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Development of Code Craft – An AI-Powered Online Code Editor

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1. ABSTRACT:

With the increasing demand for web-based development environments, Code Craft is designed as a modern online code editor that enhances coding efficiency and collaboration. This platform provides a feature-rich, user-friendly interface where developers can write, edit, and share code seamlessly. The system supports multiple programming languages, real-time collaboration, and snippet sharing for debugging assistance.

Key features include Pro and Normal modes, enabling both beginners and professionals to code effectively. Users can customize themes, share snippets via public links, and receive feedback through a commenting system. The platform integrates profile analytics, tracking the most-used languages, number of compilations, and starred snippets. Secure authentication is managed via Clerk, while Convex ensures smooth real-time updates. The system is designed for scalability and accessibility, hosted on Vercel with a responsive UI built using React and Tailwind CSS.

Keywords: Online Code Editor, Real-time Collaboration, Snippet Sharing, Web-based Development

2. INTRODUCTION:

In the rapidly evolving field of software development, the demand for efficient, collaborative, and accessible coding environments is more significant than ever. Traditional code editors often require local installations, limit collaboration, and lack community-driven debugging support. To address these challenges, we propose Code Craft – an online code editor that enhances real-time collaboration, snippet sharing, and personalized coding experiences.

Code Craft is a web-based development platform that allows users to write, edit, and share code across multiple programming languages. The platform offerstwo modes to cater to different user needs:

- **Pro Mode**: Grants access to all programming languages, multi-tab support, and version control for advanced users.
- **Normal Mode:** Limited to selected programming languages, providing a beginnerfriendly coding environment.

The system is built using Next.js and React for the frontend, ensuring a responsive and interactiveuser experience. Convex is utilized for real-time database management, enabling seamless live collaboration,

while Clerk handles secure authentication. Tailwind CSS ensures a modern, customizable UI, and Vercel provides scalability and accessibility.

Key Features of Code Craft:

- Snippet Sharing: Users can share code via public links, allowing for collaborative debugging and feedback.
- Custom Themes: Personalized UI settings for better user experience.
- Profile Analytics: Tracks most-used languages, total compilations, and starred snippets.
- Community Engagement: Public snippet pages where users can view, comment, and help debug shared code.

By integrating collaborative features, real-time editing, and user-friendly design, Code Craft aims to bridge the gap between traditional code editors and modern web-based development needs. This platform will empower developers, foster community-driven problem-solving, and create a seamless, efficient coding experience for users at all skill levels.

3. SYSTEM ARCHITECTURE:

The system architecture of Code Craft – An Online Code Editor consists of multiple components working together to provide a seamless and interactive coding experience. Below are the key architectural components along with screenshots and explanations.

a. Login Page:

This is the login page of the Code Craft platform, where users enter their email and password to access their accounts. The GUI is simple, consisting of:

- Two input fields (email & password)
- A Login button
- A link for new users to register

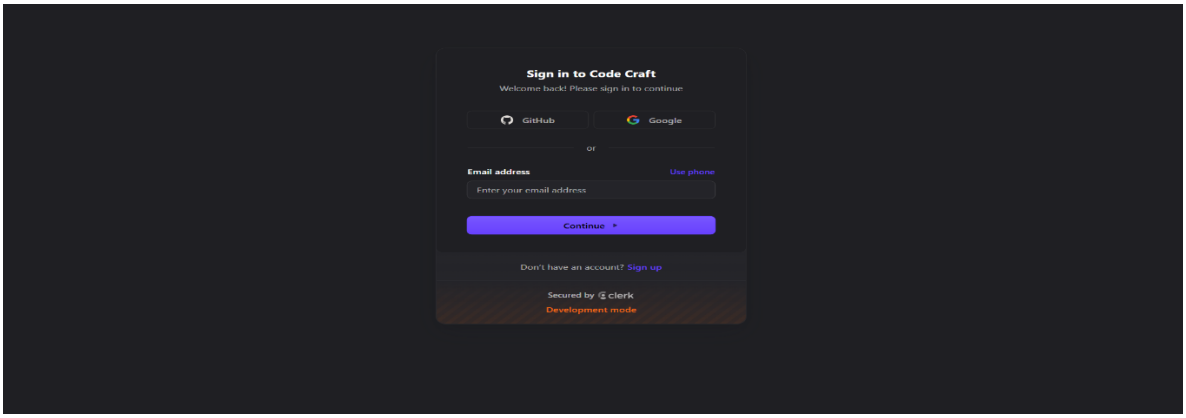

Figure 1: Login Page

b. Signup Page:

For new users without an account, the system provides a Signup page for creating account.

