Software Engineering Project

May 2025 - Team 25

Milestone - 3
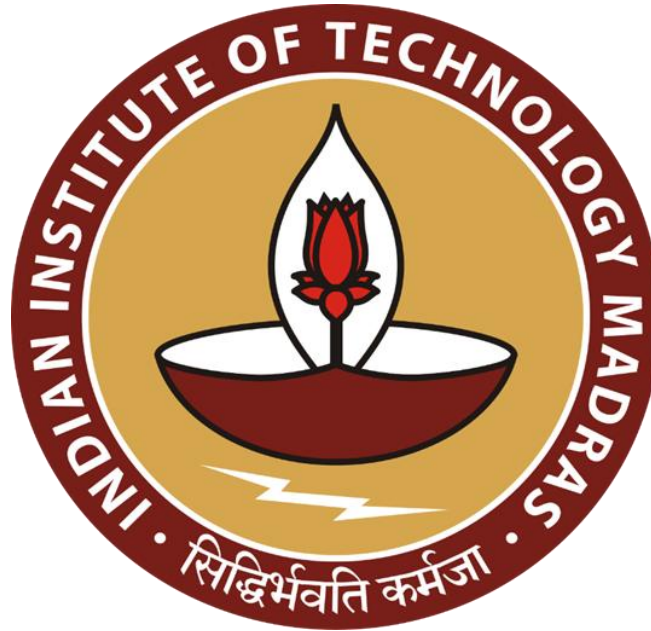
Siddhardh Devulapalli	21f2000579
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Project Schedule

Task Distribution

The entire project was divided into SDLC phases: Planning, Design, Development, Testing, and QA/Implementation. Each milestone was set for a 2–3 week duration, with the aim to complete and submit each milestone document within a single sprint.

The entire project is divided into 6 sprints, each aligned with the milestone deadlines:

- Milestone 1: 25 May, 2025
- Milestone 2: 15 June, 2025
- Milestone 3: 6 July, 2025
- Milestone 4: 20 July, 2025
- Milestone 5: 5 August, 2025
- Milestone 6: 17 August, 20251

ClickUp is used as the project management tool. One Sprint plan was created for every milestone in ClickUp . Each Sprint is subdivided into tasks or user stories, with the Development Sprint further broken down into individual user stories, and the rest into tasks.

Each task was assigned to a team member based on their availability, capability, and unique strengths to ensure a balanced workload. The main assignments are as follows:

- User Research & Requirements: All members contributed to identifying users, conducting interviews, and drafting user stories.
- Storyboard & Wireframes: Jeevan created the storyboards and Amit worked on wireframes for key features. Siddharth added notes to storyboards and took feedback on wireframes.
- Project Scheduling: Sid managed ClickUp trackers, scheduling, and overall coordination.
- Frontend Development:
  - Jeevan and Sinu: index.js, login page, and dashboard components.
  - Jeevan: Admin and Child Dashboards.
  - Sinu: Parent Dashboard.
  - Sid: Teacher Dashboard
  - Om: Emotion Chatbot, Doodling, and frontend integration.
  - Amit: Health Tracker
  - Sreekanth: Financial Literacy Tracker.

- Backend Development:
    - Om and Sreekanth: Data models, API endpoints, and backend tech stack.
- Feature Implementation:
    - Psychometric Tests: Sinu
    - Financial Literacy: Sreekanth
    - Pomodoro Timer: Pankaj
    - Enhanced Frontend Chatbot: Om
    - Good/Bad Touch Module: Jeevan and Sinu
    - Alarm Feature: Pankaj
    - English Speaking Practice: Assigned as per latest scrum (rotating responsibility)
    - Motivation Quotes (AI): Sid and Amit
    - Additional Gamification: Towards project end (team effort)
- Documentation & Diagrams:
    - Gantt Chart: Pankaj and Sid
    - Sprint Tasks: Amit and Sid
    - Scrum Board: Amit and Sid
    - Scrum Meeting Minutes: Sid
    - ER Diagram: Sinu
    - Class Diagram (UML): Sreekanth
   - Milestone-3 Doc Formatting and Compilation: Sid

The start and end dates of each Sprint coincide with the respective milestone due dates, ensuring alignment between planning and execution.

This structured task distribution ensured that all project phases were covered, responsibilities were clearly assigned, and tasks were tracked and managed efficiently using ClickUp.

Gantt chart

Monthly Timeline view ([click here for clearer view](#))

This Gantt Chart visually outlines the entire project schedule across six sprints, from May to mid-August 2025. It breaks down key phases—user requirements, interface design, scheduling, development, testing, and final implementation—showing clear start and end dates for each task. Color-coded bars represent parallel and sequential activities, helping the team track progress and manage dependencies. The chart ensures all milestones and deliverables are planned and monitored for timely completion.
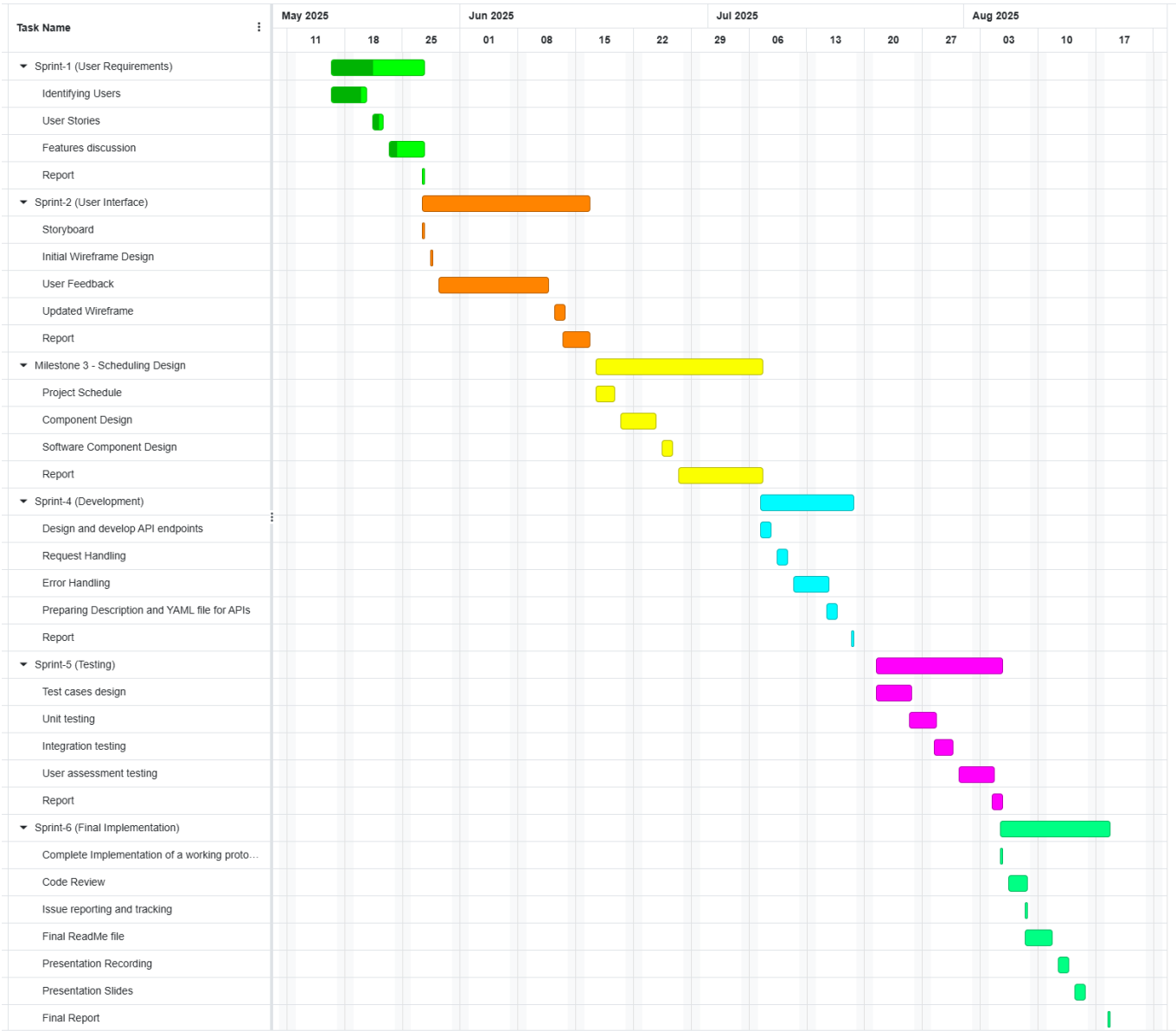
Sprint-wise Task Backlog

Sprint 3 (Scheduling & Design):

- Tasks include Project Schedule, Component Design, Software Component Design (Frontend, Backend), and Report.
- Tasks are marked as "Complete" or "In Progress" according to their current status.

Sprint 4 (Development):

- Tasks include Design and development of API endpoints, Request Handling, Error Handling, Preparing API documentation (YAML), and Report.
- All tasks are currently in "To Do" status and will be moved to "In Progress" as work begins.

