CHAPTER 4: DEVELOPMENT AND IMPLEMENTATION

4.1 Introduction

This chapter discusses the implementation phase of the BacaSama mobile application, highlighting the overall development environment, tools and frameworks used, installation procedures, and development progress. It presents the step-by-step execution of features aligned with the system design and user requirements gathered earlier. The goal is to demonstrate how the application was built to support literacy learning for illiterate adults in rural Malaysia.

4.2 Implementation Overview

The implementation phase of the BacaSama application focused on transforming the planned design and requirements into a functional mobile literacy learning tool. Developed using Flutter and integrated with Firebase services, the application was built to support key features such as phonics-based lessons, interactive quizzes, gamification rewards, and voice guidance for illiterate adult users. The implementation followed the Rapid Application Development (RAD) methodology, enabling quick prototyping and iterative feedback throughout the development process. The user interface was designed with simplicity and accessibility in mind, incorporating clear visuals and audio support to assist users with minimal or no literacy. Each module was developed incrementally, starting from user registration, progressing through lesson content delivery, and ending with quiz assessments and progress tracking. The integration of offline capabilities and speech recognition APIs further enhanced the app's suitability for rural environments with limited internet access. Overall, this stage ensured that the system aligned with the intended objectives and user needs identified during the requirement analysis phase.

4.3 Implementations and Development Logs

The implementation of the BacaSama application was carried out incrementally using the Rapid Application Development (RAD) methodology. Each feature, such as user registration, lesson access, quiz modules, and voice guidance, was developed and tested individually to ensure proper functionality. As each component was completed, it was immediately tested to identify any bugs, logic errors, or interface inconsistencies. The development process focused heavily on user accessibility and voice-enabled features to accommodate illiterate users. A development log was maintained throughout the process to document progress, note encountered issues, and record decisions made during development. This log serves as a valuable reference for future improvements and troubleshooting. Once all components were implemented, the application underwent final integration and functional testing to prepare it for user evaluation and deployment.

4.4 Software Installation and Configuration

This section outlines the software tools and configurations used throughout the development of the BacaSama mobile application. The development environment was carefully selected to support cross-platform mobile development with a focus on simplicity, scalability, and offline-first functionality. The application was built using Flutter as the primary development framework, supported by Visual Studio Code (VS Code) as the integrated development environment (IDE). Firebase was used for backend services such as authentication, Firestore database, and progress tracking, while Figma was utilized for designing the user interface before implementation. The following table summarizes the tools used and their configuration details.

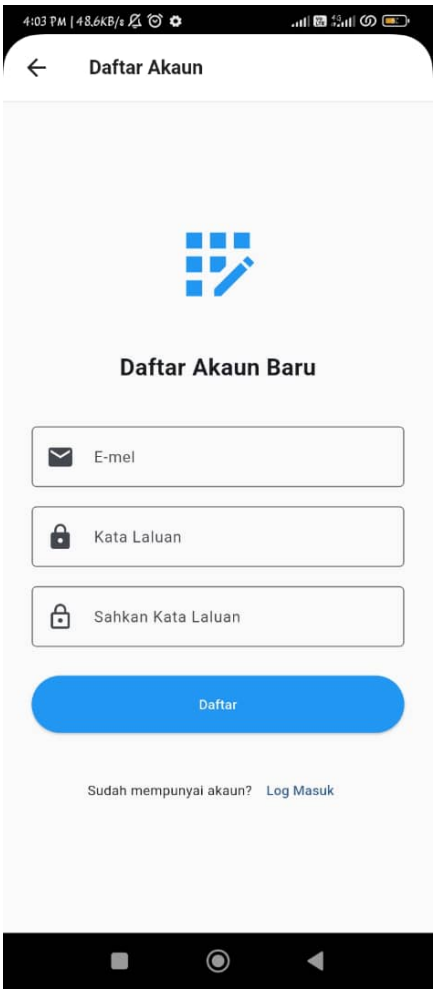
Tool	**Purpose**	**Configuration/ Details**

Flutter SDK	Main mobile app development framework.	Version: Flutter 3.x (stable), Channel: Stable
Dart	Programming language used with flutter.	Dart 3.x bundled with Flutter
VS Code	Lightweight IDE used for Flutter development	Extensions: Flutter, Dart, Firebase Tools
Firebase	Backend platform for authentication & data	Modules: Authentication, Firestore, Cloud Storage
Figma	UI/UX design tool for prototyping and layout	Used to create wireframes and user interface mock-ups
Android Emulator	For testing the mobile application	Android 11/ 12 devices, Pixel 4 emulator

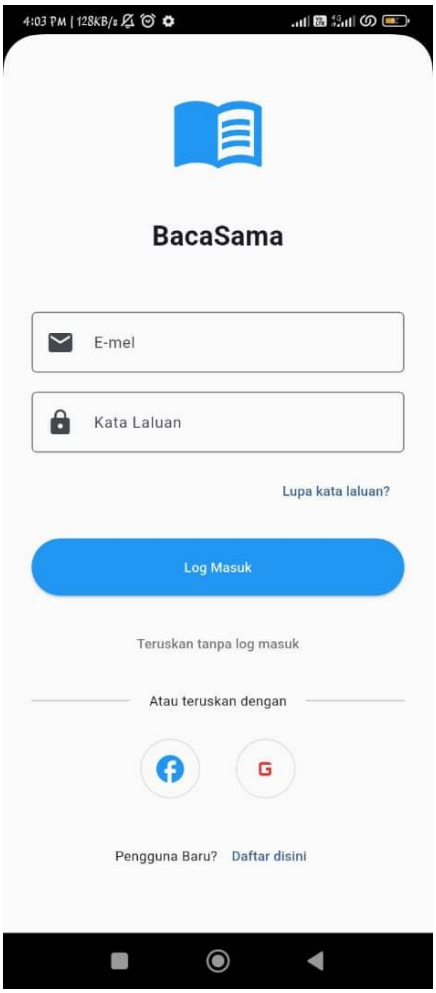
4.5 Application User Interface (UI)

The user interface of BacaSama was designed with accessibility and simplicity in mind to accommodate illiterate adult users in rural areas. The app uses icons, large buttons, audio guidance, and minimal text where possible. Each screen was designed in Figma and implemented in Flutter. The flow ensures users can navigate easily from login to lessons, complete interactive exercises, attempt quizzes, and track their progress with rewards. Below is an explanation of each screen and how users move through the app.

