S3CURE

Cybercrime Investigation Game Platform

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BTECH CSE CYBER SECURITY

2ND YEAR

INDEX

AIM

The primary aim of this project was to design, develop, and deploy a functional prototype of S3CURE, a fully gamified web platform. The objective was to create an immersive and educational experience that simulates realistic cybercrime investigation scenarios, allowing users to develop and demonstrate practical cybersecurity skills in a controlled, engaging, and skill-based environment.

INTRODUCTION

In an era of increasing digital threats, the demand for skilled cybersecurity professionals has never been higher. However, traditional training methods can often be theoretical, dry, or fail to bridge the gap between knowledge and practical application. The S3CURE platform was conceived to address this challenge by leveraging the power of gamification to make learning engaging, intuitive, and effective.

Operating under the fictional agency "Cyber Diaries," S3CURE places the user not as a player, but as an investigator. The core concept is to move beyond simple quizzes and present users with complex, multi-layered cybercrime missions that require critical thinking, tool proficiency, and analytical prowess. By solving interactive challenges, analysing forensic data, and navigating intricate narratives, users earn digital badges and progress through ranks, with their success tied directly to demonstrated skill rather than mere completion. The platform's motto, "You are not a player. You are the investigator," encapsulates its focus on immersive, skill-based learning.

METHOLODOGY

The project was executed using a modern full-stack web development approach, with a clear separation between the frontend client and the backend services.

- **System Architecture:** A modular architecture was designed with a React-based frontend and a Firebase-powered backend. This allowed for independent development and scaling of the user interface and the core logic.
- **Frontend Development (Client):** The user interface was built using **React** for its component-based structure. **Tailwind CSS** was chosen for rapid and responsive styling, and **Framer Motion** was selected to implement the fluid animations and transitions crucial for an engaging user experience. The visual theme was established as "Neon Cyberpunk" to create a futuristic, high-stakes investigative atmosphere.
- **Backend Development (Server-side Logic): Firebase Functions** were used to handle all server-side logic, including validating mission answers, processing user progress, and executing complex logic like the rank promotion algorithm. This serverless approach simplifies deployment and management.
- **Database and Authentication: Firebase Firestore** was chosen as the NoSQL database for its real-time capabilities and flexible data model, used to store user profiles, mission states, and badge configurations. **Firebase Authentication** was implemented to manage secure user registration, login, and session management.
- **Development & Debugging Environment:** The entire development process was conducted locally using the **Firebase Emulator Suite**. This provided a high-fidelity environment for testing Auth, Functions, and Firestore without interacting with live production data. A significant phase of the methodology involved systematic debugging of the development environment itself, addressing critical conflicts arising from mismatched **Node.js versions** and incompatible package dependencies between the frontend and backend. This involved a "Total Project Reset"—a clean reinstallation of all dependencies in a verified, stable Node.js v18 environment—to resolve persistent configuration errors.