Sprint 5 (Testing):

- Tasks include Test case design, Unit testing, Integration testing, User assessment testing, and Report.
- All tasks are in "To Do" status and will be updated as testing activities commence.

Sprint 6 (Final Implementation):

- Tasks include Complete implementation of a working prototype, Code Review, Issue reporting and tracking, Final ReadMe file, Presentation Recording, Presentation Slides, and Final Report.
- Tasks are scheduled and will be tracked from "To Do" to completion as the sprint progresses.
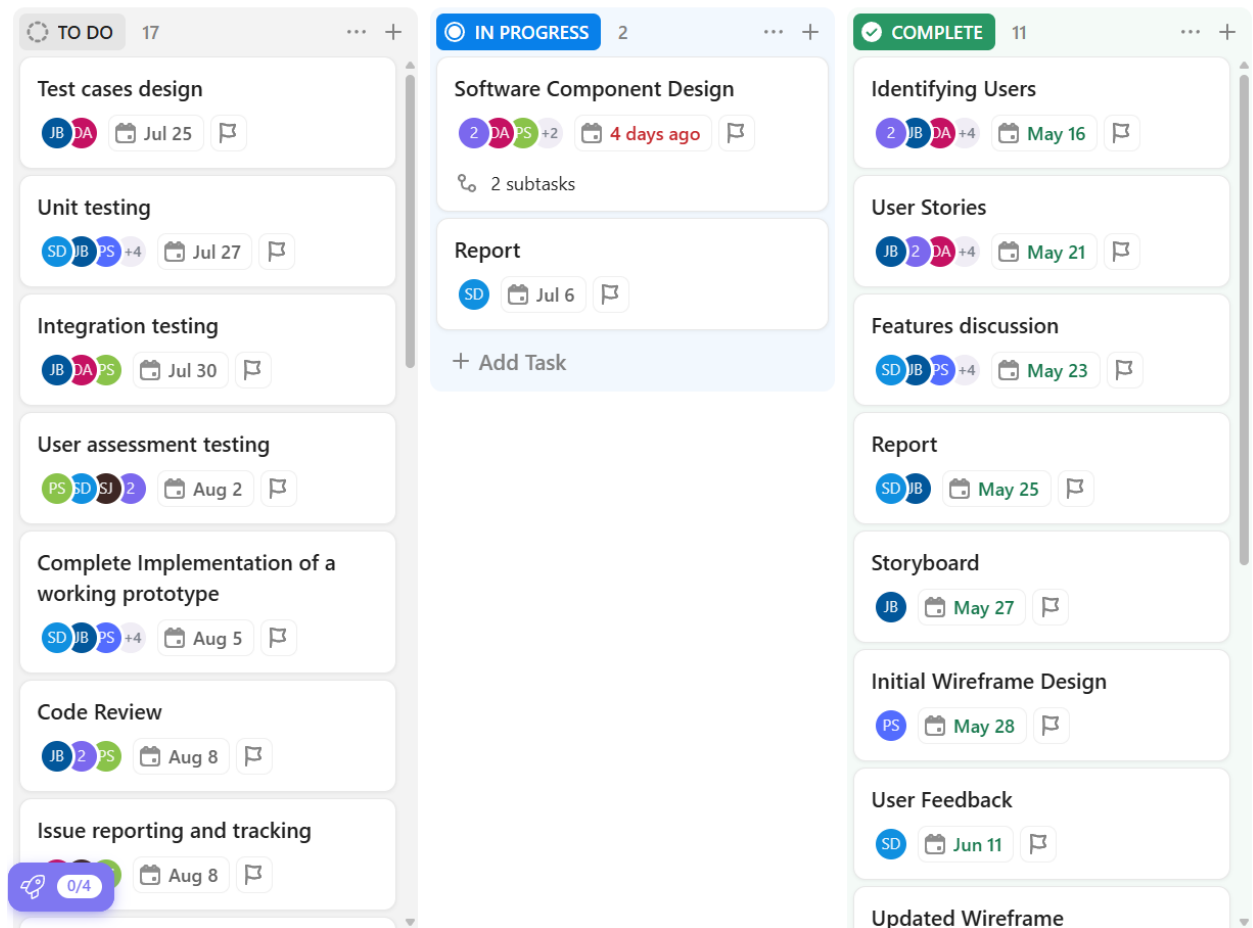

This structure ensures all tasks are visible, progress is tracked, and team members are accountable for their assignments throughout each sprint, in line with agile best practices.

Scrum Board

The Scrum board tracks each task in the backlog as it moves from 'To Do' status through 'In Progress' and finally to 'Complete' status..

The board provides a clear view of the status of each task in the sprint backlog:

- To Do:
  Test cases design, Unit testing, Integration testing, User assessment testing, Complete Implementation of a working prototype, Code Review, Issue reporting and tracking.
- In Progress:
  Software Component Design, Report.
- Complete:
  Identifying Users, User Stories, Features discussion, Report (Milestone 1/2), Storyboard, Initial Wireframe Design, User Feedback, Updated Wireframe.

TO DO 17	IN PROGRESS 2	COMPLETE 11
Test cases design JB DA Jul 25	**Software Component Design** 2 DA PS +2 4 days ago — 2 subtasks	**Identifying Users** 2 JB DA +4 May 16
Unit testing SD JB PS +4 Jul 27	**Report** SD Jul 6 + Add Task	**User Stories** JB 2 DA +4 May 21
Integration testing JB DA PS Jul 30		**Features discussion** SD JB PS +4 May 23
User assessment testing PS SD SJ 2 Aug 2		**Report** SD JB May 25
Complete Implementation of a working prototype SD JB PS +4 Aug 5		**Storyboard** JB May 27
Code Review JB 2 PS Aug 8		**Initial Wireframe Design** PS May 28
Issue reporting and tracking 0/4 Aug 8		**User Feedback** SD Jun 11
		Updated Wireframe

Scrum Meetings

Scrum Meetings Summary

Below is a summary of the scrum meetings conducted for the project, formatted for clarity and alignment with standard software engineering documentation practices:

Scrum Meeting Schedule

- Frequency: Every Tuesday and Friday, 9:00 – 10:00 PM

Meeting Summaries

20/05/2025

- Identified primary, secondary, and tertiary users for the software application.
- Reviewed progress on user interviews conducted so far.
- Initiated partial preparation of the Milestone-1 document like type of users and user stories compilation.

23/05/2025

- Brainstormed feature ideas based on user stories gathered.
- Discussed and listed possible features: separate age group modules, math games, psychometric tests, emotional companion chatbot, time management tool (Pomodoro tracker), alarm with puzzle stop, doodling session, personalized motivation, financial tracker, good touch/bad touch education (especially for girls), everyday status, English speaking, career guidance, diet suggestions, and water intake reminders.

27/05/2025

- Reviewed and shared progress on storyboards and wireframes (Jeevan and Amit).
- Noted that some features' wireframes were complete, others pending.
- Began project scheduling and design setup (Siddharth working on Task trackers).
- Organized features into three main buckets: Time Management, Financial Literacy, and Personalized Well-being.
- Finalized SMART-compliant features; non-compliant features marked as bonus.

- Prepared agenda for next client meeting, including feature presentation, storyboard/wireframe review, and scheduling updates.
- Assigned frontend and backend tasks to respective team members.
- Om worked on setting up the emotion chatbot
- Jeevan worked on setting up the frontend like login/register page, home page and tasks-to do page
- Amit has prepared wireframes before feedback
- Jeevan has prepared storyboards for milestone-2

10/06/2025

- Prepared Milestone-2 documentation (Sid).
- Compiled storyboards and wireframes (before and after feedback).
- Assigned implementation of psychometric tests (Sinu), financial literacy (Sreekanth), and Pomodoro timer (Pankaj).
- Designed Pomodoro UI with selectable session durations and a reverse timer.
- Enhanced frontend chatbot; Om to present Jeevan's work.
- Noted that a recent break slowed momentum, but progress has resumed.

13/06/2025

- Detailed the feedback from the user on Wireframes.
- Demonstrated progress on Milestone-2.
- Identified further changes needed (e.g., correcting storyboard spelling errors).
- Continued iteration on wireframes based on feedback (Amit and team).
- Setting aside Development phase for a short while to work on milestone-3
- Distributed tasks for Milestone-3:
    - Gantt Chart: Pankaj
    - Sprint Tasks: Amit
    - Scrum Board: Amit and Sid
    - Scrum Meeting Documentation: Sid
    - Frontend Tech & Screenshots: Om
    - Backend Tech: Jeevan
    - ER Diagram: Sinu
    - Class Diagram: Sreekanth
    - Frontend Code: Om & Jeevan

17/06/2025

- Discussed agenda for upcoming client call.
- Confirmed completion of sprint-wise tasks, scrum meeting notes(Sid), ER diagram(Sinu), and UML diagram(Sreekanth).

