Software Design Document

Software Name：MediCare

# **Part1 Introduction**

MediCare App is a mobile application for people who need to take medication regularly. It aims to help users take medication on time and gradually cultivate good habits of health management through efficient medication reminder and diagnosis management functions. In modern society, due to the busy work or fast pace of life, many people often forget to take medicine on time, especially users with chronic diseases or in need of long-term treatment, which will adversely affect the treatment effect. The development of this software is based on the health needs of users, through simple and friendly interface design and efficient functional support, to provide users with medication reminder and medical record services.

The software is suitable for a wide range of scenarios, including daily medication reminders, chronic disease management, and consultation records query and tracking. With the help of modern mobile Internet technology and cloud services, the application not only improves the medication experience, but also pays attention to data synchronization and privacy protection, providing users with a safe and reliable health management tool.

# **Part2 Requirements Specification**

The user requirements of this software development mainly center around facilitating users in effectively managing their medication and related medical information. Users need to be able to perform simple registration and login operations to create or access personal accounts. Through these accounts, they can track their medication data and save detailed medication records, with the added convenience of data synchronization across multiple devices. A calendar module is essential, allowing users to select dates either singly or in multiple selections to easily add and manage their medication information. The system, based on the entered medication details, must generate a comprehensive reminder plan. The reminder options should include application notifications and alarms, and users have the flexibility to choose their preferred reminder form according to their individual needs. Additionally, users should be able to add and manage their medical record information such as medical history and doctor's advice and bind it with relevant medication data for effortless future query and management. The medication reminder function is of utmost importance and must be highly reliable, ensuring that notifications are sent promptly at the designated times so that users never miss their medication schedules.

Functionally, the application interface is required to be simple and intuitive, with a rational distribution of features to enable users to quickly become proficient in using it. Clear operation instructions and interaction feedback must be provided to assist users in smoothly executing core functions. The user data management system should support operations like creating, reading, updating, and deleting data and also offer synchronization services between local and cloud data. Offline mode support is crucial, allowing users to access and manage their medication information even in the absence of network connectivity. Moreover, the software should have multi-device support capabilities, ensuring that when users log in to their accounts on any device, their personal data and medication records are fully restored and available for use.

# **Part3 Overall Design**

The Intelligent Medication Reminder App is designed with a client-cloud architecture. The client side is responsible for functions such as user interface interaction, medication reminders, and medical record management. Meanwhile, the cloud server is utilized for storing user data and enabling multi-device synchronization.

The application program mainly consists of the following modules:

* User Module: It provides functions for user registration, login, and account management.
* Calendar Module: It offers functions for adding, modifying, viewing, and reminding medication information. Users can intuitively manage their medication plans through the calendar view.
* Medical Record Module: It enables the input, viewing, and editing of medical record information and also supports the association and binding with medication information.
* Notification Module: It handles the generation and push of medication reminders. Users can choose to use system notifications or the built-in alarm clock for reminders.

# **Part4 User Interface Design**

The Intelligent Medication Reminder App's user interface design is centered around two essential concepts: "simplicity" and "a sense of health", with a significant emphasis on optimizing the user experience and maintaining consistency in visual design. The overall color palette of the interface features a gentle blue gradient as the dominant hue, complemented by white and gray as secondary colors. This combination works together to evoke a feeling of health, freshness, and reassurance. The user page, which encompasses login, registration, and account information display, is designed to be clear and uncluttered. The form validation interactions are both prompt and user-friendly. The calendar page utilizes an intuitive calendar view that permits single and multiple date selection operations. Users can effortlessly view, add, or modify their medication plans. When a specific date is clicked, a details box pops up, presenting the medication information for that particular day. The medical record page offers a categorized list of medical record entries and supports a search function. This enables users to swiftly locate and update their medical record information and also review the associated medication records. In terms of interaction design, buttons have dynamic feedback, such as color changes or a slight enlargement effect, when clicked. Real-time prompts are provided during form filling to minimize operational errors. Page transitions are enhanced with transition animations, which contribute to a smoother and more aesthetically pleasing experience.