CODE

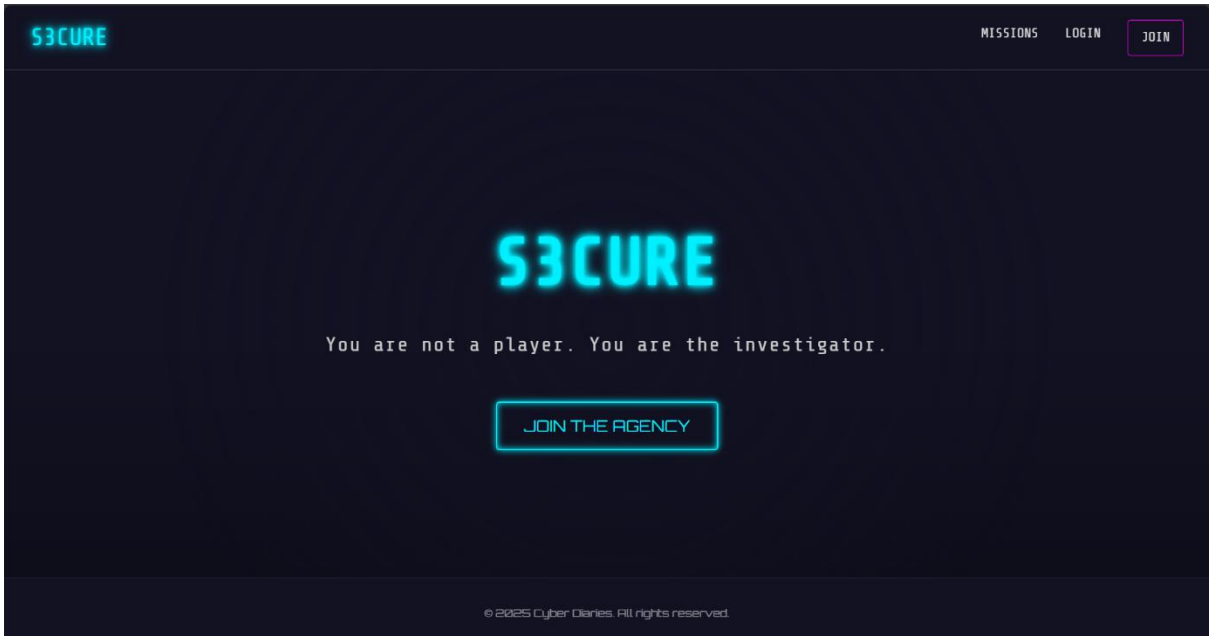
The codes are provided in the GitHub.

RESULT AND TESTING

The project successfully culminated in a stable, functional prototype of the S3CURE platform, achieving all core objectives defined in the initial plan.

- **Functional Core Application:** A user can successfully register for an account, log in, view a personalized profile page displaying their static data (username, email, rank), and log out. The user's authentication state is correctly managed throughout the application.
- **Stable and Operational Backend:** The critical environmental bugs have been fully resolved. The Firebase emulators for Authentication, Functions, and Firestore now launch and run correctly in a synchronized, stable state. The backend functions are reachable by the frontend client.
- **Working Mission and Progression Loop:** The core gameplay loop is now functional. A user can undertake a mission, submit an answer, and have that answer correctly validated by a Firebase Function. The mission status is updated in the Firestore database, and the user's progress is reflected on their profile.
- **Resolved Dependency Conflicts:** The version conflicts between the frontend (vite, react-router-dom) and the Node.js v18 environment have been resolved by downgrading the frontend packages to compatible versions, resulting in a stable npm install and a working development server.
- **Correct Frontend-to-Backend Communication:** The final configuration error, where the frontend client was attempting to connect to the wrong emulator port, has been corrected. The application now successfully connects to the Firestore emulator on the correct port (8090), allowing it to fetch and display dynamic user data.

  In summary, the application has been transformed from a non-functional state plagued by deep-seated environmental issues into a working, demonstrable prototype that successfully executes its primary user flows.