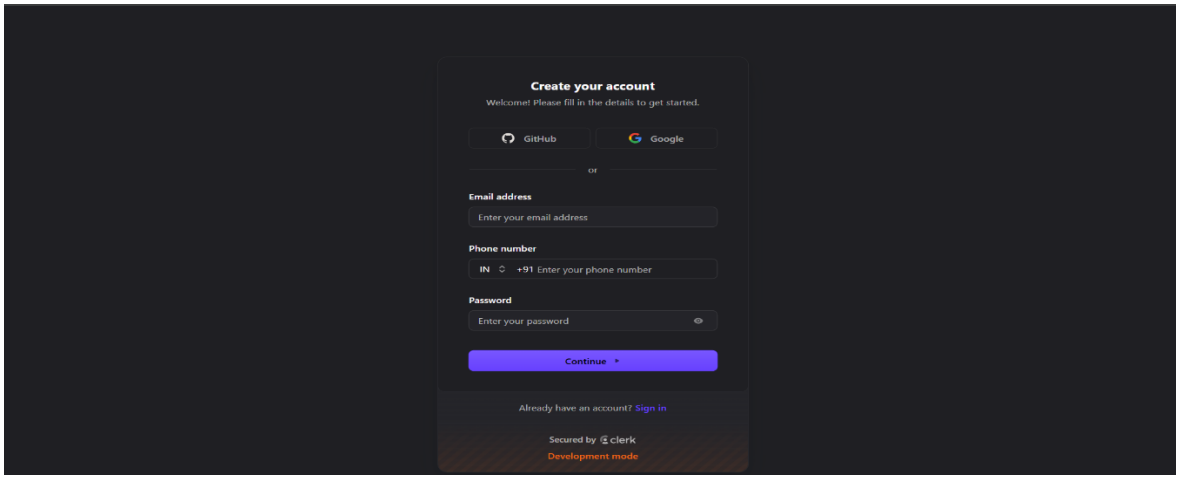

Figure 2: Signup Page

c. Home Page:

The Home Page of Code Craft integrates the Code Editor, Output Panel, and AI Chatbot, offering a seamless coding experience.

Key Features:

- Write & execute code with real-time feedback and share the code snippet.
- Pro Mode supports all languages; Normal Mode has limited access.
- Custom Themes for a personalized experience.
- AI-Powered Debugging using Together AI's Meta-Llama 3.3-70B Model
    - Auto-detects errors upon execution.
    - Provides instant fixes & suggestions to improve debugging.

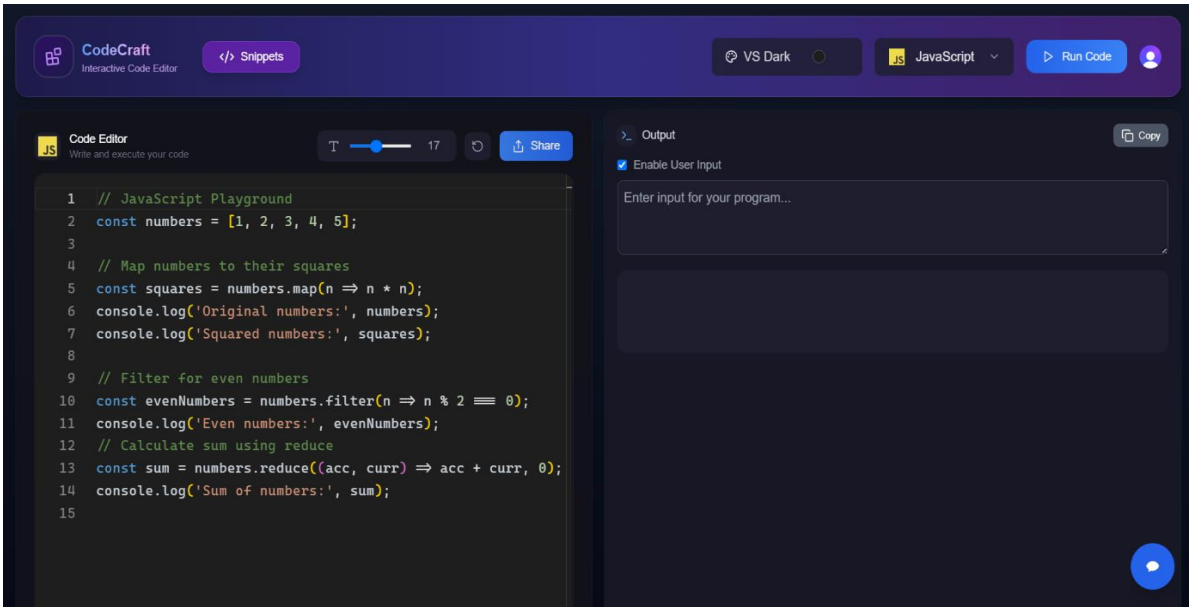

Figure 3: Home Page

d. Snippet Page:

