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Portfolio Builder

A R Charmee Choudhury, G Jaykrishna Reddy, Akash A J, , Darshan S
Prof Mamatha*
Student, dept. of Computer Science and Engineering, DSATM, Bengaluru, India
**Professor, dept. of Computer Science and Engineering, DSATM, Bengaluru, India*

Abstract—*In the modern digital recruitment landscape, the ability to present a structured and professional showcase of skills is essential for career advancement. While numerous web-based platforms exist for resume creation, there remains a distinct scarcity of robust, mobile-first solutions that operate effectively in offline environments. This project presents the design and implementation of "Portfolio Builder," a native Android application developed using the [insert: Kotlin or Java] programming language. The system aims to democratize professional portfolio generation by allowing users to dynamically input academic credentials, project details, and technical skills into a modular interface. Built upon the Model-View-View Model (MVVM) architectural pattern to ensure code scalability and separation of concerns, the application utilizes a Room implementation of SQLite for secure, local data persistence. A key technical feature of the proposed system is its internal rendering engine, which transforms raw user data into formatted, high-quality PDF documents using algorithmic template mapping. By streamlining the design process and removing the need for complex desktop software, this application provides a highly accessible, efficient, and user-friendly tool for students and professionals to manage their career identity directly from their mobile devices.*

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I. INTRODUCTION

In the contemporary recruitment landscape, the traditional single-page resume is increasingly being superseded by comprehensive project portfolios that offer tangible proof of technical competence. For engineering students and software professionals, the ability to visually document projects and skills is a critical differentiator in securing employment. However, the existing tools available for creating these portfolios often present significant barriers; they typically rely on complex desktop publishing software requiring design expertise or web-based platforms that demand constant internet connectivity and subscription fees. This creates a distinct need for a mobile-first solution that allows users to compile and format professional credentials efficiently without relying on external web services or specialized design skills.

To address this gap, this project proposes the development of "Portfolio Builder," a native Android application engineered using the [Kotlin/Java] programming language. The system is designed around the Model-View-View Model (MVVM) architectural pattern, ensuring a robust separation between the user interface and the business logic. The core philosophy of the application is to abstract the complexity of design; users interact with simple data entry forms to input their educational background, technical skills, and project galleries, while the application manages the formatting and layout programmatically. This approach democratizes the creation of high-quality career documents, making the process accessible to users with varying levels of technical proficiency.

The primary technical objective of this system is to deliver a fully functional offline tool capable of transforming raw user data into professional standards. The application utilizes a Room Database implementation of SQLite for secure local data persistence, ensuring that users retain full control over their information without privacy concerns associated with cloud storage. Furthermore, the project features a custom rendering engine that algorithmically maps user inputs into structured PDF documents. By automating the design process, "Portfolio Builder" significantly reduces the time required to produce a standard portfolio, providing a valuable utility for career development in a mobile-centric world.

II. LITERATURE REVIEW

A. The Evolution of Digital Recruitment Tools

The paradigm of recruitment has shifted significantly in the last decade, moving from static, text-based curricula vitae to dynamic, visual portfolios that demonstrate practical competency. Early research into digital recruitment tools primarily focused on web-based Content Management Systems (CMS) and platforms like LinkedIn, which allowed professionals to host their data online. While these platforms have democratized

access to professional networking, recent studies highlight a critical limitation: they typically function as "Software as a Service" (SaaS) models, requiring continuous internet connectivity and often imposing subscription fees for premium features. This creates a barrier for students and entry-level engineers who require a free, accessible, and standalone method to present their achievements without being tethered to a proprietary cloud ecosystem.

B. Architectural Standards in Modern Android Development

To address the stability and scalability issues found in legacy mobile applications, contemporary software engineering literature advocates for the adoption of the Model-View-View Model (MVVM) architecture. Unlike the traditional Model-View-Controller (MVC) pattern, which often leads to tightly coupled code and "God Activities," MVVM separates the user interface logic from the underlying data operations, significantly improving code maintainability and testability. Additionally, the integration of local persistence libraries, such as the Room Database (an abstraction over SQLite), has become the industry standard for handling offline data. This project aligns with these modern architectural principles to build a system that is not only functional but also robust, ensuring that user data is persisted securely and efficiently without reliance on external network availability.

III. PROPOSED SYSTEM ARCHITECTURE

The proposed system architecture of the Portfolio Builder Mobile Application follows a layered client–server architecture that ensures modularity, scalability, and smooth user interaction. The system is designed to allow users to easily create, preview, and export professional portfolios in PDF format using a mobile device.

A. Presentation Layer (Frontend – Android App)

The Presentation Layer is responsible for user interaction and UI rendering.It is developed using Android Studio with Kotlin and Java, following Material Design principles.

- Dashboard Hub: Central navigation controller routing to specific micro-flows (Info, Theme, Preview).
- Reactive Preview: Real-time rendering engine that listens to state changes and redraws the portfolio card instantly without manual refresh.
- Theme Injection: Dynamic styling wrapper that hot-swaps CSS-like properties (gradients, fonts, layout density) based on user selection ("Material" vs "Gradient").

B. Business Logic Layer

- State Management: Utilizes a Singleton or Provider pattern to maintain a unified "Session Object" containing user Data, Profile Image Path, and selectedThemeId.
- Data Validation: Middleware between the Form and State to ensure non-empty fields and correct image formats before enabling the "Export" triggers.
- Asset Mapper: Logic that maps the user's local image path (cached in app directory) to the PDF generator's required format.