S3CURE
MISSIONS
LOGIN
JOIN
S3CURE
You are not a player. You are the investigator.
JOIN THE AGENCY
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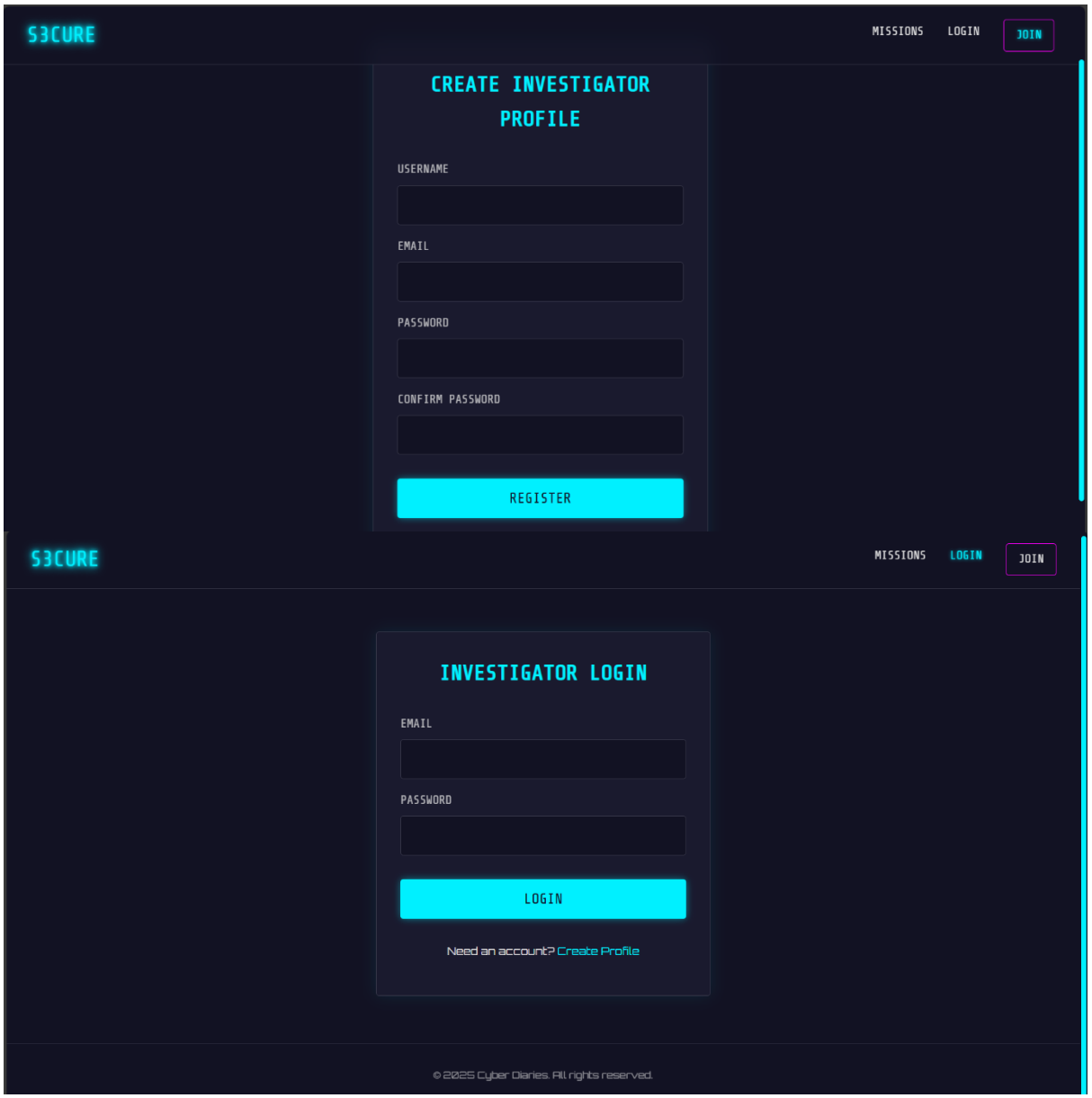
S3CURE
MISSIONS