- Showcases publicly shared code snippets for community exploration.
- Allows users to star snippets for easy access and future reference.
- Encourages collaboration and knowledge sharing among developers.
- Includes a search engine to find code snippets based on keywords.
- Provides both grid view and normal view for flexible browsing.

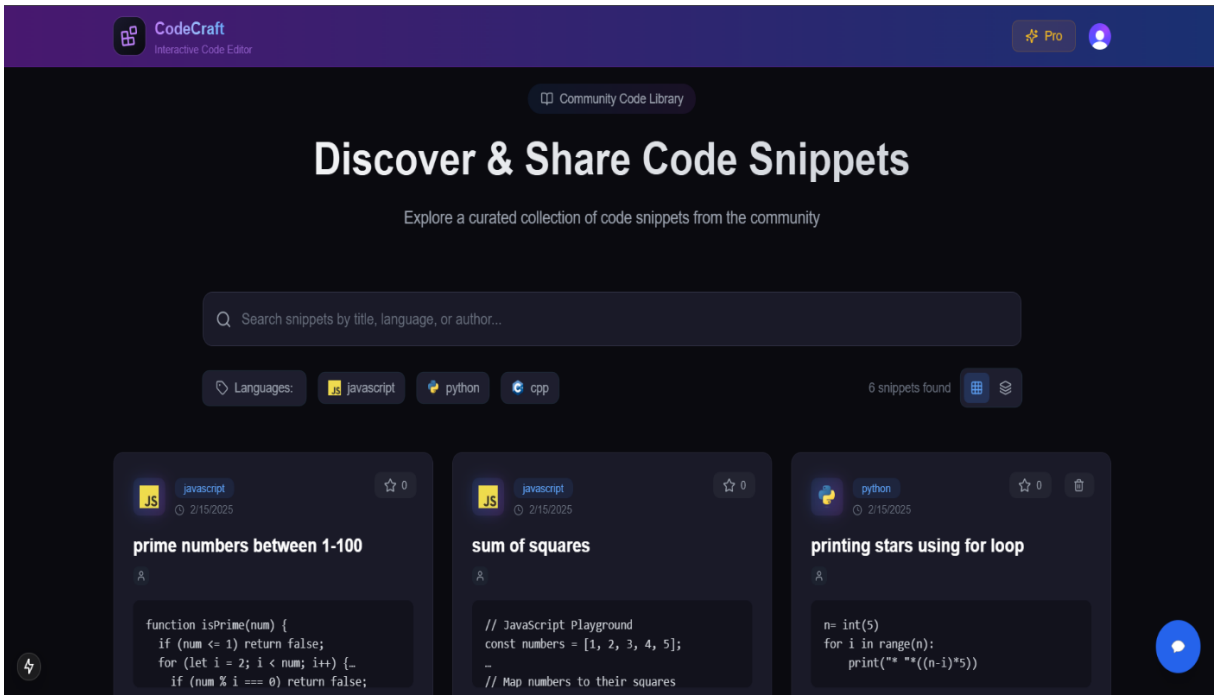

Figure 4: Snippet Page

e. Snippet Detailed View Page:

- Provides an in-depth view of shared code snippets.
- Community users can copy code, comment, discuss, and suggest improvements.
- Supports formatted code blocks (```language) for writing code in the discussion section.

