Cool Cyber Games

Interactive Web Application for Teaching Cybersecurity

coolcybergames.com

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Goals and Motivation

Goals:

- Provide an interactive and effective platform to teach cyber security to adult users (18+).
- Build user awareness, practical skills, and resilience against cyber threats.
- Allow compatibility with all the most commonly used operating systems and languages.
- Offer hands-on experience with simulations of real-world scenarios.
- Foster a smooth learning experience with user-centered content.

Goals and Motivation

Motivation:

- **Lack of Accessibility and Usability**: Existing cyber security learning have not so beginner-friendly, and have intimidating interfaces, discouraging new and inexperienced users from engaging.

- **Absence of Gamification**: Cybersecurity is often presented in a dry, textbook-like manner. Gamification and interactive practical exposure help users to stay motivated.

- **Lack of hands-on opportunities:** Without practical exposure, users cannot effectively apply cybersecurity principles in real-life scenarios.

- **Intimidation Around Cybersecurity Concepts:** Many users find complex cybersecurity concepts abstract and intimidating. Instead of avoiding the topic entirely, a guided approach can help users feel confident and capable.

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Approach

Interactive tutorials and quizzes

- Users will go through interactive tutorials that guide them through learning the essential cybersecurity concepts in a step-by-step manner.
- The users will apply knowledge through quizzes/labs at the end of each tutorial.

Modules and Levels with gamification.

- The users will go through gamified modules tailored to a specific topic.
- Users will interact with gamified elements, such as interactive characters, environments, challenges, etc.
- Users will receive real-time, detailed feedback and clear progress metrics.

Approach (cont.)

Real-world cybersecurity challenges.

- Users will learn by playing in real-world cybersecurity simulations, where for example they simulate defending against cyber attacks like phishing, malware, etc.

- The users can practice applying cybersecurity strategies in scenarios that mirror real-life situations, gaining insights into how cybersecurity threats evolve and how to protect against them.

Progress tracking, certifications, and leaderboards.

- The users will have their progress automatically tracked, like completion of tutorials, modules, quizzes, and be able to view it in a simple dashboard.

- Users can earn achievements, and certifications as they progress through different levels of content, and a real time leaderboard will be kept scoring to defined logic.

Novel Features

Gamification

- Gamified elements like fun changes, leaderboards, progress milestones and more, keeping user motivated and gaining building practical experience that is missing in other platforms.

Adaptive Learning Paths

- Automatically adjust difficulty levels or give personalized learning suggestions.
- Ensures the content is always appropriately challenging.

Progress Tracking, Achievements, and Feedback

- Give user real-time feedback on their progress, helping them, suggesting next steps, and saving their progress automatically
- Offering certificates/badges upon completion of challenges

Technical Challenges

Defining the Structure of Real-World Cybersecurity Simulations:

- Create engaging, realistic threat scenarios while balancing complexity for diverse user

Developing Frontend and Backend Architecture:

- Using React.js, Python, and JavaScript while designing efficient APIs for progress tracking and gamification.
- Seamlessly integrating various tools and algorithms.

Hosting and Storage:

- Choosing cost-effective hosting for performance and scalability
- Optimizing database storage for user progress, game results, and authentication.

Current Tools and Algorithms

Frontend Development

- HTML, CSS, Javascript, React.js
- Godot game engine, Unity game engine, and Javascript