LOGIN
JOIN
CREATE INVESTIGATOR PROFILE
USERNAME
EMAIL
PASSWORD
CONFIRM PASSWORD
REGISTER
S3CURE
MISSIONS
LOGIN
JOIN
INVESTIGATOR LOGIN
EMAIL
PASSWORD
LOGIN
Need an account? Create Profile
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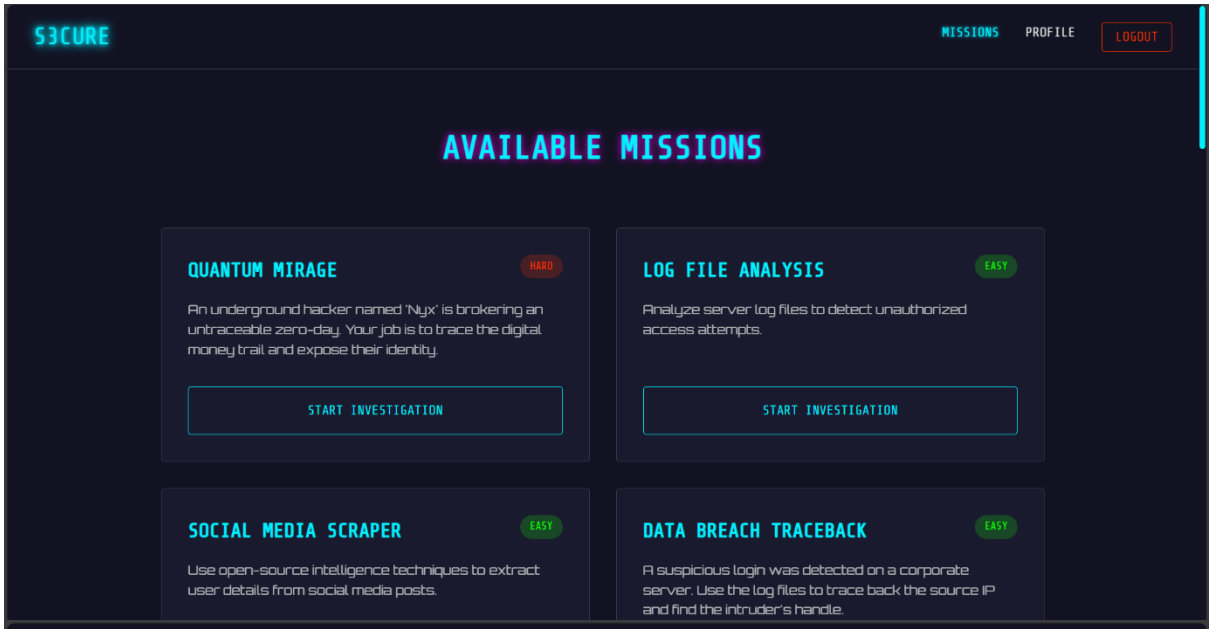
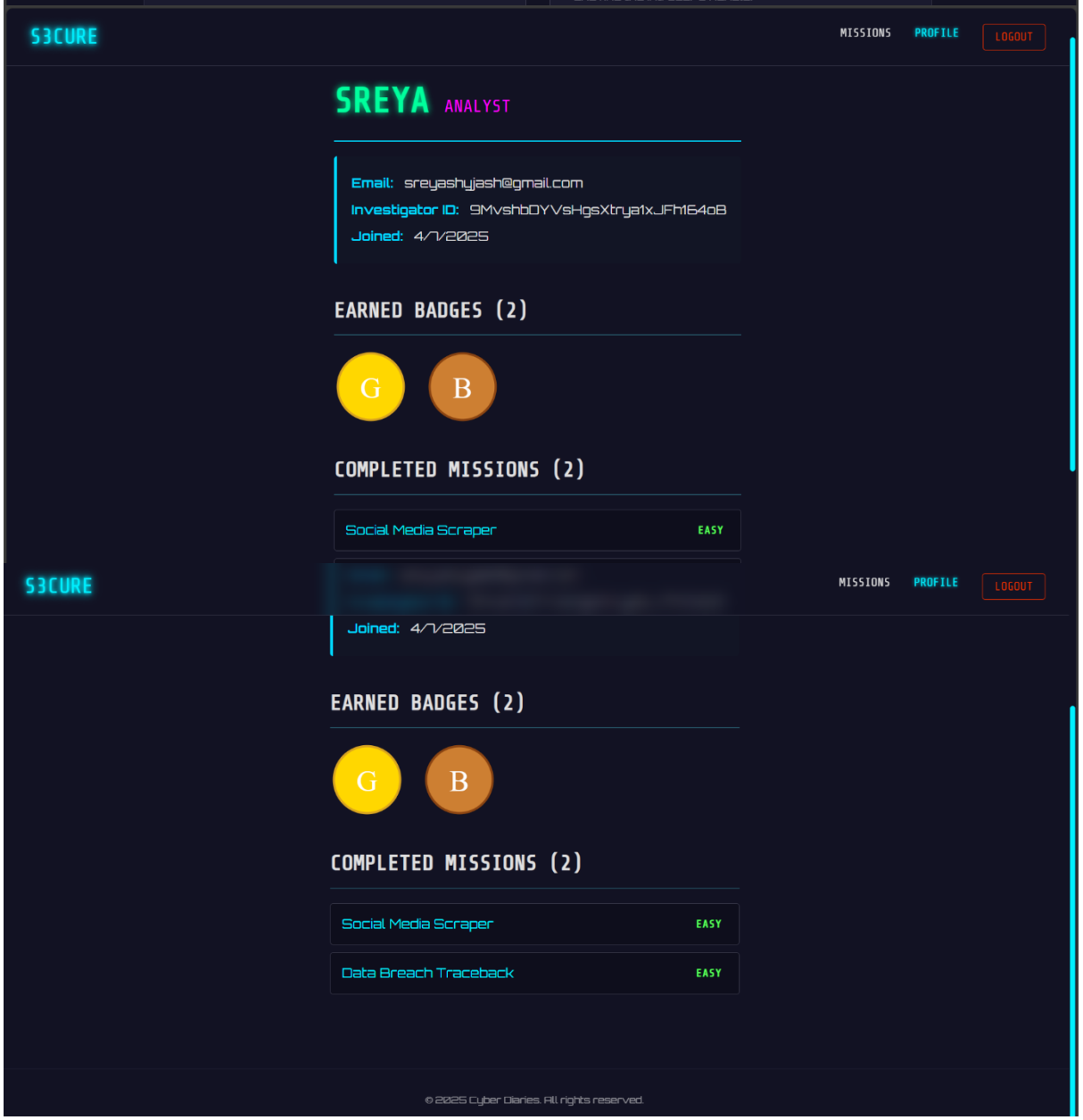
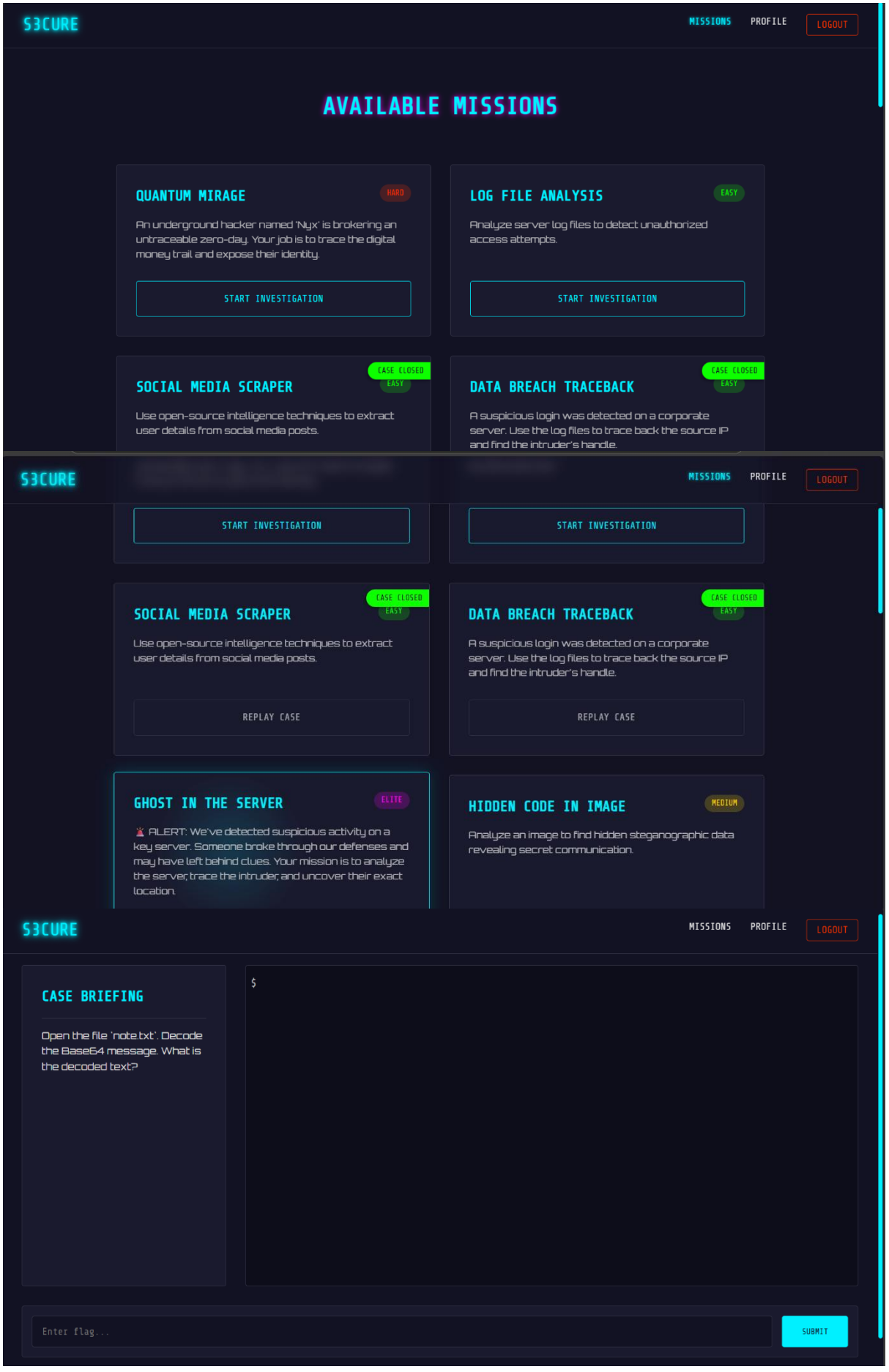
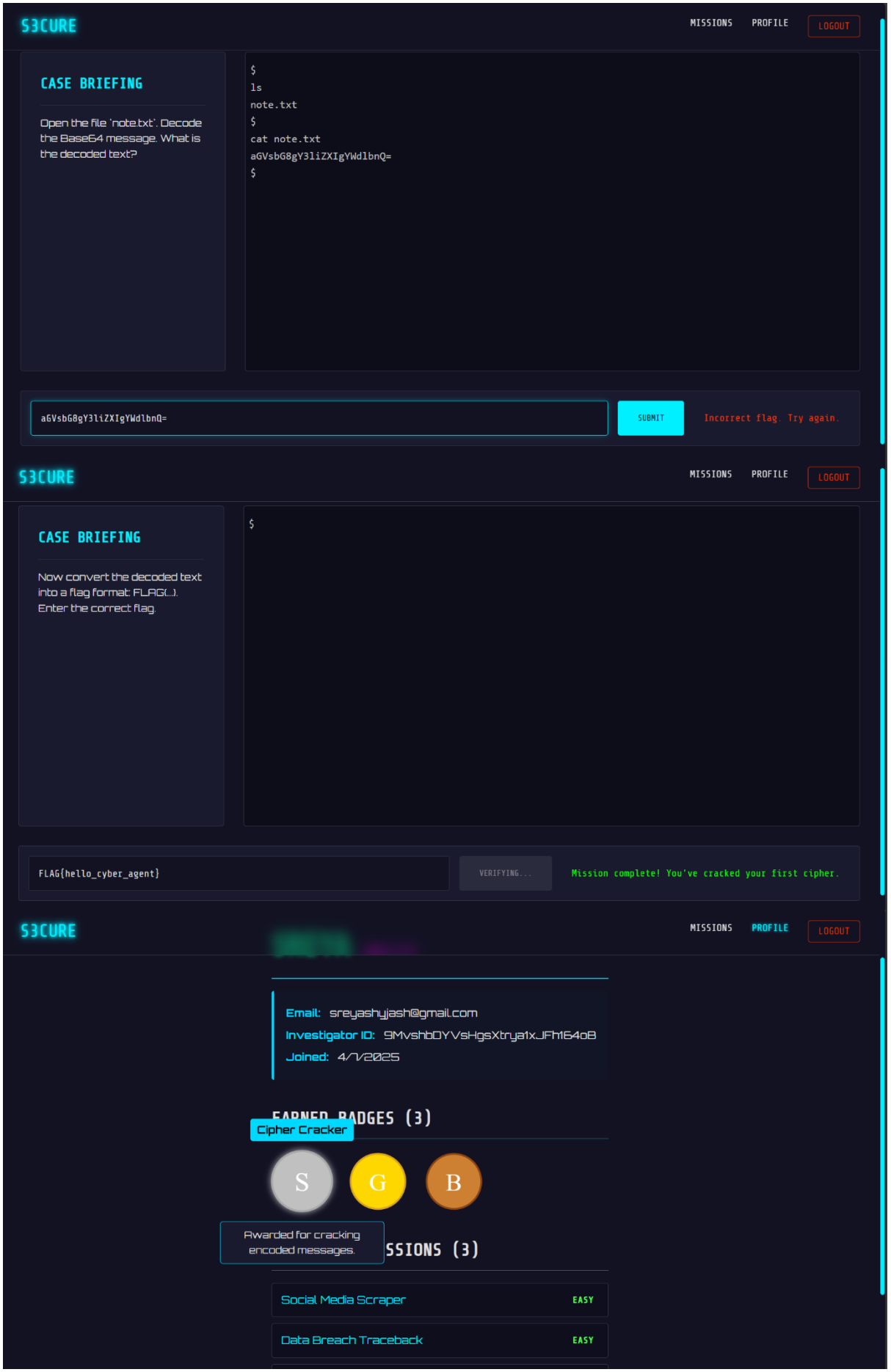