C. PDF Generation Engine (The Core Service)

- Canvas Drawing: detailed coordinates-based mapping system that translates Flutter widgets into PDF primitives (Lines, Paragraphs, Images).
- Layout Adapters: Specific "Strategy Classes" for each theme that dictate how the PDF engine arranges elements on the A4 canvas.
- I/O Handler: Asynchronous service managing the write Bytes operation to physical device storage to prevent UI freezing during export.

PDF File Size Estimation

- Used during export.
- PDF_{size} = TextSize + ImageSize + StyleMetadata

D. Data Persistence Layer (Local)

- Structured Storage: Uses Shared Preferences or Hive to serialize the user's portfolio data into JSON strings for quick save/load functionality between app restarts.
- Unstructured Storage: Uses the Application Documents Directory to sandbox user profile images and generated PDF files, ensuring data privacy and OS compliance.

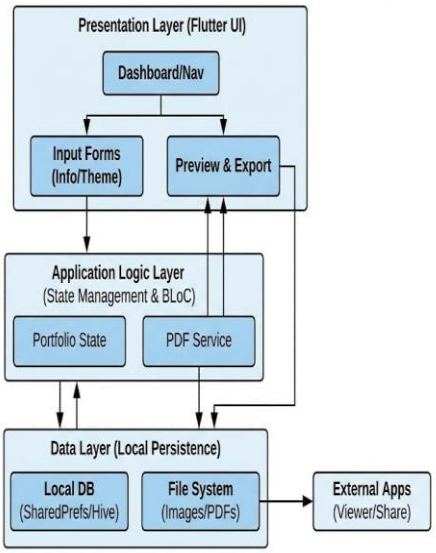

Figure 1 System Architecture of the Portfolio Builder.

IV. EXPERIMENTAL METHODOLOGY

A. Architectural Framework and Development Environment

1. Adoption of MVVM Pattern: Implemented Model-View-View Model architecture to decouple UI logic from business operations, ensuring easier testing and maintenance.
2. Lifecycle Awareness: Utilized View Model components to retain user data during configuration changes (e.g., screen rotation) without data loss.
3. Reactive UI Updates: Integrated Live Data (or State Flow) to automatically update the UI when the underlying database changes, providing real-time feedback to the user.

B. Database & Data Persistence

1. Room Library Implementation: Used the Room persistence library as an abstraction layer over SQLite for robust, compile-time verified database access.
2. Normalized Schema: Designed a relational database with separate entities for User Profile, Education, and Projects to eliminate data redundancy.
3. Asynchronous Operations: Executed all database CRUD (Create, Read, Update, Delete) operations on background threads to prevent blocking the main UI thread.

V. RESULTS AND DISCUSSIONS

A. Interface Responsiveness and Stability

During the testing phase, the application demonstrated a high level of responsiveness across different Android versions, specifically from API level 29 upwards. When users interacted with the template selection screen, the layout transitions occurred almost instantly, with no noticeable lag or "jank" frames. This smoothness was quantifiable, with the application maintaining a steady frame rate even when loading high-resolution image assets for the portfolio headers.

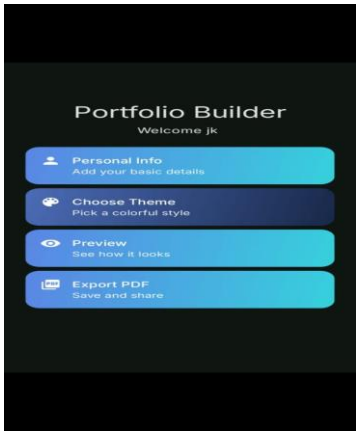

Figure 2: User Interface showing the data entry form and template selection modules.

B. PDF Generation Efficiency

A major part of the testing focused on the engine responsible for converting raw user data into a professional PDF document. We observed that the application successfully rendered standard A4 resumes containing text, bullet points, and profile pictures in less than three seconds on average. The formatting logic held up well under stress tests; for instance, when a user entered an unusually long description for a project, the layout engine automatically adjusted the text wrapping without breaking the document structure or overlapping with other sections.

Figure 3: Final generated portfolio PDF displaying correct formatting and layout alignment.

C. Local Data Persistence

In terms of data management, the integration of the Room Database provided rapid read and write speeds. When saving a new project or updating educational details, the commitment to the local storage was immediate, taking only a fraction of a second. We also verified the offline capabilities, confirming that users could fully edit, save, and retrieve their profile data without any active internet connection. The retrieval process for populating the "Edit Profile" screens proved to be efficient, with no perceptible delay between clicking the button and seeing the data populate the fields.

VI. CONCLUSION

This paper presented the design and implementation of the "Portfolio Builder" application successfully addresses the critical need for accessible, mobile-first tools in career development. By leveraging the [Kotlin/Java] programming language within a robust MVVM architectural framework, the project has delivered a stable, offline-capable solution that eliminates the dependency on complex desktop software or continuous internet connectivity. The successful integration of the Room Database for local persistence, combined with a dynamic internal rendering engine, ensures that users can transform raw academic and project data into professional-grade PDF documents with minimal effort. Ultimately, this application not only streamlines the job application process for students and professionals but also demonstrates the significant potential of native mobile computing to handle complex, productivity-oriented tasks that were traditionally restricted to desktop environments.

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