Backend & API

- Java, Python (FastAPI)
- Node.js

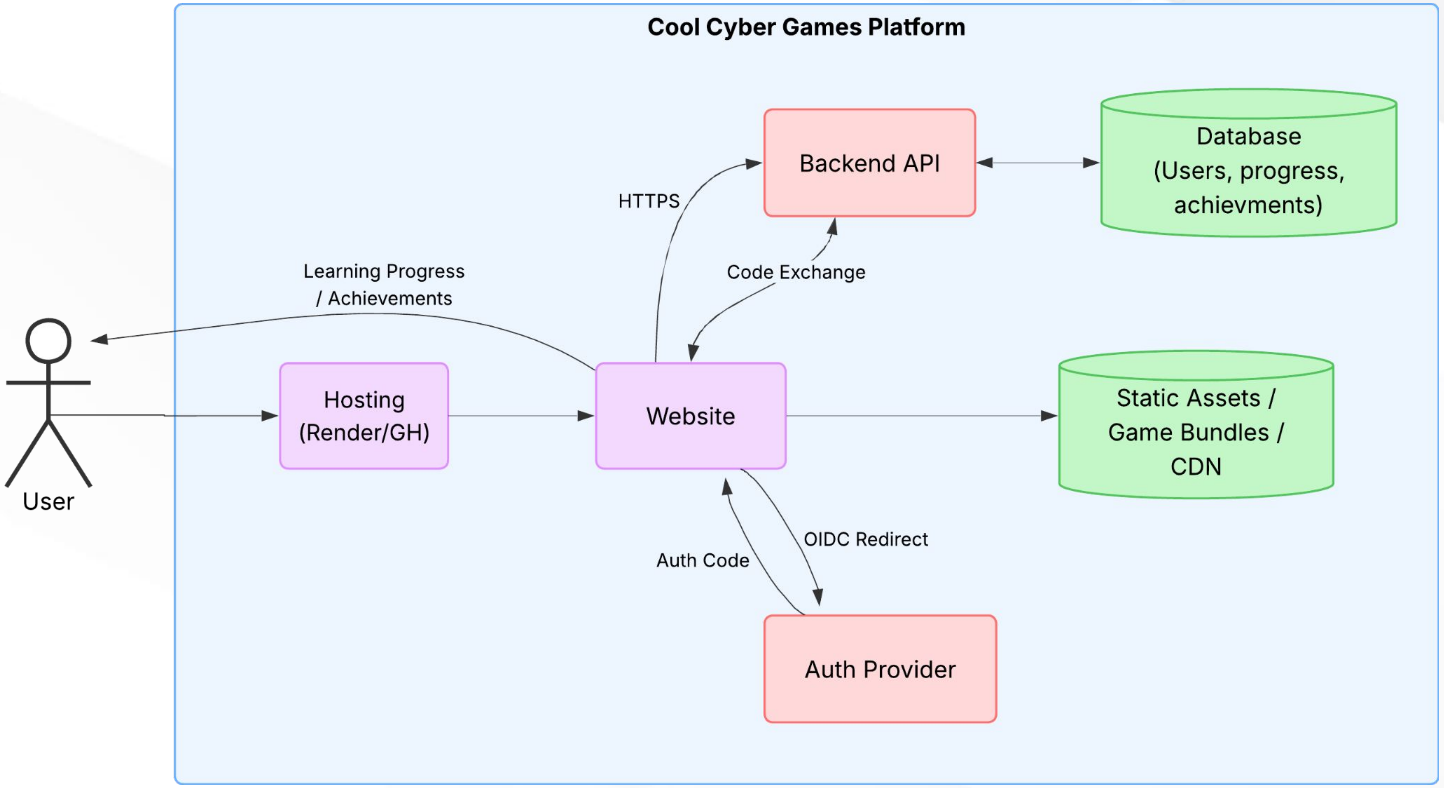
Security & Hosting

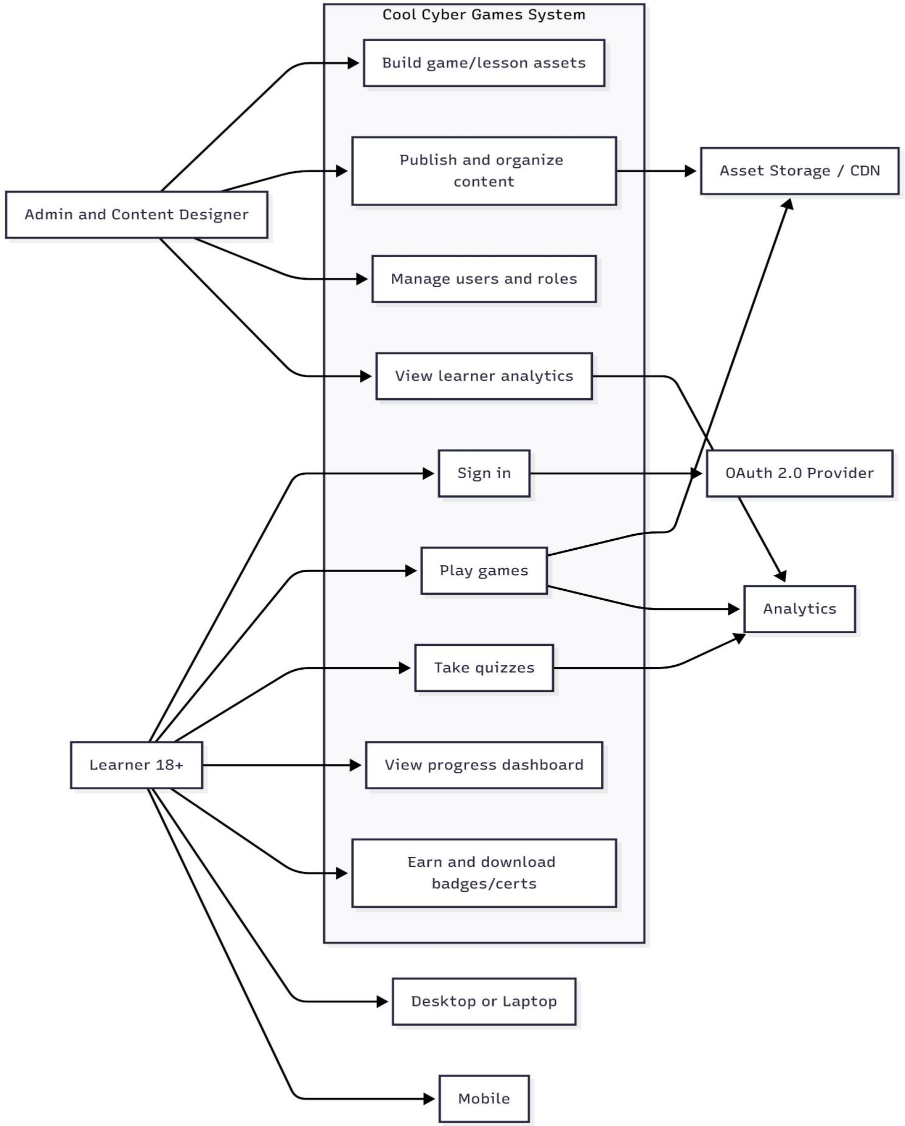
- OAuth, JWT, Bcrypt
- Render
- AWS/GCP

Database & Storage

- PostgreSQL
- MongoDB

System Architecture


Cool Cyber Games Platform
Backend API
Database (Users, progress, achievments)
HTTPS
Code Exchange
Learning Progress / Achievements
User
Hosting (Render/GH)
Website
Static Assets / Game Bundles / CDN
Auth Code
OIDC Redirect
Auth Provider



Milestone Four Tasks: (Sep 29)

1. **Finish, Implement, Test, and Demo Three Games**
   - Master the Password
   - File Detective
   - Web Quest
2. **Connect Malware Maze to Backend → Frontend**
   - Progress tracking and achievements tied to database.
3. **User Dashboard + Leaderboard**
   - Finish building and demo frontend dashboard.
   - Fetch player progress and rankings from database.

Milestone Five Tasks: (Oct 27)

1. **Finalize Games**
    - Complete Game 2, Game 3, Game 4 with art/UI polish.
    - Integrate with backend for persistence and scoring.
2. **Refine User Dashboard**
    - Add progress bars, badges, and visual polish.
3. **Conduct Evaluation Study**
    - Measure learning outcomes (pre/post quiz, completion rates).
    - Gather usability feedback (navigation, clarity, enjoyment).
4. **Showcase Prep**
    - Begin poster design for Senior Design Showcase.
