Lab 1: QuestNest

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Table of Contents

Listing of Figures

Listing of Tables

No table of figures entries found.

1 Introduction

Managing household chores is a persistent challenge for families. Effective systems for chore management are critical for balancing workloads, reducing stress, and fostering children's development of essential skills. QuestNest is a mobile application designed to address these challenges by transforming routine household chores into structured, trackable activities reinforced through rewards.

1.1 Societal Problem

The distribution of household chores often falls disproportionately on one parent or caregiver, frequently contributing to conflict when there is no shared agreement on responsibilities (Lam, 2016). This imbalance can become more pronounced in households where both parents work full-time, highlighting the need for systems that emphasize equitable chore distribution. Despite the benefits of assigning chores to children, such as improved school engagement, stronger mental health outcomes in adulthood, and greater family cohesion (Rende, 2015), only 28 percent of U.S. adults surveyed assign chores to their children on a regular basis (Society for the Psychology of Women, 2017). This lack of consistent child involvement increases the workload on caregivers and reduces opportunities for children to build responsibility and essential life skills.

1.2 Problem Characteristics

Traditional methods for managing household chores, such as charts, wheels, or to-do lists, provide limited structure and often fail to maintain participation or accountability. These limitations are especially evident in busy households, where parents face difficulties consistently assigning and monitoring tasks. In families with multiple children, varying levels of engagement can lead to uneven task completion and conflict among family members. Without a reliable system in place, children may struggle to form consistent routines, develop accountability, and stay motivated to complete household tasks. These challenges indicate a need for a structured system that clearly defines caregiver expectations, encourages balanced participation from all family members, and fosters consistent household routines.

1.3 Solution Statement

QuestNest is a mobile application designed to increase children's participation in household chores through structured task management and reward systems. The system enables caregivers to assign, monitor, and track tasks while providing feedback and positive reinforcement for completed chores. Multiple children can be managed simultaneously, reducing caregiver workload and ensuring equitable distribution of responsibilities. By simplifying chore management for caregivers and offering reinforcement for completed tasks, QuestNest transforms routine household chores into structured activities that promote responsibility, cooperation, and consistency.

2 Product Description

QuestNest is a cross-platform mobile application designed to help families manage household chores through a structured, reward-based system. By turning daily responsibilities into interactive quests, the application motivates children to complete tasks while providing caregivers with tools to assign, monitor, and customize chores. Children earn experience points (XP) for completing tasks, level up through consistent participation, and unlock real-world rewards such as screen time or family activities. Core features include caregiver-managed verification, tiered incentives, reminders, and a shared family calendar to encourage consistency, accountability, and communication. The application aims to promote lasting habits of responsibility while reducing household stress and improving family collaboration.

2.1 Key Product Features and Capabilities

The core features of QuestNest focus on task management combined with positive reinforcements that encourage consistent participation. Each feature is designed to address specific challenges in chore distribution and accountability, while supporting children's motivation to continue contributing to household responsibilities. These features provide caregivers with tools to monitor progress, maintain equitable distribution among children, and strengthen family collaboration.

2.1.1 Gamified Chore Tracking and Experience Points System

QuestNest transforms daily household chores into interactive quests using an experience points (XP) system. Children earn points for each completed task, allowing progress to be tracked over time and linking progression to tangible rewards.

2.1.2 Tiered Leveling System

The application implements a tiered leveling system that tracks progress as XP is accumulated. As children level up, they unlock rewards of higher value, reinforcing long-term engagement and goal setting.

2.1.3 Collaborative Family Rewards

This feature enables caregivers to define rewards that require collective task completion by the entire family. Collaborative rewards promote accountability across all members and help strengthen family relationships.

2.1.4 Customization

Caregivers maintain full control over the rewards system. They can define which rewards are available and assign XP costs to each. All reward redemptions will require caregiver approval before being granted.

2.1.5 Validation and Verification

QuestNest incorporates caregiver-managed verification. When children complete a task, they submit proof, such as photos or videos. Caregivers review submissions and validate completion before XP is awarded.

2.1.6 Shared Family Calendar and Notifications

An integrated calendar keeps the family organized by allowing scheduling of chores, events, and important dates. Assigned tasks appear directly in the calendar and are tied to reminders and notifications to ensure timely completion.

2.2 Major Components (Hardware/Software)

QuestNest will be developed as a cross-platform mobile application using Python 3.13.5. The application will adopt the Model-View-Controller (MVC) architectural pattern to maintain an organized codebase and ensure clear separation of responsibilities. The MVC model and functional components are shown in Figure 1.

2.2.1 Model

The *Model* layer manages the application's business logic and database interactions. QuestNest will use Google Firestore, a cloud-based NoSQL database, capable of multi-platform hosting and real-time updates. Python Admin SDK will handle queries and interactions with the Firestore database.

2.2.2 View

The *View* manages the visual presentation of the application. It formats and displays data retrieved from the database. QuestNest will use Flet, a Python framework built on Flutter, to support multi-platform development and create an interface suitable for users of all ages.

2.2.3 Controller

The *Controller* serves as the central coordinator, handling communication between the Model and the View. Model and View will not interact directly, ensuring a strict separation of concerns. The Controller will request data from the Model, process it, and then pass it to the View for presentation. Since Python alone cannot efficiently handle all backend operations, the application will incorporate FastAPI to connect components. FastAPI will provide RESTful API endpoints to manage navigation, interact with the web server, and provide high performance.