- Remaining tasks: Gantt Chart(Pankaj), Scrum Board(Amit and Sid), frontend(Om) and backend(Jeevan) progress, frontend(Om) code to be showcased in the following week.

20/06/2025

- API Integration: Discussed the need to integrate a psychometric API with a comprehensive set of questions for report generation. Task assigned to identify and finalize a suitable API.
- Division of Functionalities: Remaining modules (Good/Bad Touch, Alarm, English Speaking Practice) allocated among team members for development.
- UI/UX Finalization: Decided that each member working on a feature will meet with Jeevan to finalize UI and workflow before committing changes.
- Modeling and Diagrams: Agreed to finalize ER and class diagrams for all functionalities, ensuring frontend designs align with models for Milestone 3.
- Unit Testing: Initiated unit testing for each functionality.
- Remaining Features: Parent dashboard, Teacher dashboard, and Healthy habits module were identified as pending.

24/06/2025

- Model Progress: Sinu completed three models; teacher model pending.
- Admin Dashboard: Pankaj and Jeevan to collaborate on its development.
- Client Meeting Preparation: Agenda set with clear roles—Sid (Intro), Sinu & Jeevan (Frontend), Sinu (Parent Dashboard), Jeevan (Child Dashboard), Sreekanth (Financial Literacy), Om (Chatbot & Backend), Amit (Kanban Board), Pankaj (Gantt Chart).

27/06/2025

- Diagram & Code Deadlines: ER diagram and psychometric code to be completed by Sinu by Sunday; UML diagram by Sreekanth.
- Frontend Compilation: Assigned completion of specific components—Login/Signup (Sinu), Admin Dashboard (Jeevan), Parent Dashboard (Sinu), Student Dashboard (Jeevan), Finances Tracker (Sreekanth), Emotion Chatbot (Om), Health Tracker (Amit), Pomodoro (Pankaj), Doodling (Om).
- Integration: All frontend code to be pushed to GitHub by next Thursday/Friday; unfinished components to be coordinated with Jeevan.
- Remaining Features: Teacher dashboard (Sid), Motivation Quotes (Sid & Amit), Good/Bad Touch (Jeevan & Sinu), Alarm (Pankaj), Additional Gamification (end of project).

01/07/2025

- Milestone 3 Review: Sid presented the compiled Milestone 3 document; demo of all features and UI given.
- Task Briefing for Client: Task Distribution (Sid), Gantt Chart (Pankaj), Sprint Backlog (Amit), Scrum Boards (Amit), Scrum Meetings (Sid), Frontend (Jeevan, Sinu, Sreekanth, Om), Backend (Om), ER Diagram (Sinu), UML Diagram (Sreekanth).
- Pending Tasks: Health Tracker (Amit), Task Tracker (Jeevan), Child Dashboard UI rearrangement (Jeevan), Parent Dashboard (Sinu).
- Focus Shift: Decided to prioritize main features (Task Tracker, Health Tracker, Finances Tracker) over gamification to better showcase core functionality and design.

Key Outcomes

- Regularly scheduled meetings ensured steady progress and accountability.
- Tasks were clearly distributed based on expertise and availability.
- Continuous feedback and iteration were incorporated for both design and documentation.
- Project management tools were set up for tracking and scheduling.
- All major components (frontend, backend, diagrams, documentation) were assigned and tracked.

Proof of Interaction

Software Design

Frontend

The frontend of KidQuest is a Vue.js-based interface that provides role-specific dashboards and features for children, parents, and teachers, each with unique views and interactions.

It consists of the following components:

Home page

This is the home/login page for KidQuest. It welcomes users with a bright, inviting message and encourages them to start or continue their adventure to master life skills. The page highlights key features like tracking homework, building habits, and unlocking rewards. Clear "Start Your Quest" and "Continue Adventure" buttons make it easy for kids to begin their journey.
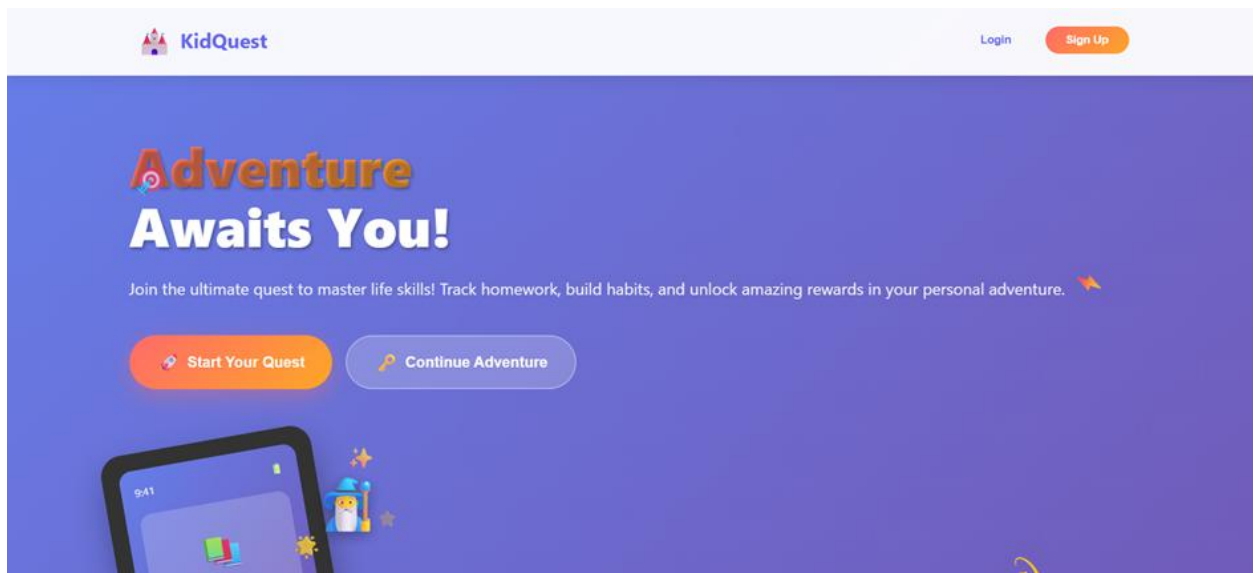
SignUp

This SignUp page for KidQuest offers a friendly, step-by-step registration experience for both kids and parents. Users first choose whether they are signing up as a child or a guardian, then fill out a simple form with their name, email, and a secure password. The playful design, clear instructions, and engaging icons make the process inviting and