# **Part5 Key Technologies**

The technical implementation of the Intelligent Medication Reminder App is based on the Android platform and incorporates a variety of modern frameworks and tools to achieve highly efficient and reliable functional support. In terms of development technologies, JetPack Room is utilized to manage the local database, ensuring stable data storage and efficient querying. The front end employs the Retrofit framework for communication with the back-end server, streamlining API calls and data processing. SQLite database serves as the core tool for local offline storage and works in coordination with the cloud synchronization service. However, there are also technical challenges and corresponding solutions. For screen adaptation, the ConstraintLayout layout and dynamic size adjustment are adopted to address the layout issues caused by different screen resolutions. Regarding data synchronization, a time-stamp-based synchronization mechanism is designed to prevent conflicts between local and cloud data and also ensure the security of data transmission. This combination of technologies and solutions enables the app to function smoothly and provide a reliable user experience.

# **Part6 Testing and User Experience Analysis**

To ensure the app's compatibility and performance across various devices, we conducted comprehensive tests using Tencent's WeTest platform, covering the Top 50 mainstream devices. The results showed good overall compatibility, with a pass rate of 86%. The devices that failed the test included OPPO A83, MI 5X, Mi Note 3, vivo X9Plus, and OPPO R9s Plus. The primary reason for these failures was that their system SDK versions were lower than the app's minimum requirement (SDK 26). Since our app leverages advanced features and controls from newer SDKs, such as Material Design 3 components, these devices could not fully support the app's functionality. In future updates, we plan to improve compatibility for these devices by incorporating backward-compatible controls or alternative implementations to expand device support.

Analyzing the performance test reports from WeTest revealed strong performance across several key metrics:

* **Installation and Startup Time:** The app demonstrated short installation and startup times, reflecting its lightweight design and meeting user expectations for fast usability.
* **CPU Usage:** It exhibited low CPU utilization, indicating efficient processing and minimal background tasks.
* **Memory Usage:** Memory usage varied significantly across devices, likely due to differences in hardware configurations, system versions, and potential memory leaks in the app.
* **FPS:** The app consumed minimal data during synchronization and notifications, meeting the standards for a data-efficient application. The frame rate remained stable across test devices, ensuring smooth animations and interactions without noticeable lag.

Overall, the test results highlight the app's strengths in functionality and performance design, though some areas require optimization. In future iterations, we will focus on improving memory management, enhancing compatibility with older SDK versions, and refining startup speed and background processes to ensure stability and efficiency across a wider range of devices.

The user experience of the app has both strengths and weaknesses. On the positive side, the app offers several well-designed features that significantly enhance the user experience.

* + **User-Friendly Interface:** Its user-friendly interface, characterized by simple and clear layouts, along with visually appealing design and intuitive navigation, makes it easy for users to interact with the app.
  + **Valuable Functions:** Features like expiration reminders and family medication tracking are especially valued, as they address key user needs related to health management, enabling users to effectively manage their own medications and their family’s health.
  + **Cloud Backup:** The convenient cloud backup function provides users with peace of mind by ensuring the security of their data, which contributes to a positive overall experience.

However, the app also has areas that require improvement.

* + **Performance Issues:** Users have reported performance issues, such as lag when loading medication information, which undermines their experience.
  + **Complex Add Medication Process:** The process of adding medication information has been criticized for being overly complex.
  + **Lack of Onboarding Tutorials:** The absence of tutorials for new users creates a steep learning curve.

Possible solutions of them are:

* + **Optimizing database queries and improving network request efficiency**
  + **Add medication by scan the product code of it:** If it is possible to build a database of drug codes and drug information, this can be a good solution.
  + **Add use tutorial:** Introducing an onboarding tutorial or help section would assist users in understanding and utilizing the app effectively.

# **Part7 Conclusion**

The MediCare App has successfully achieved the goal of helping users take medication on time and pay attention to their own health by integrating medication reminder, clinic registration management and data synchronization functions. The development process overcomes the technical difficulties such as multi-screen adaptation and database synchronization, and finally provides an easy to use, reliable and featurely-rich mobile application.

In the future, the software plans to further optimize user privacy protection and add health data analysis and intelligent recommendations to help users manage their health more comprehensively.