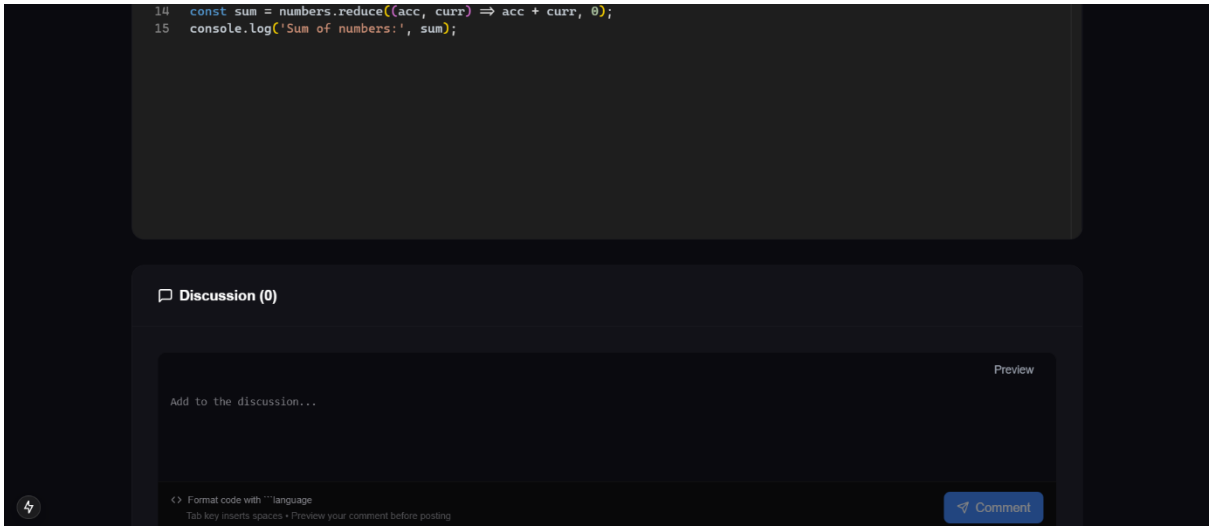

Figure 4: Snippet Detailed View Page

f. Profile & Analytics Page:

- Displays user statistics, including:
    1. Most used languages
    2. Total number of compilations
    3. Starred snippet count
- Helps users track progress and analyse coding habits.

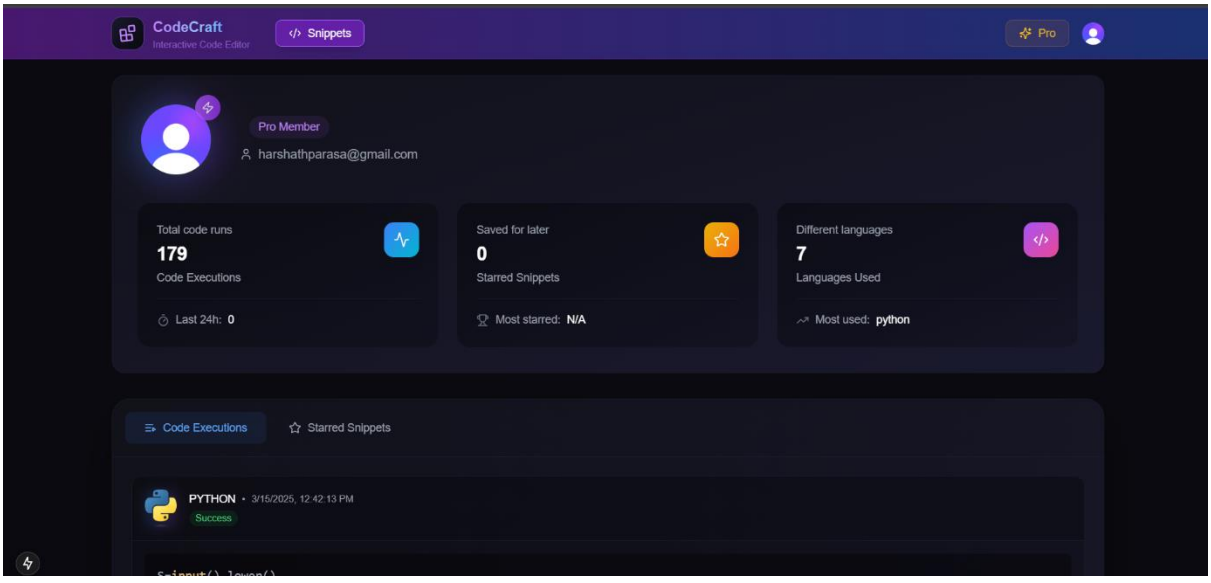

Figure 5: Profile & Analytics Page

g. Support Page:

- Users can describe their issues and submit a support request for assistance.
- Our support team receives an email with the issue details and works on resolving it.

Once a request is submitted, our team ensures prompt resolution of the issue.

