regardless of whether or not they can afford it, and will provide expert level support. Finally, when you begin using ARIA, you will immediately receive something of value, and as you continue to use the platform, you will receive even more [8].

B. Service Components

ARIA consists of two major components. ARIA Prep removes the confusion from interview preparation. This includes, structured interview practice plans (AI-driven interview questions related to your job), voice practice with emotional feedback, multiple angle feedback, and a record of your progress.

Next, ARIA Career Agent provides you with a virtual assistant to assist you throughout your entire career [9].

Discuss ways to find a job, which skills are most important to have, and what is currently happening in your field. ARIA will assess your resume and let you know precisely how you may be able to enhance it [3]. ARIA provides personal learning plans; demonstrates what you should learn (in what order); as well as assists with writing cover letters to match the position you're applying for.

C. Technical Architecture

The architecture of ARIA has been developed using microservices and therefore each component functions independently but is still closely linked. Shared Infrastructure links everything together. The Clerk manages your identity, through OAuth 2.0 Social Logins, Multi-Factor Authentication, etc. PostgreSQL securely stores your Data and Drizzle ORM safely and efficiently handles Database Queries with Type Safety.

Google Gemini 2.5 Flash is the primary model used by ARIA for text generation and Analysis [1] whereas, Hume AI is the model used by ARIA for Voice interactions and in Real-Time Speech and Emotion Analysis. LangChain is used by ARIA to manage the flow of conversation between you and the AI, keeping track of the Prompts and Outputs from the AI. Inngest is responsible for managing Background Jobs that may take longer. UploadThing is responsible for securely uploading files to the system and automatically checking files for viruses. Resend manages sending email to you when you need them.

IV. METHODS

A. Architectural Design

The design of ARIA's system architecture was developed to meet competing demands. Yes, we have many services; however, we did not take an extreme approach to Microservices (with fully independent databases and completely isolated deployment). Each Service shares the Core components of Authentication, Databases and AI – however, each Service is clearly defined as to its specific function.

Both Services are co-located in a single Next.js Code Base. The benefit of this design is that it allows for the reuse of UI Components, consistent Navigation, and Simplified Deployment. At the same time, the Code remains Modular and allows Teams to develop new Features without Interference or Interdependence. All Services connect to a Single PostgreSQL Database – rather than being distributed across many databases.

In order to maintain simplicity, Schemas for Tables were created within each Service's schema and Cross-Service Connections were limited to only those that were deemed necessary.

B. AI Integration Strategy

ARIA utilizes a variety of Specialized AI Tools to deliver the desired functionality. For most of the Heavy Lifting, we rely on Google Gemini 2.5 Flash which provides High-Quality Results at a Reasonable Speed, and Cost [1]. It is used to Generate Interview Questions, Analyze Resumes with Detailed Scoring, Offer Career Advice, Develop Personalized Learning Paths, and Assist Users with Polishing Content. To ensure Smooth System Functionality, Prompts were established to inform the AI of its Role and Response Format. Example Inputs and Outputs were provided to ensure that the Output Format is Consistent and Structured Outputs are Enforced We are able to modify parameters (for example temperature) to increase or decrease creative output; establish time limits (timeouts) so that requests do not hang indefinitely; and store previous responses in a cache in order to reduce API call charges. In regards to voice-based interaction, Hume AI is utilized by ARIA Prep. ARIA Prep utilizes Hume AI in order to simulate an interview experience, and users provide spoken responses. In order to facilitate fast audio transfer, we utilize WebRTC. We also have the ability to rapidly transcribe spoken language to written language, as well as to analyze the spoken language for tone, pitch, speed, and energy. ARIAPrep can recognize emotional characteristics such as the user's confidence or nervousness and respond accordingly. Therefore, the user will be able to simulate an interview experience, including receiving the same type of feedback they would receive during a real interview, but without having to use a keyboard [10].

The fact that we utilize a voice first approach to simulation is beneficial over a typed simulation in several key areas. For instance, users become accustomed to providing a response while being placed in a high-pressure environment, users learn how to pace themselves appropriately, and users gain insight as to how to appear confident while speaking. Additionally, users may feel less anxious due to repetitive, simulated interviews. LangChain serves as a means of tying all of the AI interactions together. LangChain can manage prompts, parse responses, string together multiple AI requests, keep track of the current state of the conversation, and handle errors by automatically retrying them. The Career Agent utilizes LangChain extensively, particularly with respect to the chat based features of the Career Agent where context is important.

