Requirement Document – SENG 401 Term Project – Group 17

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Functional Requirements

1. **User Authentication and Splash Screen**
   - **Feature:** Display an engaging splash screen on launch.
   - **Requirement:** Enable users to log in or sign up via Firebase authentication.
2. **Character Creation and Tutorial**
   - **Feature:** Seamless onboarding of new users into understanding the app's working
   - **Requirement:** Provide a tutorial that explains game mechanics, including note import and gameplay navigation.
3. **Campaign Setup**
   - **Feature:** Offer options to start a new campaign or continue an existing one.
   - **Requirement:** Enable users to choose between different campaign lengths (Quest, Odyssey, Saga).
4. **Notes Import and Analysis**
   - **Feature:** Support local note import.
   - **Requirement:** Utilize file system access for offline note uploads; process notes using LLM integration to extract key terminology and generate question sets.
5. **LLM Integration for Question Generation**
   - **Feature:** Integrate two specialized models (4o-mini).
   - **Requirement:** Process the imported notes to generate three tiers of questions (easy, medium, hard) that will be distributed throughout the campaign.
6. **Endless Runner Gameplay Mechanics**
   - **Feature:** Implement an auto-run system with dynamic environments.
   - **Requirement:** Ensure the player character runs automatically while the system triggers enemy encounters.
7. **Mana/Spell System**
   - **Feature:** Allow players to cast spells during combat.
   - **Requirement:** Deduct mana for spell usage; incorporate a system where correct answers to questions replenish mana, and incorrect answers do not.
8. **Boss Battles (Turn-Based Combat)**
   - **Feature:** Initiate boss battles at the end of each level.
   - **Requirement:** Switch to a turn-based combat mode with a card-based system that triggers questions for bonuses or causes skipped turns on wrong answers.
9. **Progress Tracking and Achievements**
   - **Feature:** Track user progress and achievements.
   - **Requirement:** Record campaign progress, number of level failures (max three per campaign), and achievements which are then displayed on an Achievements Page.
10. **Session Management and Data Persistence**
    - **Feature:** Save user progress and game state.
    - **Requirement:** Allow users to resume campaigns seamlessly and store user data (progress, generated questions, achievements) in a PostgreSQL database hosted on a cloud provider.

Non-Functional Requirements

1. **Performance**
   - **Requirement:** The game should load quickly on all supported devices (iOS, Android, Web) with minimal lag during gameplay, including smooth integration between React Native UI and Unity-based core gameplay. Aiming for a 60FPS as a starting benchmark.

2. **Security**
   - **Requirement:** Ensure that important user data (notes, authentication credentials, progress) is secured. Done by using Firebase for a secure authentication protocol and storing notes/sensitive data locally.

3. **Scalability**
   - **Requirement:** Design the backend (Flask API, PostgreSQL) to handle increasing user loads and data volumes, with the ability to scale resources on the cloud provider Neon.

4. **Usability**
   - **Requirement:** Provide an intuitive and responsive user interface across all platforms, with accessible controls for both novice and experienced users. New user onboarding with tutorials / interactive game guides.

5. **Reliability and Fault Tolerance**
   - **Requirement:** The system must ensure data integrity and uptime, with mechanisms for automatic recovery in the event of a failure (e.g., game state autosave, error handling in note processing).

User Stories / Use Cases

1. **Authentication**
   - **As a** new user,
   - **I want to** sign up and create an account via a simple, secure authentication process,
   - **So that** I can start playing the game ASAP.

2. **Character Creation**
   - **As a** returning player,
   - **I want to** customize my wizard avatar,
   - **So that** my in-game character feels personal and unique.

3. **Campaign Setup and Progress**
   - **As a** learner,
   - **I want to** import my study notes and have the system generate tailored questions,
   - **So that** I can study in an engaging and structured manner throughout the campaign.

4. **Gameplay and Combat**
   - **As a** player,
   - **I want to** participate in endless runner gameplay and boss battles,
   - **So that** I can test my learnings while having fun playing the game.

5. **Achievements and Progress Tracking**
   - **As a** dedicated user,
   - **I want to** view my achievements and track my campaign progress,
   - **So that** I can be motivated by my improvements and milestones.