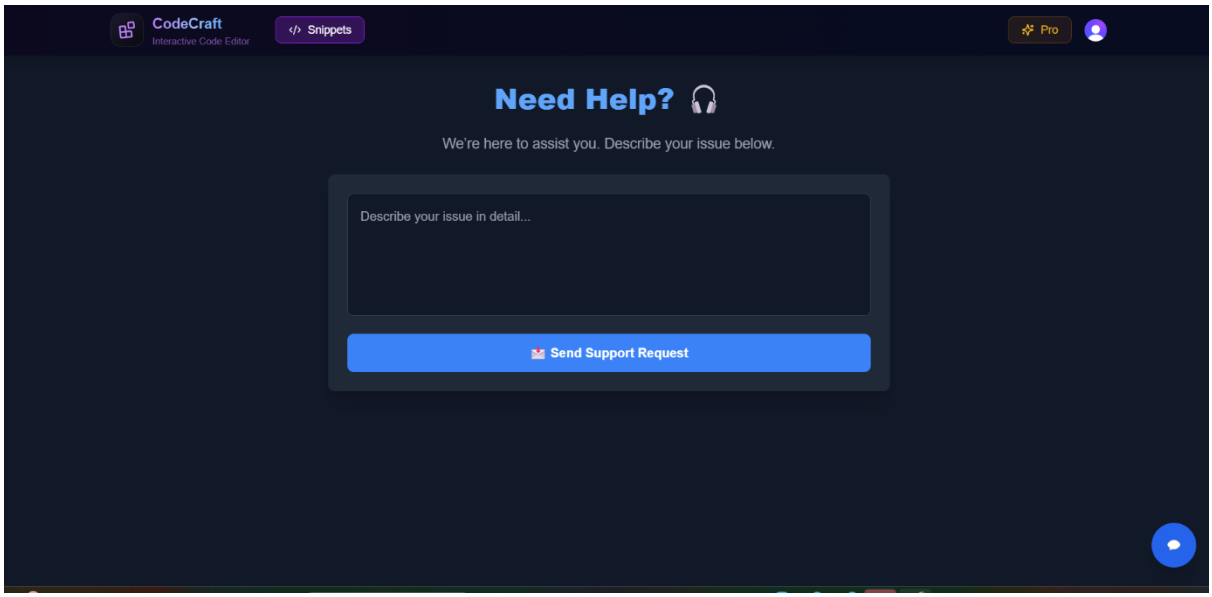

Figure 6: Support Page

h. Privacy Policy Page:

The privacy page explains how user's data is handled, stored, and protected. We are committed to ensuring transparency and safeguarding user information.

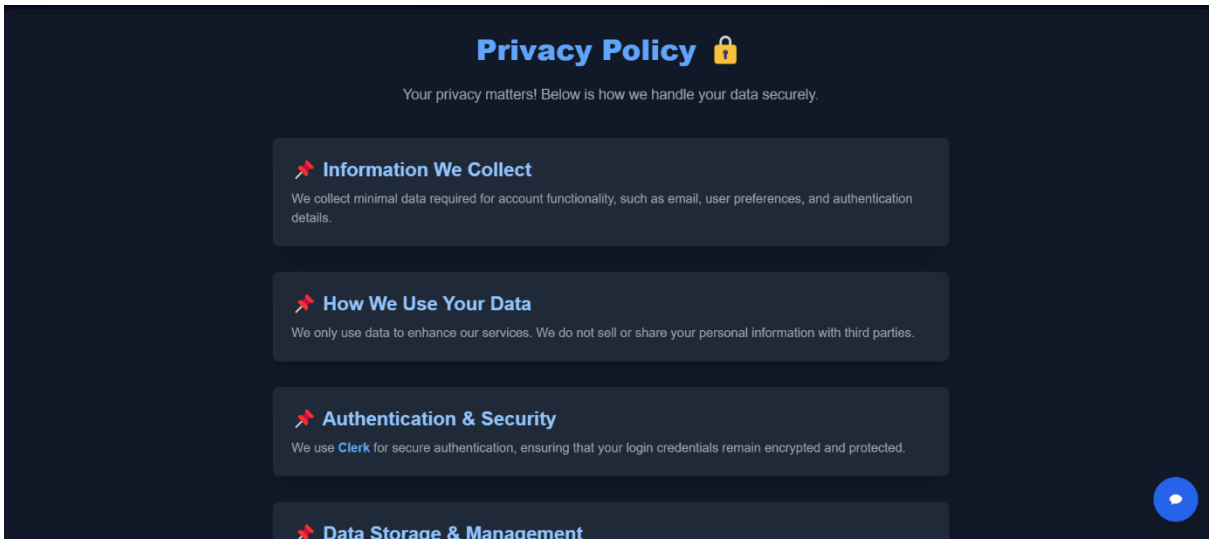

Figure 7: Privacy Policy Page

i. About Us Page:

The About Us page provides information about the developers behind CodeCraft, their mission, vision, and the work they've put into building this platform.