    - Midpoint client demo: present functional website, multiple games, dashboard, and early evaluation data.

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Milestone Six Tasks: (Nov 24)

1. **Implement, Test, and Demo Advanced Features**:
   - ○ Implement and test full system integration (all games, dashboard, backend, DB, auth).
   - ○ Conduct final end-to-end testing and demos
   - ○ Run final evaluation: analyze technical metrics (load times, errors) + user learning outcomes.
2. **Create Final Showcase Media (Physical and Digital)**
   - ○ Create User Manual (how to play, navigate, track progress) and Developer Manual (setup, architecture, future work).
   - ○ Record and edit a demo video highlighting system features.
   - ○ Finalize and print poster for Senior Design Showcase.
3. **Showcase Final Product**
   - ○ Final presentation to client and faculty advisor.
   - ○ Bring feedback on overall state of the project
   - ○ Coordinate next development phase of the project

Task Matrix: Milestone 4

Task	Anthony	Matthew	Ben	Ludendorf
Implement, test & demo *Game: Master the Password*	100%	0%	0%	0%
Implement, test & demo *Game: File Detective*	0%	0%	0%	100%
Implement, test & demo *Game: Web Quest*	0%	0%	100%	0%
Implement & test Backend→Frontend Game connection for Malware Maze	0%	100%	0%	0%
Implement, test & demo Frontend user dashboard and leaderboard	0%	100%	0%	0%

Questions?