C. Database Design

Our solution utilized a single database for all services. We were able to find a middle ground between a highly normalized database design and real world performance. All services link to a single user table utilizing Clerk generated IDs as primary keys. Each service has its own separate tables. ARIA Prep stores information about jobs, stores the generated interview questions, and stores transcripts and feedback provided after each practice session. The Career Agent utilizes a flexible history table to store chats, analysis, learning paths, letters and other items of various data types in JSON format so we can support variable data types. We utilize foreign keys to enable us to perform cross-service queries when necessary. In general, our application adheres to the principles of Third Normal Form (Third Normal Form) for the design of its database schema. However, based on certain performance considerations, we relax some of these constraints, if it makes sense for the functionality we are implementing. For example, we utilize JSON columns for storing semi-structured data, and create indexes for the most frequently accessed fields by our most common queries (including composite indexes).

D. Implementation of Security

Security is embedded into every aspect of the system — from the users' login process through to the backend storage of data — security is a top priority of this application. The Clerk handles all aspects of user authentication via OAuth 2.0, while also ensuring that the password entered during the authentication process is hashed prior to being stored within the database. After a successful login, a user's session will be wrapped into a JSON Web Token (JWT) that will then be placed into an HTTP-only cookie on the user's browser, thus preventing JavaScript code running on the user's browser from accessing their session information. Each incoming request will be processed through a middleware function, which will validate the JWT, which was issued after the user logged in successfully.

Data will always be transmitted across the internet using HTTPS with TLS 1.3 encryption. This provides a strong barrier of protection from potential eavesdropping attempts. Encryption will also be used to protect data traveling from the application to the database, thus protecting sensitive information from being disclosed. Data encryption is accomplished using bcrypt hashing, and passwords will be hashed separately and uniquely for each user for added layers of protection. Sensitive API Keys will never be included in the source code repository — instead, they will be defined in environmental variable(s), which is the correct place for them to reside. The entire platform will adhere to GDPR regulations, allowing users to export and/or delete their data at any time. The application does not grant free access to user input either. Every piece of data entering the application will first have to pass validation checks, in accordance with a set of strict Zod schemas that verify the type, format and range of the data. As such, SQL injection attacks will be ineffective due to the fact that the Drizzle ORM utilizes parameterized queries. Cross-Site Scripting (XSS) attacks will be thwarted as well — due to the fact that React automatically escapes data entering the DOM, and the application has implemented Content Security Policy (CSP) header values that provide additional layers of protection. Rate limiting will also be employed to prevent abuse of the application's API endpoints.

V. IMPLEMENTATION

The System Treats Your AI as an Experienced Career Counselor:

The System Draws Upon Experience in All Sorts of Industries & Career Stages, Providing Straightforward, Practical Advice, Not Vague Encouragement.

Each Conversation Will Be Saved So That You Can Review It Later & See What You Discussed and How Your Thinking Has Changed Over Time.

A. Resume Analyzer

This Tool Takes the Text From Your Uploaded Pdf Resume & Does A Deep Dive into [3].

It Creates Detailed Prompts Based On What Matters Most, Sends Everything to Gemini, and Then Breaks Down the Feedback and Scores.

You Will Have the Ability to See How Your Resume Measures Up In Terms of Overall Quality, How Well It Works With Ats Systems, Whether or Not Your Contact Information Is Complete, How Strong Your Experience Section Is, How Your Education Comes Across, And How Well Your Skills Match the Roles You Are Seeking.

For Each Area, the AI Gives You a Score, Tells You Exactly Where You Are Doing Well, Tells You Precisely Where You Are Falling Short, and Ranks the Changes That Will Make the Biggest Difference.

B. Roadmap Generator

The Roadmap Generator Provides You with a Plan to Reach Your Career Goals.

Just Tell the AI the Job You Want, What You Can Do Now, and How You Like to Learn.