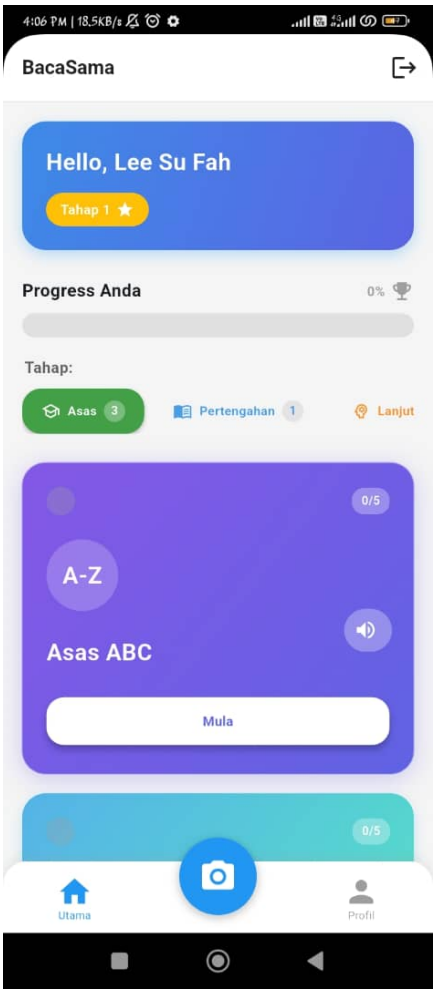
4.5.1 Register Screen



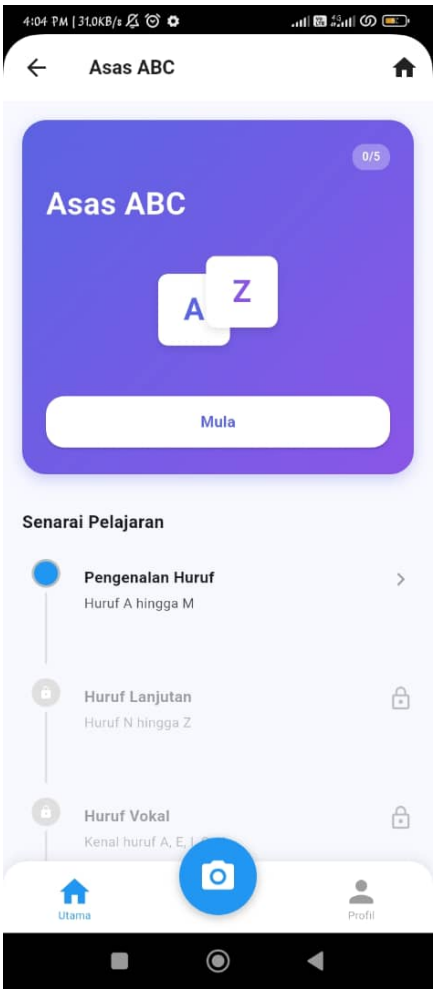
4.5.2 Login Screen



4.5.3 Home Screen

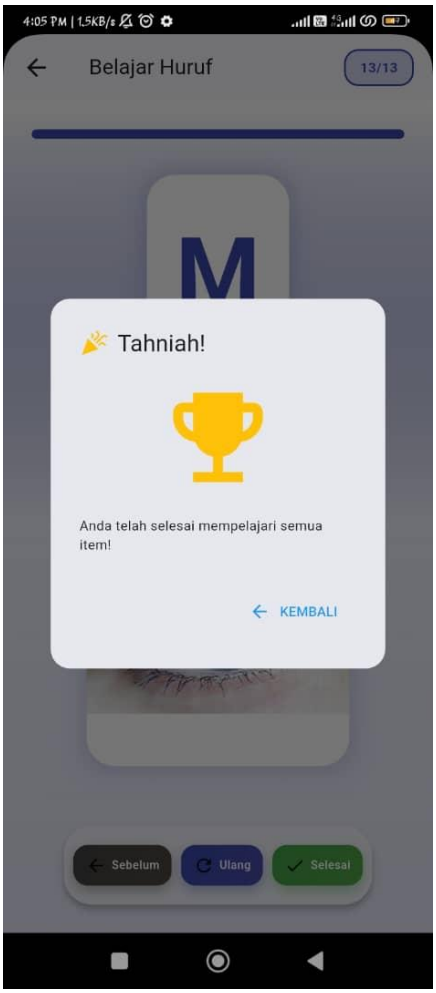


4.5.4 Lesson List Screen



4.5.5 Lesson Screen

4.5.6 Lesson Completed Screen



4.5.7 Progress Screen

4.6 Summary

This chapter highlighted the tools, RAD methodology, and implementation of core features in the BacaSama application. The integration of voice guidance, offline learning, gamification, and user-friendly interface ensures that the app meets the specific needs of adult illiterate learners in rural areas. The successful implementation phase lays the foundation for comprehensive testing and evaluation in the next chapter.