easy to follow. This approach ensures a safe and welcoming start to the KidQuest adventure for every family member.
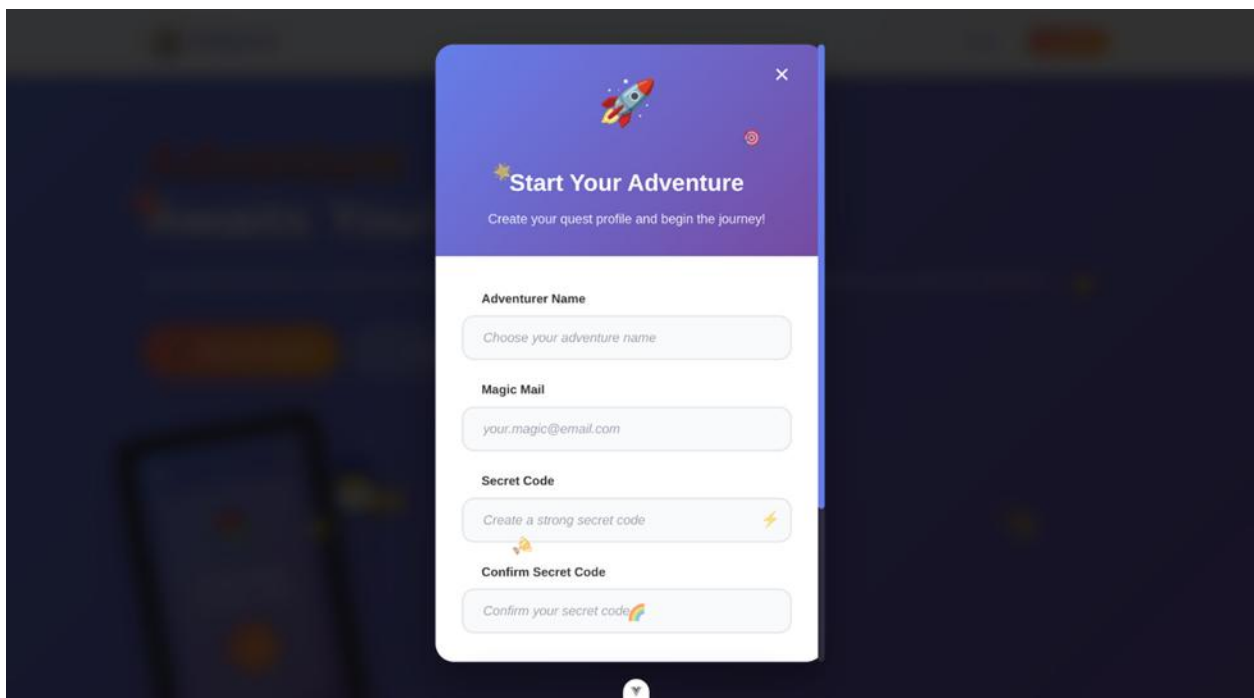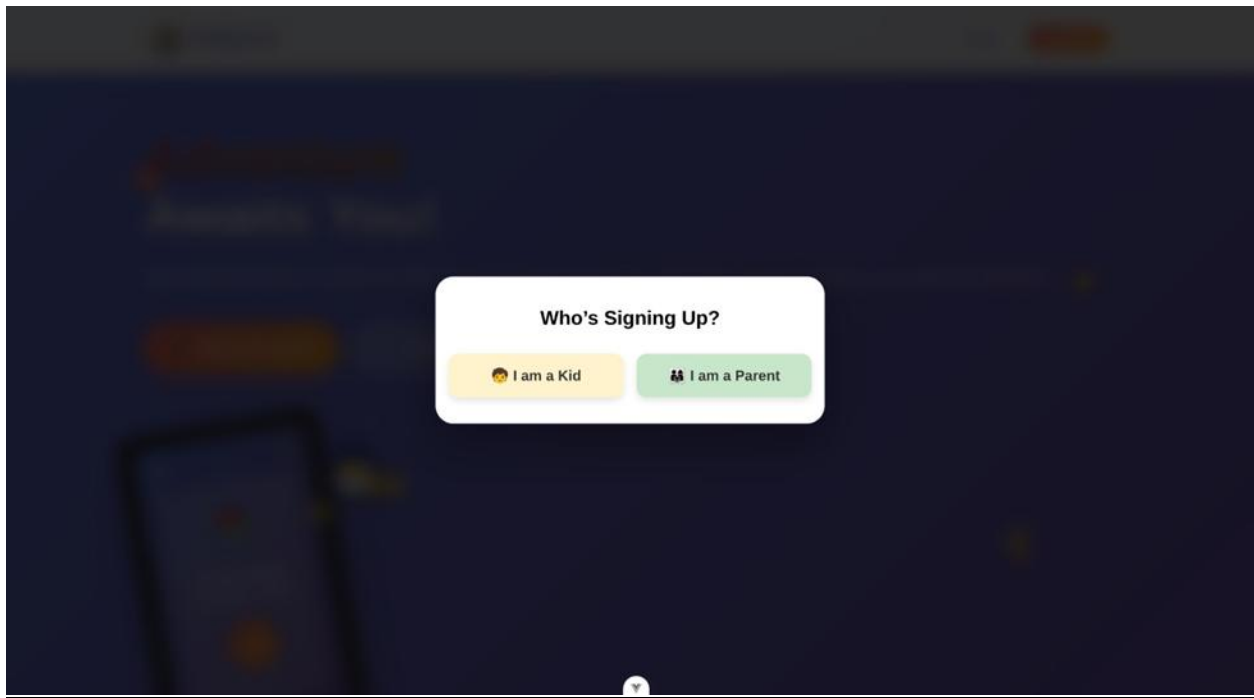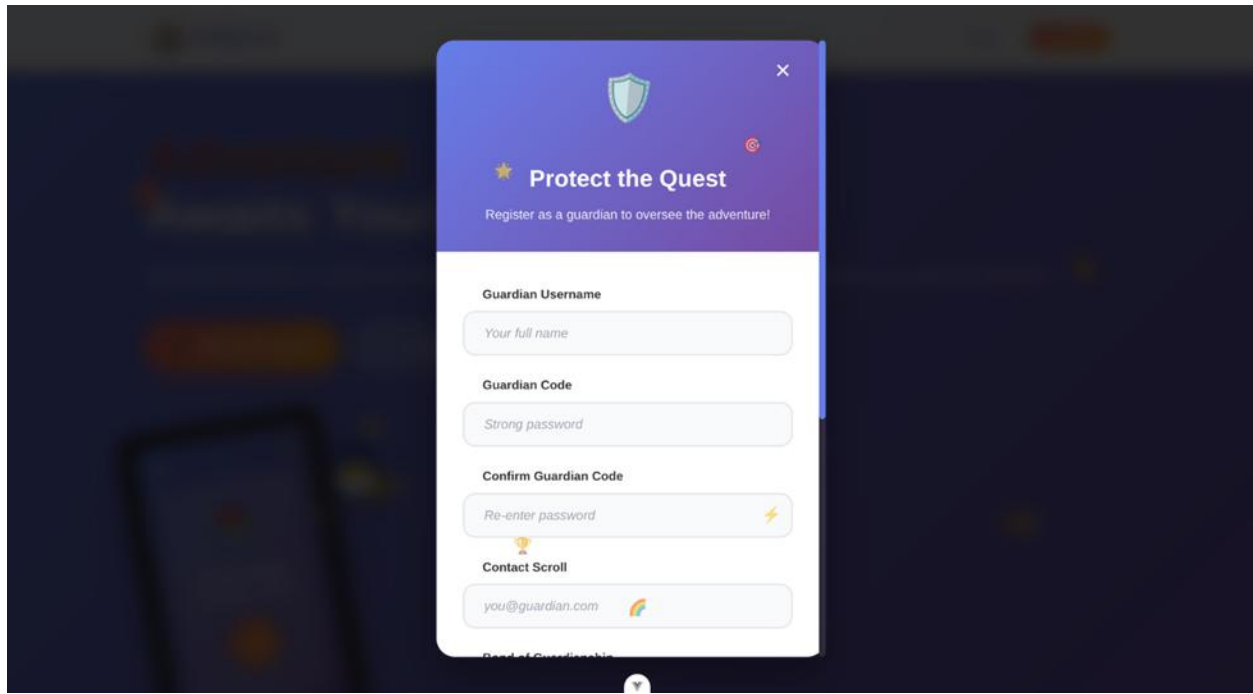
Child Dashboard

This child dashboard welcomes young users with a cheerful greeting and a motivating message to start their day's adventures. It visually tracks the child's progress by showing stars collected, quests completed, skills mastered, and today's goals. Main adventures like Psychometric Test, Finance Tracker, Health Tracker, and Task Tracker are highlighted for easy access. The colorful and organized layout encourages kids to explore, learn, and celebrate their achievements every day.
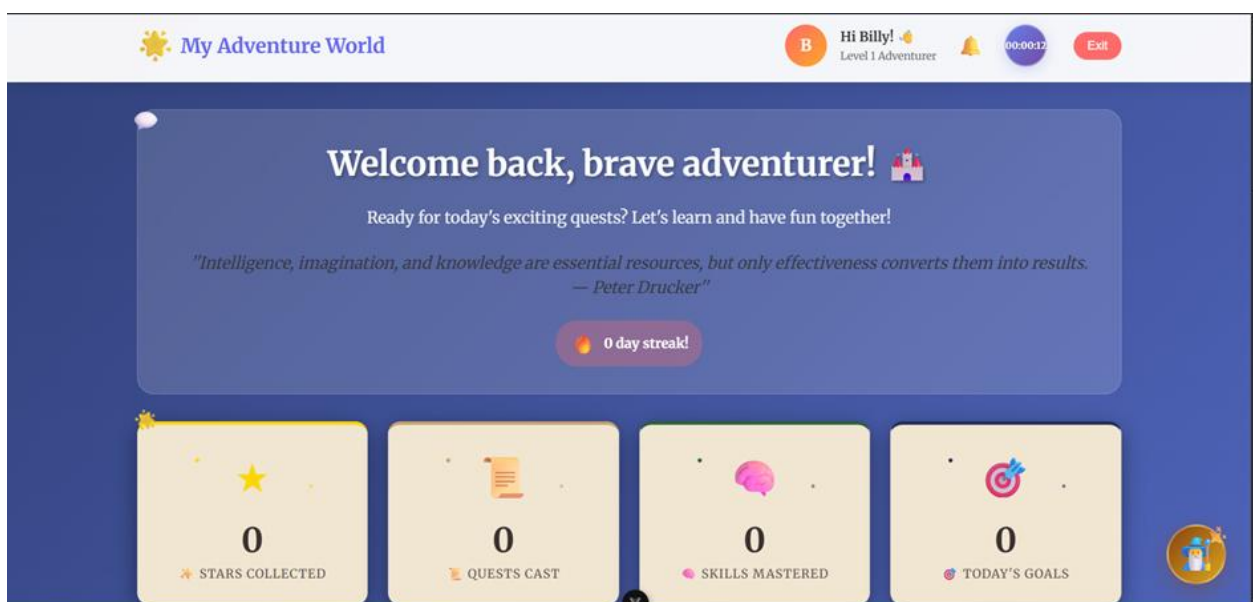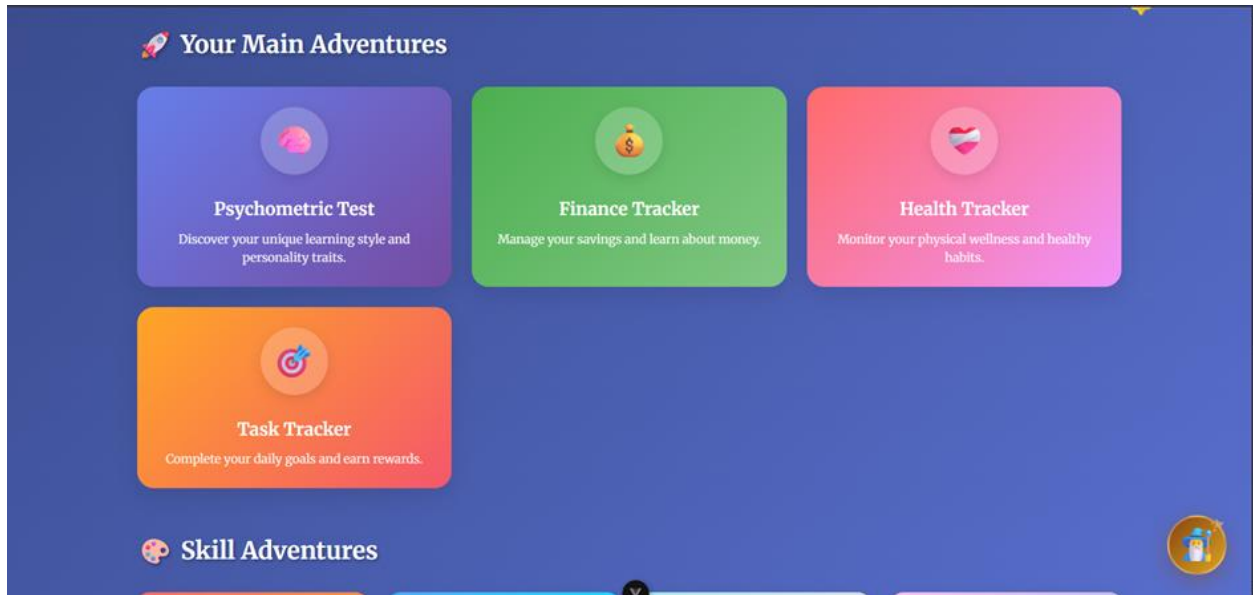
Finances Tracker