S3CURE
MISSIONS
PROFILE
LOGOUT
AVAILABLE MISSIONS
QUANTUM MIRAGE
HARD
An underground hacker named 'Nyx' is brokering an untraceable zero-day. Your job is to trace the digital money trail and expose their identity.
START INVESTIGATION
LOG FILE ANALYSIS
EASY
Analyze server log files to detect unauthorized access attempts.
START INVESTIGATION
SOCIAL MEDIA SCRAPER
CASE CLOSED
EASY
Use open-source intelligence techniques to extract user details from social media posts.
DATA BREACH TRACEBACK
CASE CLOSED
EASY
A suspicious login was detected on a corporate server. Use the log files to trace back the source IP and find the intruder's handle.
S3CURE
MISSIONS
PROFILE
LOGOUT
START INVESTIGATION
START INVESTIGATION
SOCIAL MEDIA SCRAPER
CASE CLOSED
EASY
Use open-source intelligence techniques to extract user details from social media posts.
REPLAY CASE
DATA BREACH TRACEBACK
CASE CLOSED
EASY
A suspicious login was detected on a corporate server. Use the log files to trace back the source IP and find the intruder's handle.
REPLAY CASE
GHOST IN THE SERVER
ELITE
ALERT: We've detected suspicious activity on a key server. Someone broke through our defenses and may have left behind clues. Your mission is to analyze the server, trace the intruder, and uncover their exact location.
HIDDEN CODE IN IMAGE
MEDIUM
Analyze an image to find hidden steganographic data revealing secret communication.
S3CURE
MISSIONS
PROFILE
LOGOUT
CASE BRIEFING
Open the file 'note.txt'. Decode the Base64 message. What is the decoded text?
$
Enter flag...
SUBMIT


