Epsilon Project Architecture Outline

Date: 2025-04-05

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# Introduction

This document outlines the current architecture of the Epsilon project, reflecting all decisions and work conducted up to this date. It incorporates recent decisions, particularly the strategic adoption of Flutter for mobile client application development.

# Backend Architecture

The backend system is developed using Python and leverages PostgreSQL as the primary database system. The backend provides APIs and handles business logic for game entities, game sessions, and player interactions. It incorporates the following components:  
- Python (FastAPI for API management)  
- PostgreSQL (Database)  
- ORM (SQLAlchemy for data modeling)  
- Hosted deployment on Render.com

# Frontend and Game Logic

The game logic and frontend are designed around a cooperative sci-fi scenario with structured gameplay mechanics. Game interactions are tile-based, featuring exploration, combat, and cooperative player mechanics. Key frontend features include:  
- Tile-based exploration system  
- Combat system with initiative-based turns  
- UI enhancements indicating directions (North indicator)  
- Detailed characters and NPC management

# Mobile Client (Flutter)

Flutter has been strategically chosen for mobile client development, enabling a unified codebase for both Android and iOS platforms. The Flutter architecture will interact directly with the backend via APIs.  
  
Deployment and testing strategies include:  
- Android deployment directly from Windows using Android Studio  
- iOS deployment using cloud-based macOS services such as Codemagic  
- Testing via Android emulators, physical Android devices, and TestFlight for iOS beta distribution  
  
Flutter provides rapid prototyping, high performance, and consistency across platforms, simplifying maintenance and updates.

# Characters and Storyline

The project features predefined characters with rich backgrounds, distinct skill sets, and unique roles, including:  
- Captain Morgan Ashford (Strategist/Soldier)  
- Julián Rosales (Field Medic)  
- Blake Ryder (Combat Hacker)  
- Lieutenant Yuki Tanaka (Combat Specialist)  
- Kateryna Markova (Engineer)  
- Vikram Iyer (AI Technician)  
  
Narrative scenarios are centered around cooperative gameplay aboard the spaceship Epsilon 267, involving interactions with enemy bosses, minions, and NPC survivors, notably the ECSF Fulcrum mission.

# Repository and Deployment Strategy

The project uses GitHub for source control, with the repository available at:  
https://github.com/mkssystems/Epsilon-POC-2  
  
Deployment strategies are environment-specific:  
- Backend: Render.com  
- Mobile (Android): Google Play Store  
- Mobile (iOS): Apple App Store via cloud CI/CD solutions

# Conclusion

The current architecture supports modular expansion and iterative development. The strategic decision to use Flutter greatly reduces development overhead and enables rapid cross-platform releases. Future architectural evolutions will focus on scalability, enhanced interactivity, and seamless backend integration.