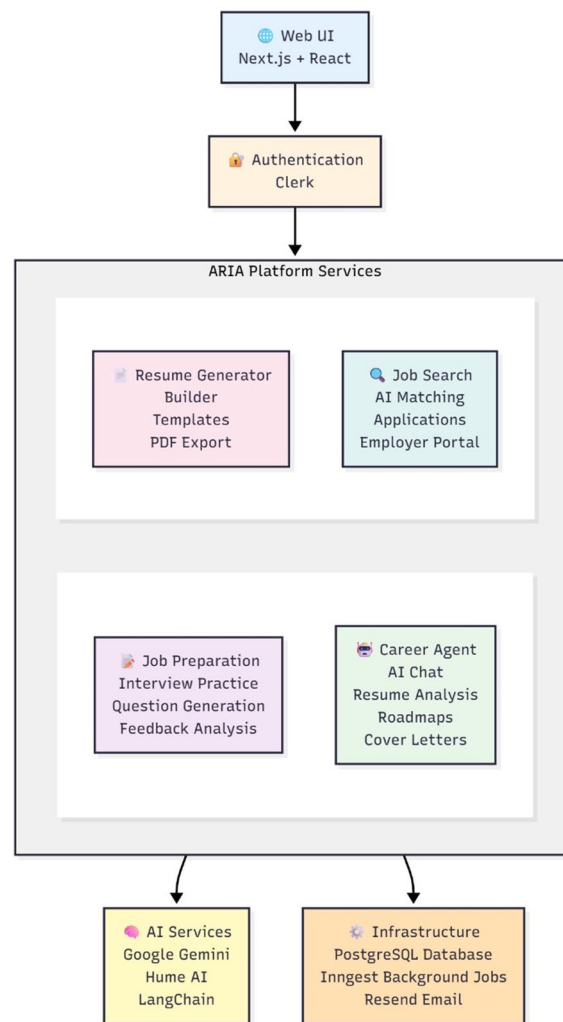
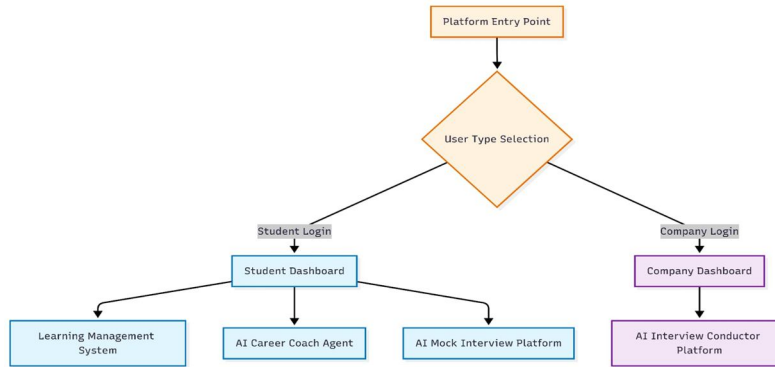
The AI Determines the Gap Between Where You Are and Where You Want to Be, Maps Out the Skills You Need in What Order, and Organizes Everything Logically [8].

You Get a Visual Roadmap — Nodes for Each Milestone, Clear Learning Goals, Estimated Times for Completion, Helpful Resources, and Even How Each Step Connects.

All the Above Are Displayed Interactively.

Want a cover letter? The tool generates a personalized professional cover letter using the job title, company, and job description you enter, as well as your career experience on our platform. Each cover letter has a tried-and-true format: an opening paragraph about your interest; a middle section highlighting your greatest accomplishments; and a closing section calling them to take action. It uses real-world examples, rather than just vague statements. When the draft is complete, we will give you ideas on how to make it even more personal.

Each time you interact (chat, resume assessment, roadmap, cover letter), this information is recorded into a flexible history. The tool tracks what type of content it is and stores all the information in a searchable manner so you can always come back and look at anything you have done.



VI. EVALUATION

A. Methodology for Evaluating Career Development Platform

Unlike evaluating individual AI capabilities, evaluating an entire career development platform is a complex task. Traditional metrics such as classification accuracy do not capture the benefits of a system that has all its components working together to provide the best possible user experience; nor do they measure how well the system can track an individual's progress over time. Therefore, the methodology used in this study will assess the overall performance of the system, as well as the user experience and the design architecture of the system.