2.2.4 Web Server

Uvicorn will serve as the web server, receiving user requests, parsing data, passing it to FastAPI, and returning the appropriate responses. Uvicorn integrates seamlessly with FastAPI and flet, providing reliable communication and performance.

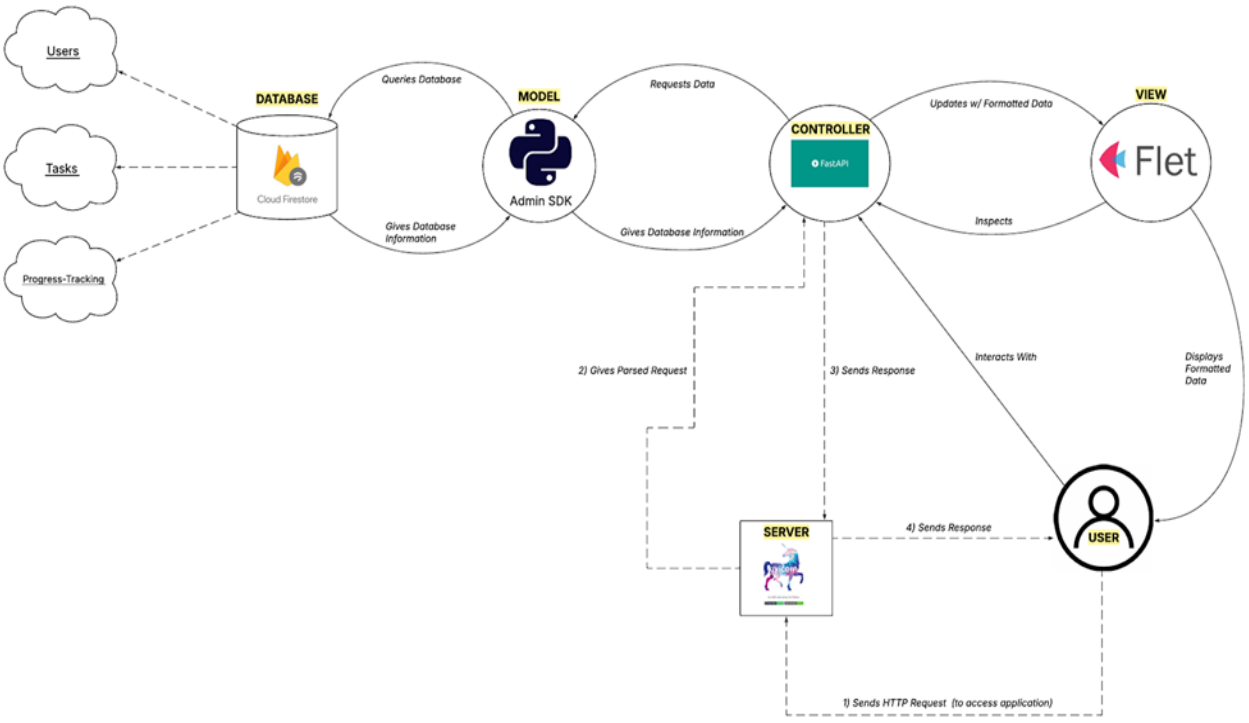

Figure 1: Functional Components Diagram

3 Identification of Case Study

QuestNest is designed to improve household chore management by promoting consistency, accountability, and motivation among family members. The primary users include caregivers, such as parents and guardians, who are seeking to distribute chores equitably and reinforce responsible behavior in children. Secondary users are children, who complete chores, gain experience points, and unlock rewards that encourage continued participation and habit formation. QuestNest directly supports families that struggle to ensure tasks are completed and maintain children's participation in household responsibilities.

In addition to its application within families, QuestNest has potential for future adaptation in educational and therapeutic contexts. The system's progression and reward structure makes it transferable to environments where consistent participation and accountability are required. In educational settings, QuestNest could encourage student participation in classroom responsibilities while reinforcing routines such as classroom organization. It can also promote cooperative group work through shared rewards. In therapeutic or developmental programs, the application could support behavior reinforcement plans and serve as a tool for building habits and developing essential life skills in children. While these adaptations demonstrate QuestNest's broader potential, the family context provides the most immediate and practical environment for showcasing its effectiveness.

4 Glossary

Application Program Interface (API) – a set of protocols that allow different software applications to communicate and interact with each other.

Collaborative Family Reward – collaborative custom rewards awarded if all members of the family complete their assigned tasks.

Cross-Platform Application – software designed to operate on multiple types of devices (e.g., iOS and Android) from a single codebase.

Experience Points (XP) – points awarded as a progression indicator for task completion.

FastAPI – a modern web framework for Python that supports the creation of RESTful APIs.

Firestore – a cloud-based NoSQL database provided by Google, designed for real-time data synchronization across devices.

Flet – a Python framework built on Flutter that enables cross-platform development and user interface design.

Model-View-Controller (MVC) – a software architectural pattern that separates data management (Model), user interface (View), and application control logic (Controller).

Push Notification – an alert received from an application to notify when there is a new event or message to view.

Reminder – a scheduled alert generated by the application to prompt task completion.

RESTful API – an interface used to exchange information securely over the internet.

Tiered Leveling System – a progression structure where children advance through levels by earning experience points (XP), unlocking higher value rewards as they progress.

Uvicorn – a web server for Python, used to run FastAPI applications.

Validation and Verification – the process of submitting proof (such as photos or videos) of chore completion for caregiver review and approval.

5 References

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