S3CURE
MISSIONS
PROFILE
LOGOUT
CASE BRIEFING
Open the file 'note.txt'. Decode the Base64 message. What is the decoded text?
$
ls
note.txt
$
cat note.txt
aGVsbG8gY3liZXIgYWdlbnQ=
$
aGVsbG8gY3liZXIgYWdlbnQ=
SUBMIT
Incorrect flag. Try again.
S3CURE
MISSIONS
PROFILE
LOGOUT
CASE BRIEFING
Now convert the decoded text into a flag format: FLAG{...}. Enter the correct flag.
$
FLAG{hello_cyber_agent}
VERIFYING...
Mission complete! You've cracked your first cipher.
S3CURE
MISSIONS
PROFILE
LOGOUT
Email: sreyashyjash@gmail.com
Investigator ID: 9MvshbOYVsHgsXtrya1xJFh164oB
Joined: 4/7/2025
EARNED BADGES (3)
Cipher Cracker
S
G
B
Awarded for cracking encoded messages.
SSIONS (3)
Social Media Scraper
EASY
Data Breach Traceback
EASY

CONCLUSION

The S3CURE project successfully met its aim of creating a functional prototype for a gamified cybersecurity education platform. The journey from concept to a working application highlighted the critical importance of meticulous environment configuration in modern full-stack development. The resolution of complex Node.js version conflicts and dependency mismatches was a significant learning experience and a crucial outcome of the project, underscoring that a robust architecture is only effective within a correctly configured environment.
The final prototype now stands as a solid foundation upon which the full vision of S3CURE can be built.