This Finances Tracker page, called the "Treasure Chest," helps children manage their money by tracking income and expenses in a simple, visual way. Kids can see their total savings, add new income or expenses, and view recent transactions. The page also lets them set savings goals—like for a birthday—and track their progress towards reaching them. The friendly design encourages kids to build smart money habits and celebrate their achievements.
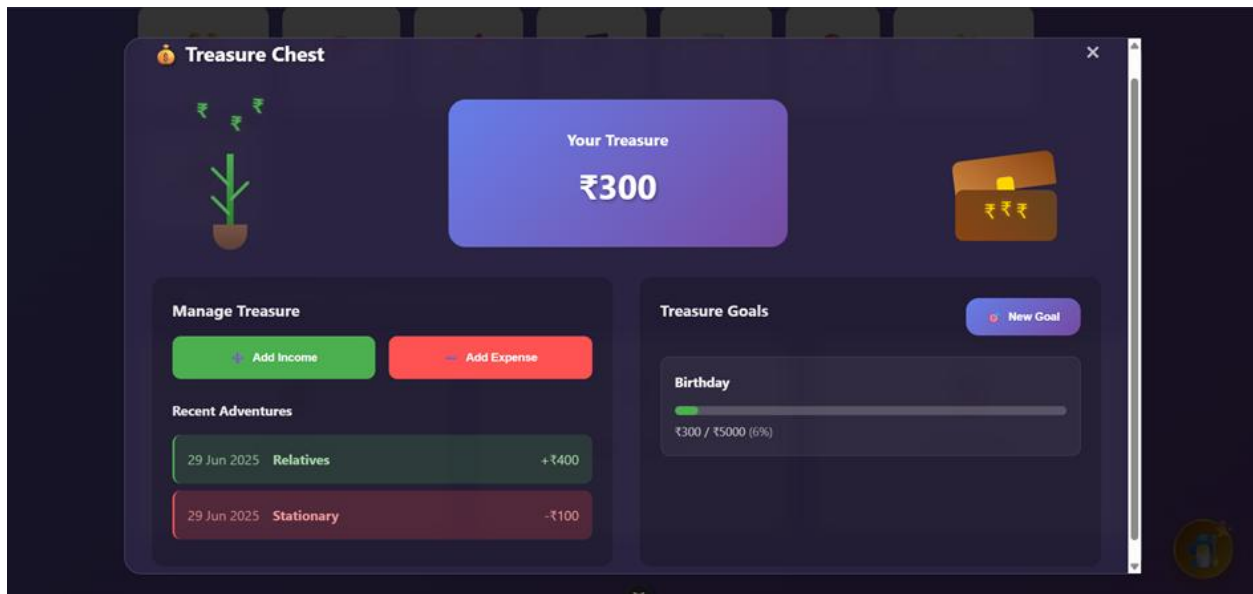
Task Tracker

This Task Tracker page lets children view and manage their daily quests and homework in a fun, organized way. Kids can see their current tasks, start a focus session, or mark them as done when completed. The right side allows them to add new quests by entering the title, subject, and due date. The clear layout helps children stay on top of their assignments and build good study habits.
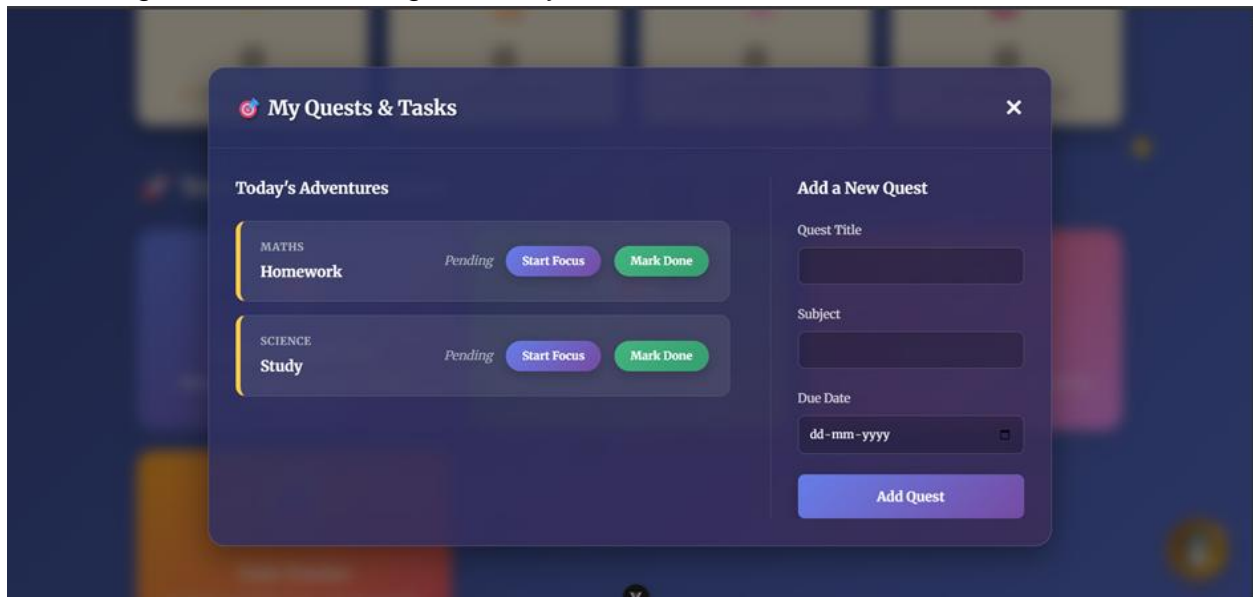