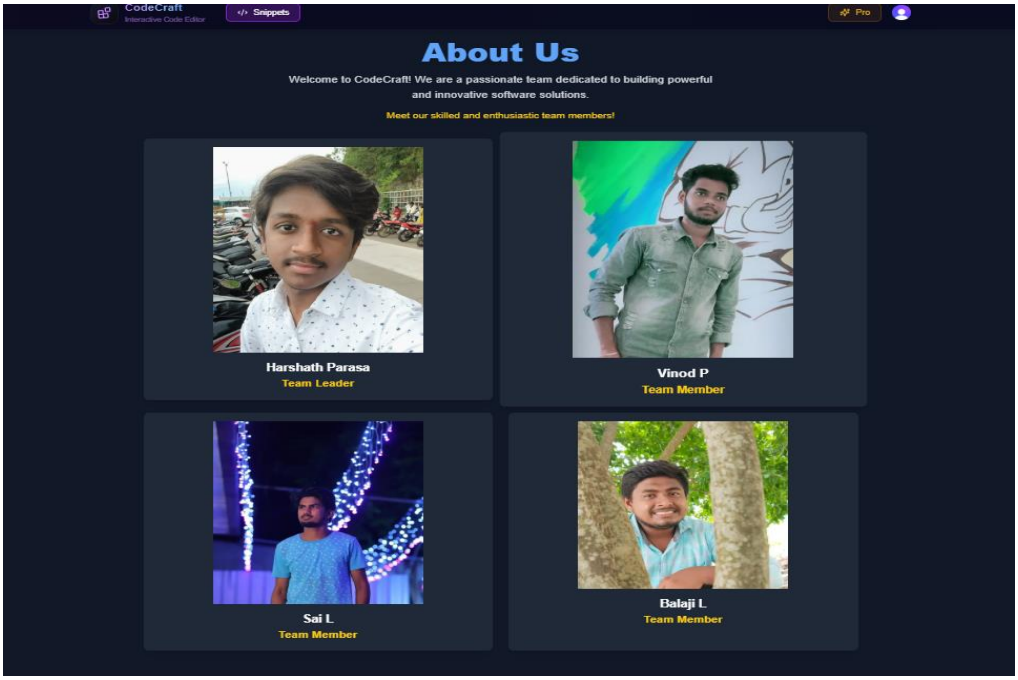

Figure 8: About Us Page

4. **Software Modeling:**

a. Use Case Diagram: Represents the interactions between users (normal users and pro users) and the system. Showcases features such as code execution, snippet sharing, AI debugging, and profile analytics.

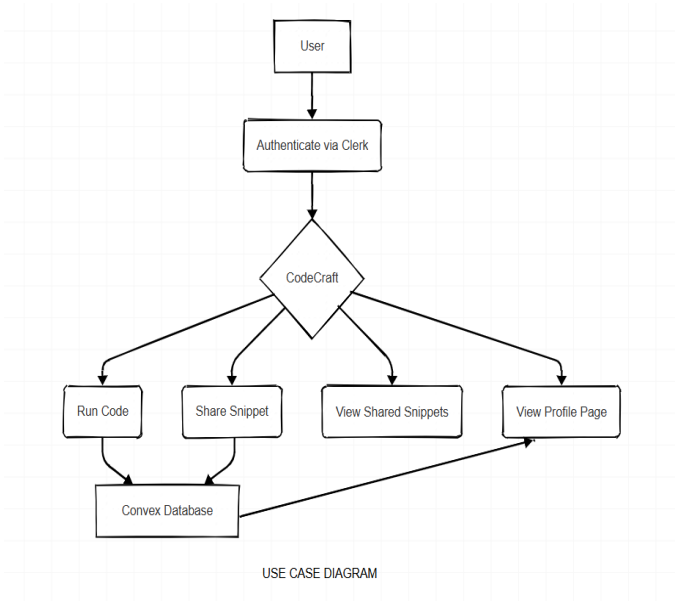

Figure 9: Use Case Diagram

b. Class Diagram: The Class Diagram defines the system's structure by detailing classes like User, Snippet, Profile, and AI Debugging Module, along with their relationships.