B. System Performance

There are many advantages to having a unified system versus multiple separate systems. In addition to not having to enter a multitude of different passwords or usernames to access each system individually, the results from your interviews directly flow into your career guidance session. Your career goal discussions with the agent also determine what types of interview questions you receive. With a unified system, there is no need to continually re-enter the same information. Simply describe your background once, and you are ready to go. With continued use of the system, it becomes more familiar with you, providing more personalized advice and more relevant practice opportunities. A combination of various models of artificial intelligence (AI) allows for additional features that cannot be achieved with a single model of AI [9]. Using voice-based interview practice through Hume AI, you will have access to mock interviews that sound very realistic and include emotional feedback, which you would not achieve through plain text. The AI also generates new interview questions based upon your specific job type and experience. This provides much more relevant and practical interview preparation. The human-in-the-loop architecture positions AI as supporting individuals, rather than replacing them [7]. Users receive AI-generated content as a starting point, however they still must evaluate and improve their own thoughts. These user-experience-related design decisions are directly supported through actual transcripts from interviews and example resumes, showing how each assessment was created, providing users with a direct view into the thought process behind the assessment results. For resumes, the system provides a clear comparison of "before" and "after" versions of a resume, allowing the user to decide which version they find most useful.

C. Accessibility Successes

The platform is designed to be accessible using several creative approaches. First, since the platform is based on the web, there is no software to download and install; simply open a browser on your desktop computer, laptop, tablet or smartphone and the platform is available to you. Second, all of the key features of the platform are available at no cost to the user. Therefore, access to the platform will never be blocked by a payment wall. Third, AI support is available 24 hours per day, 7 days per week, allowing individuals from anywhere in the world or with unpredictable schedules to receive help as needed.

The platform is also accessible regardless of the type of device being used (i.e., desktop, laptop, smartphone). All controls and features of the platform automatically adjust to fit within the space available on your screen, whether that space is large (e.g., 17-inch monitor) or small (e.g., 3.5-inch smartphone). In addition, the platform uses touch-friendly interfaces and is optimized for mobile devices, making the experience feel very natural when interacting with the platform via a touchscreen.

D. Technical Reliability

When functioning normally, the platform functions reliably. Most of the pages of the platform will load in less than 2 seconds. Additionally, many of the AI-powered features are fast as well; for example, simple activities such as generating questions may require only a few seconds while more complex tasks (such as analyzing a resume) typically complete in approximately 15-20 seconds. If the AI service fails, the platform does not fail completely. For example, if the system is unable to generate questions quickly enough (due to technical difficulties), it will display previously generated questions in its place. Similarly, if the content enhancement feature cannot obtain an AI-generated response, it will preserve the original text displayed. These safety net approaches ensure that the system remains operational even though some of the functionality may not be operating perfectly.

E. Architectural Effectiveness

The platform's microservice architecture strikes a good balance between the need for individual services to work together seamlessly and the need for individual developers to focus on their own specific service without requiring knowledge of the entire platform. Parallel team efforts are made easier due to clearly defined boundaries (e.g., routing and database schema) that allow multiple teams to build on top of the same base infrastructure. Additionally, shared components avoid the wasteful duplication of development effort and provide logical separation between each module. While the platform currently operates at a relatively low scale, the architectural design supports an increase in scale as needed. The fact that applications operate in a stateless manner allows additional instances to be easily added to support increased load, while database query performance has been optimized and connection pooling has been enabled to support larger amounts of traffic; caching also helps offload the workload from the database, while background processing handles time-consuming operations that do not block the end-user experience. From a security standpoint, the platform has robust defensive capabilities. Authentication is run through Clerk and well-proven OAuth mechanisms, input validation using Zod schemas prevents malicious data entry attempts, and Drizzle ORM utilizes parameterized queries to prevent SQL injection attacks. In addition, React automatically escapes all content as a result of its inherent properties, preventing cross-site scripting vulnerabilities.

F. Evaluation Gaps

There are significant limitations associated with this evaluation. There were no formal, controlled user studies, nor was there quantitative data to allow for comparisons to other viable alternatives. Most of what is known about the usability and effectiveness of the platform comes from observations of the system as opposed to user-based measures. As such, there is no empirical evidence to support these claims, no longitudinal tracking, and no comparative control group, resulting in a non-rigorous evaluation process.

VII. CONCLUSION

ARIA provides both Interview Prep and Career Guidance within a single interface, utilizing smart AI and a focus on Accessibility. The manner in which we have designed the architecture of ARIA (utilizing multiple components and providing a single, unified architecture) has resulted in a platform that is stronger than the sum of its individual components. We have utilized a Microservice Architecture along with Shared Infrastructure to allow for Deep Integration of the services, while also allowing for each Service to function Independently as needed. We selected the correct Commercial AI Models to utilize the benefits of Commercial Capabilities, while avoiding becoming tied to One Way of Doing Things.

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