Pomodoro Timer

This Pomodoro Timer page is designed to help kids concentrate and manage their homework time effectively. It features a simple 25-minute countdown for focused work sessions, with clear play and pause controls that are easy for children to use. The friendly design and visual timer make it fun and motivating for kids to build good study habits and take regular breaks.
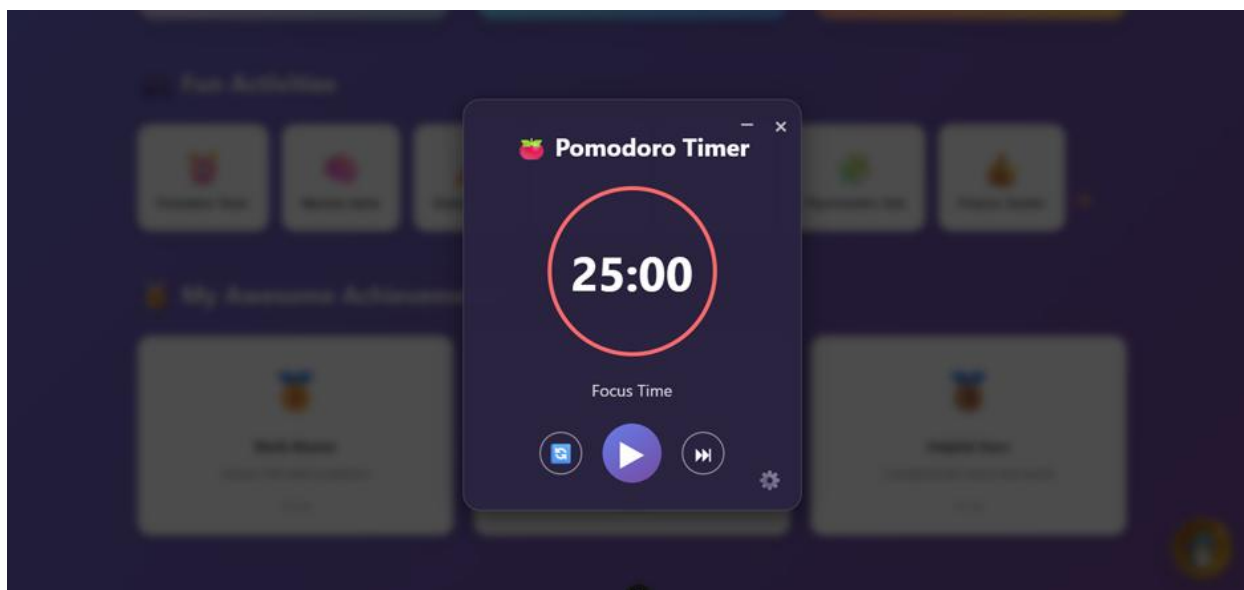
Doodling session (during break)

This Doodling page, called "Creative Canvas," gives kids a fun and relaxing space to draw or doodle after finishing their homework or a Pomodoro session. Children can choose different colors and brush sizes, and use simple shapes or erasers to create whatever they imagine. The easy-to-use design encourages creativity and helps kids unwind, making breaks enjoyable and refreshing before they return to learning.
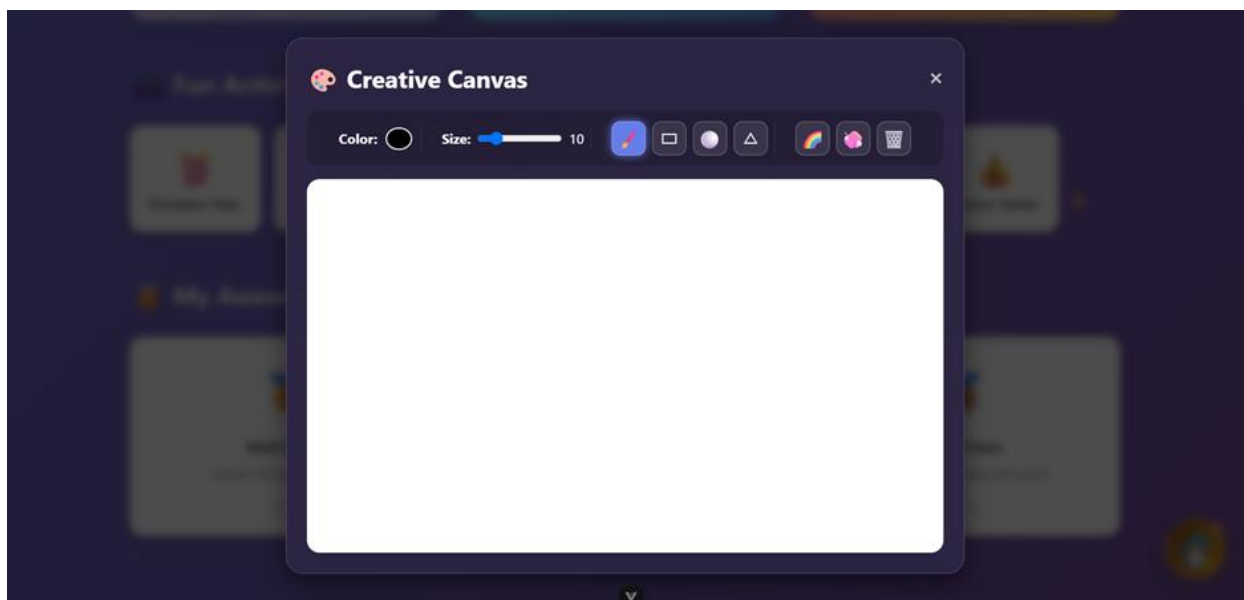
Health Tracker

This Health Tracker page, titled "My Health Adventure," encourages kids to build healthy habits through daily quests like running, yoga, meditation, and helping with chores. Children can track their progress with a magic streak counter, log their water intake using the Hydration Potion feature, and view their achievements in the Progress Chronicle. The playful design makes staying active and healthy fun and rewarding for kids.
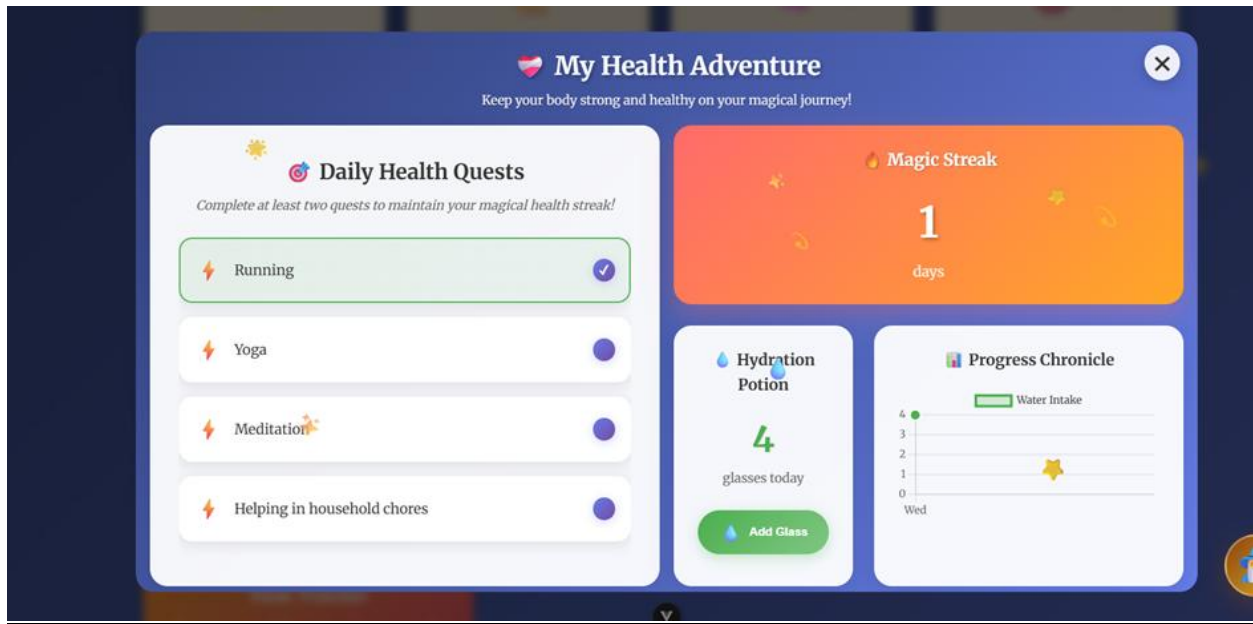
Psychometric Tests

The Psychometric Tests section guides children through a friendly, interactive assessment to explore their learning styles, personality traits, and cognitive strengths. Kids answer scenario-based questions, and upon completion, receive a detailed summary with scores for concentration, memory, and other skills. The results page highlights their unique learning and personality profiles, along with personalized feedback and practical study tips. This engaging process helps children and parents better understand how the child learns best and supports personal growth.

Personalized Feedback:

Learning Style Feedback

Hi there! We're excited to share with you your learning style results. You have a Balanced learning style, which means you're good at both reading and doing activities. You like to learn through a mix of textbooks, discussions, and hands-on projects.

As a Balanced learner, you can try studying in different ways to stay engaged. Here are some tips:

- Use flashcards to help you remember new words and concepts.
- Watch educational videos to learn new things.
- Do activities that let you get your hands dirty, like building models or conducting science experiments.

You're a very **Creative** person, which means you have a lot of imagination and can think outside the box. This is an amazing strength that will help you solve problems and come up with new ideas.

One of your top interests is Nature! You might enjoy activities like hiking, gardening, or even just observing the birds in your backyard. Why not try to draw or paint something inspired by nature?

Remember, everyone has areas where they need a little extra help. To improve your concentration, try setting a timer and taking breaks to stay focused. To boost your memory, try repeating new information out loud or making a song out of it.