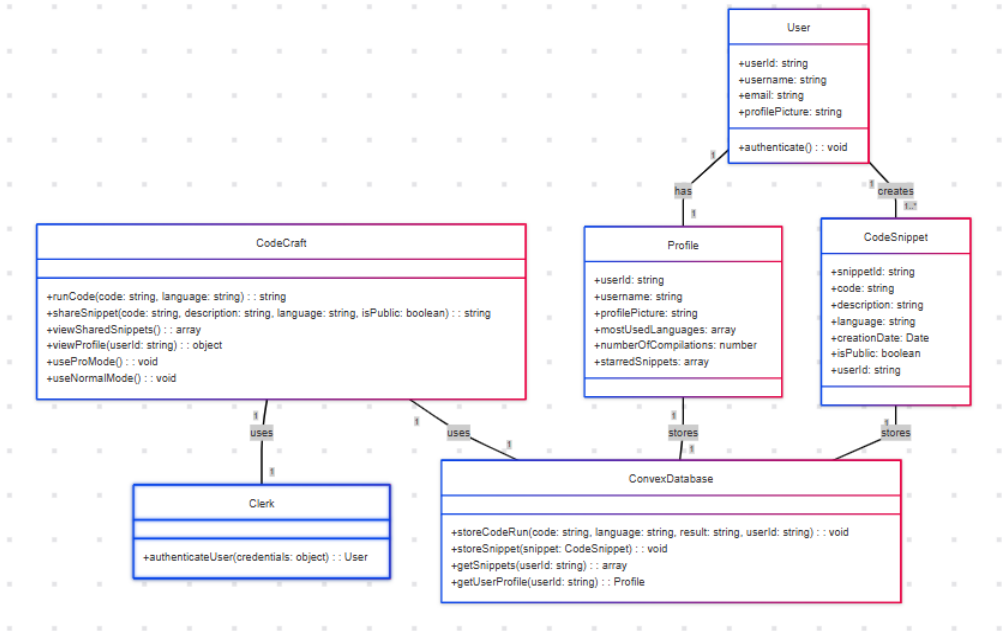

Figure 10: Class Diagram

c. Sequence Diagram A sequence diagram, visualizes the interactions and the order in which those interactions occur between the different parts of your system when a user performs a specific action. It focuses on the time-based sequence of messages and calls between the user, the CodeCraft application, the authentication service (Clerk), Convex (DB).

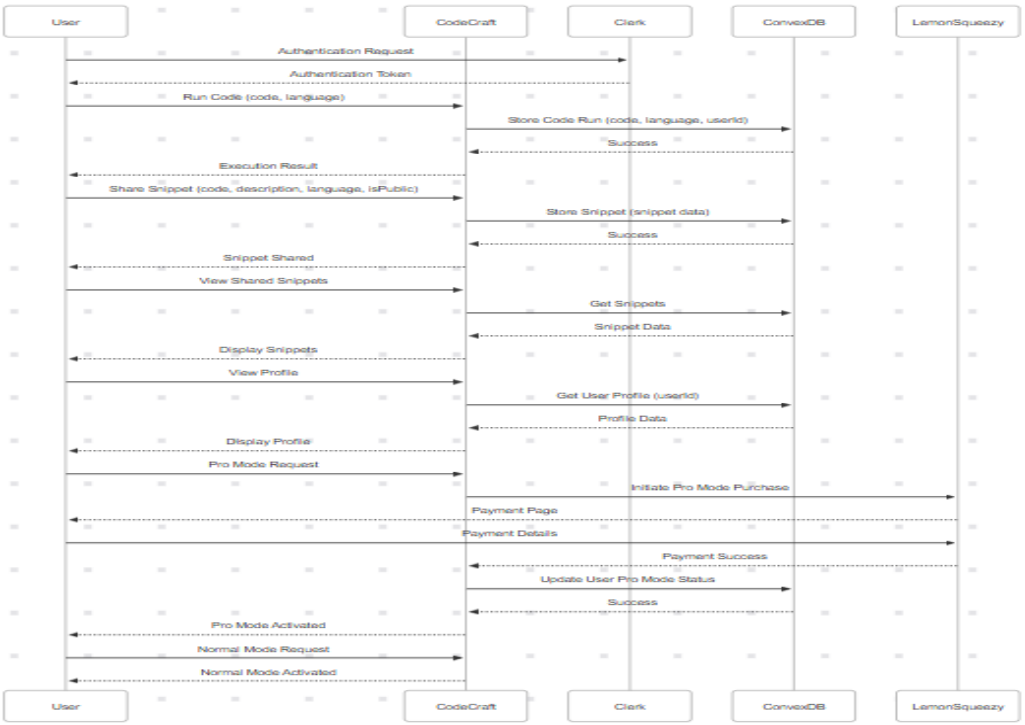

Figure 11: Sequence Diagram

d. Activity Diagram: An Activity Diagram is a type of Unified Modeling Language (UML) diagram that visually represents the flow of activities and actions within a system or process. It's essentially a

flowchart that shows the sequence of steps involved in a particular process, along with decision points and parallel activities.