Start New Test

Emotion Chatbot

This is the Emotion Chatbot page for KidQuest, where children can safely share their feelings and get supportive guidance from their virtual guide, "Gandalf the Wise." The chatbot listens to children's emotions, offers comforting advice, and encourages them to talk to trusted adults when needed. Mood status is displayed at the top, and kids can type or select topics like time tips, study help, health, and mood for more support. The friendly design helps kids feel heard and cared for during their life skills journey.
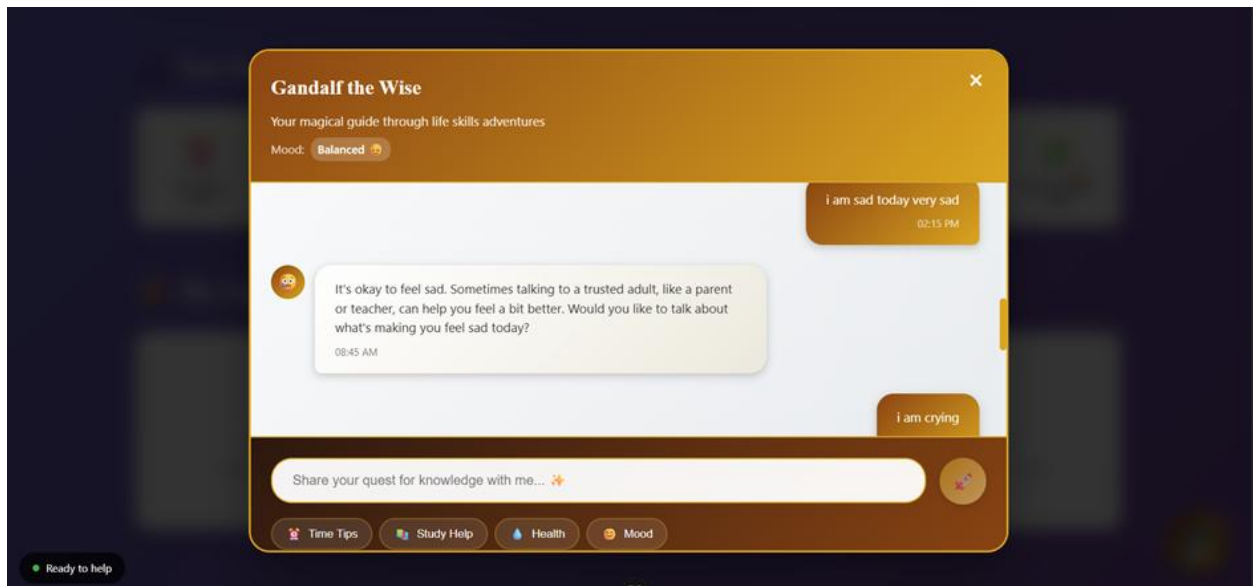
Skill Development

This Skill Development page presents a variety of engaging "Skill Adventures" for kids, including Math Magic, Word Wizard, Science Explorer, Art Creator, Life Skills, and Safety Measures. Each adventure focuses on building a specific set of skills—like problem-solving, creativity, daily habits, and personal safety—in a fun, interactive way. Progress bars help children track their completion for each area, motivating them to explore and grow across multiple domains. The colorful, organized layout makes it easy for kids to choose and start new learning journeys.
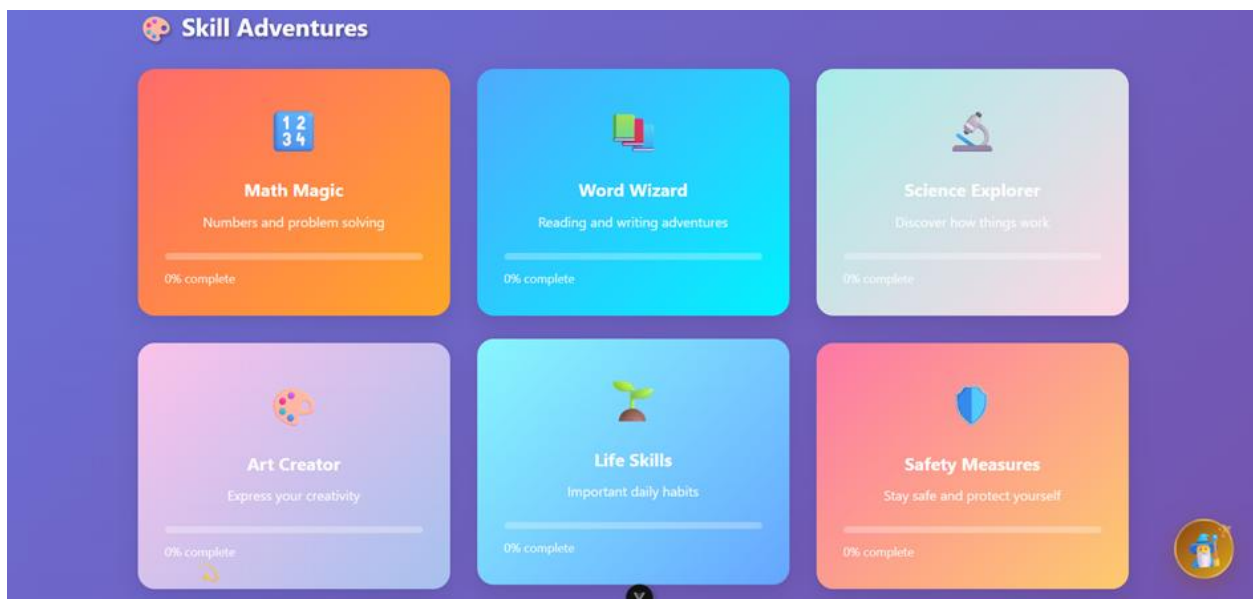
Parent Dashboard

This Parent Dashboard provides a comprehensive overview of a child's progress and well-being in the KidQuest app. Parents can view overall development, screen time, tasks completed, money saved, and detailed psychometric assessments. The dashboard also offers insights into homework, recent activities, mood trends, creative work, focus, and personalized recommendations—helping parents support their child's learning, emotional health, and daily habits at a glance.
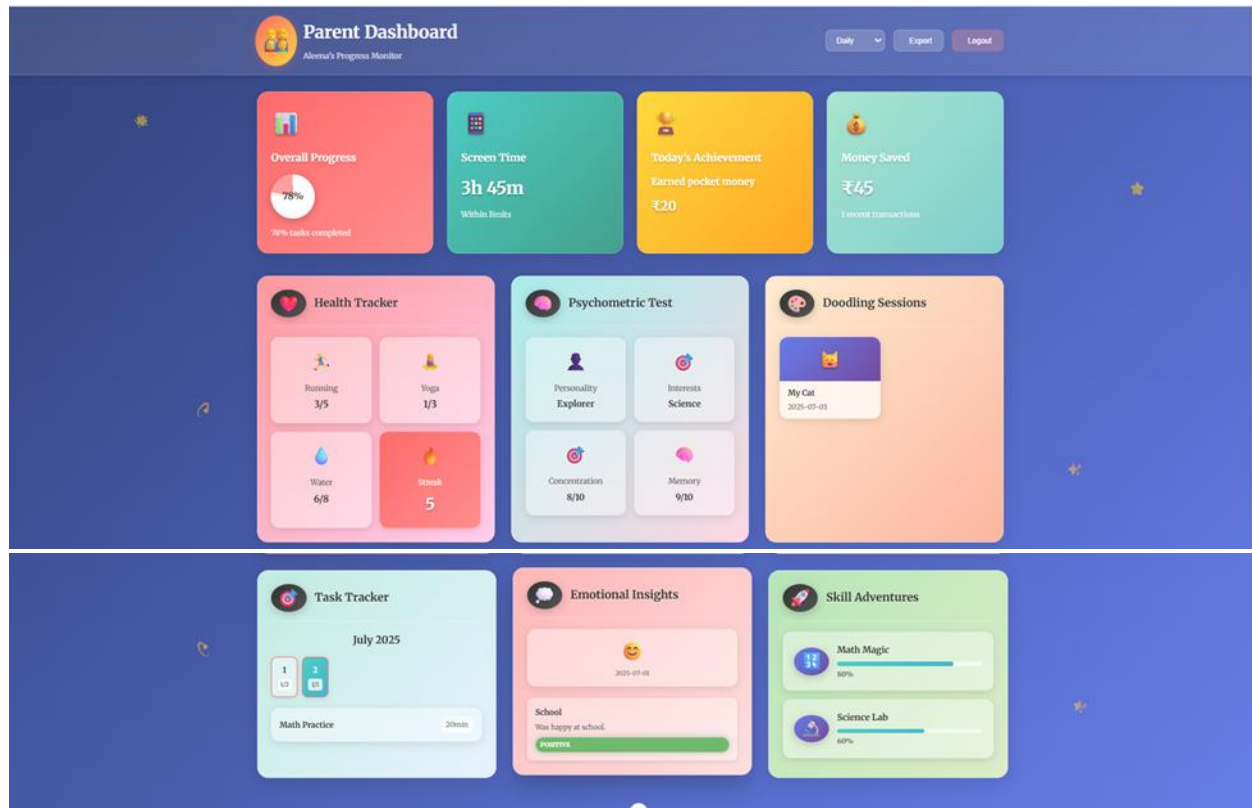
Admin Dashboard