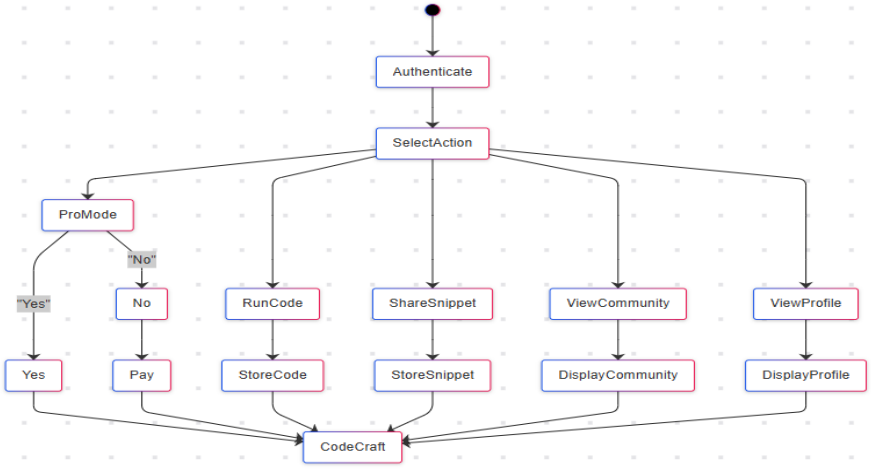

Figure 12: Activity Diagram

e. Deployment Diagram: A deployment diagrams shows the hard ware of your system and the software in that hardware. Deployment diagrams areusefulwhenyoursoftwaresolution isdeployed acrossmultiple machines with each having a unique configuration. Below is an example deployment diagram. UML Class Diagram with Relationships.

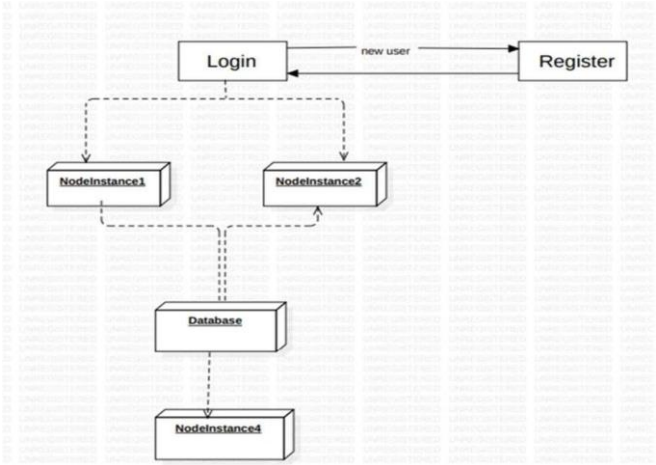

Figure 13: Deployment Diagram

5.Software Testing:

Software testing ensures that CodeCraft functions as expected, verifying both frontend and backend operations. The testing phase focuses on validation through black-box and white-box testing to ensure a seamless coding experience.

- Black-Box Testing evaluates the system based on expected outputs without examining internal structures, ensuring correct execution of code and UI responsiveness.
- White-Box Testing examines internal logic and structures, verifying functions like code execution, AI-assisted debugging, and user authentication.

Several test cases validate the execution of the code editor, AI chatbot debugging, user authentication, and snippet sharing. Key areas tested include compilation accuracy, user role-based features, and real-time assistance.

6.Conclusion:

CodeCraft is an AI-powered online code editor designed for seamless coding, debugging, and community collaboration. It provides a versatile development environment, allowing users to write, execute, and debug code in real time.

- Pro Mode users can access all programming languages, while Normal Mode users have limited access.
- The AI chatbot, powered by Meta-Llama 3.3, detects and suggests fixes for errors, enhancing the coding experience.
- Users can share code snippets, receive feedback, and collaborate with the community through comments and discussions.
- The platform ensures secure authentication using Clerk and real-time database management with Convex.

With an intuitive UI, CodeCraft empowers developers to code efficiently, debug effortlessly, and collaborate effectively within a community-driven ecosystem.

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