This Admin Dashboard page for KidQuest gives administrators an overview of key platform metrics, including total users, chat messages, active sessions, and achievements. Admins can test and monitor the AI chatbot, manage user accounts and permissions, and access analytics for usage reports and data export. The interface is organized for quick navigation, making it easy to oversee system performance and manage platform settings efficiently.
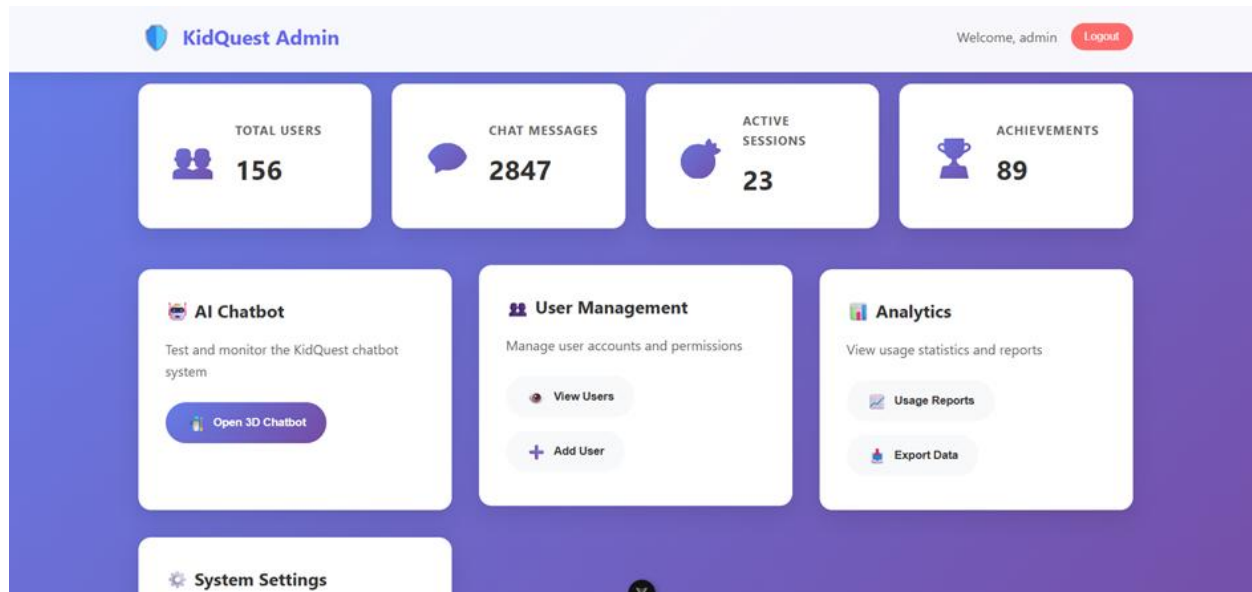
Backend

1. Programming Language & Framework

- Python 3.10+
- Flask: Lightweight web framework for routing, request handling, session management, and app configuration.
- Flask-CORS: Enables secure cross-origin requests for frontend-backend communication.
- Flask-SQLAlchemy: ORM layer for managing relational database operations.

2. Architecture Overview

- Modular Monolith Structure with clear separation of concerns:
  - app.py: Main application logic, routing, and initialization.
  - models.py: SQLAlchemy ORM model definitions.
  - Custom modules for each major feature (e.g., chatbot, finances, tasks).

3. Database and ORM

- Relational Database: SQLite (for development and prototyping).
- SQLAlchemy ORM:
  - Models include: User, ChildProfile, Transaction, HomeworkSchedule, PomodoroSession, Notification, SavingGoal, etc.
  - Supports strong normalization, parent-child relationships, and foreign key constraints for data integrity.

4. Authentication & Authorization

- Session-based authentication using Flask sessions.
- Password hashing with werkzeug.security.
- Role-based access control for admin, child, and parent roles.

5. LLM Integration & AI Features

- ChatGroq-compatible API and Openrouter API: For chatbot and psychometric analysis.
- Integrated LLMs: e.g., meta-llama/llama-3.1-8b-instruct.
- Use Cases:
  - *Emotional Chatbot:* Empathetic support for children, using custom prompts.

- *Psychometric Engine:* Dynamic question generation, answer parsing, and categorization into cognitive, personality, and interest domains.

6. Utilities & Tooling

- Regex-based input validations
- Session management for features like psychometric quiz state.
- Tracebacks and logging for debugging and monitoring.
- Environment-based config for API keys and secrets.
- Automatic admin creation on app initialization.

7. Security Considerations

- Password hashing with generate_password_hash.
- Secret key generation using secrets.token_hex.
- Input validation and fallback handling.
- Role-based resource protection for sensitive endpoints.
- Sanitized and structured AI prompts for consistent chatbot behavior.

Summary:

The KidQuest backend is a feature-rich, LLM-powered RESTful service supporting child learning, progress tracking, financial literacy, and emotional health. It leverages Flask for flexible web development, SQLAlchemy for robust data modeling, and integrates advanced AI models for interactive, child-friendly experiences—all while prioritizing security and modularity.

ER Diagram *(click here and zoom for clearer view)*
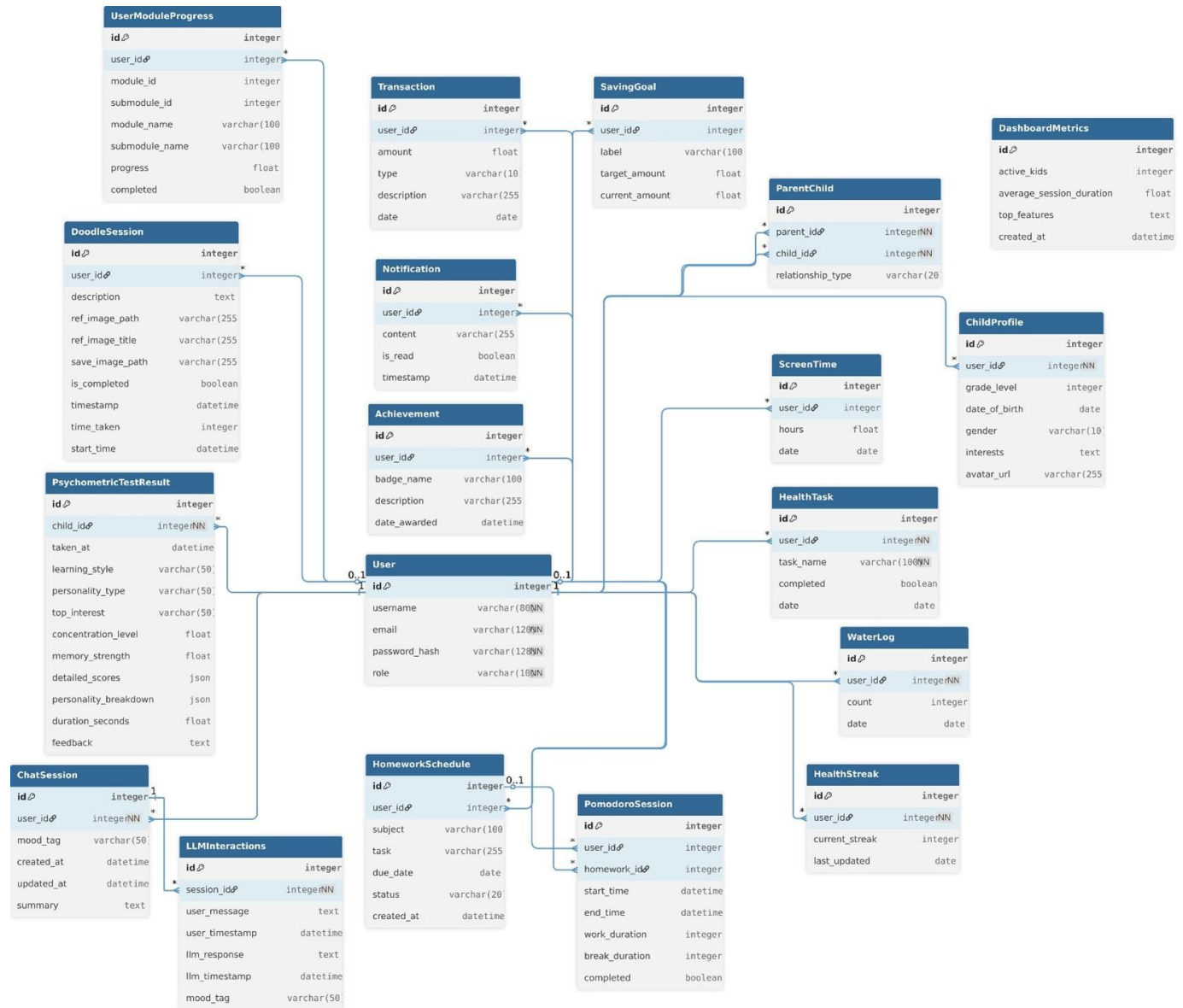
Class(UML) Diagram *(click here and zoom for clearer view)*