

WorkForce: A Mobile-Based Unified System for Real-Time Employee Task Management and Organizational Workflow Optimization

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Abstract—Modern organizations face significant challenges coordinating distributed workforces, tracking real-time task progress, and maintaining communication across hierarchical teams. Existing solutions are either siloed (handling only HR or only tasks) or require expensive enterprise licensing. This paper presents WorkForce, a mobile-first unified workforce management system built with React Native (Expo) and Firebase Firestore as a real-time cloud backend. WorkForce integrates ten enterprise-level modules—including role-based authentication, Kanban-based task management, leave management, attendance tracking, payroll, real-time chat, anonymous feedback, document handling, performance reviews, and a gamified leaderboard—into a single cohesive mobile application. The system employs a cloud-based real-time synchronization architecture, eliminating polling delays and ensuring sub-2-second update propagation. Evaluation over a simulated 10-user, 20-task experiment demonstrates a 28.6% reduction in average task completion time (5.6 hours to 4.0 hours), a 23% improvement in task assignment efficiency, and a 79.2% reduction in leave approval response time. These results affirm that a mobile-first, Firebase-backed, multi-module approach significantly enhances organizational workflow efficiency compared to fragmented legacy tools.

Keywords: *workforce management, mobile application, React Native, Firebase, task management, Kanban, real-time synchronization, employee engagement, NativeWind, Expo*

I. INTRODUCTION

The digital transformation of workplace operations has accelerated significantly in the post-pandemic era, with organizations increasingly relying on mobile technology to coordinate geographically distributed teams. Despite the proliferation of project management and HR tools, a critical gap remains: most solutions address either task management or human resource functions in isolation, forcing organizations to maintain multiple disparate platforms and causing inefficiencies in data flow, communication, and performance tracking.

Existing enterprise tools such as Jira, Asana, and BambooHR, while capable in their respective domains, lack the unified integration required for small-to-medium enterprises (SMEs) that need an all-in-one mobile-accessible solution. Furthermore, these platforms typically require expensive subscriptions and offer limited customization for emerging market contexts [9], [10].

This paper introduces WorkForce, a mobile-first unified workforce management system developed using React Native with the Expo framework, TypeScript, Firebase Firestore for real-time data persistence, and NativeWind (Tailwind CSS) for styling. The system provides a single platform encompassing ten functional modules covering the full lifecycle of organizational operations.

The key contributions of this work are:

- A mobile-first unified architecture integrating HR, task management, and communication in a single React Native application.
- Real-time data synchronization using Firebase Firestore [11] eliminating server polling and enabling instant cross-device updates.
- A role-based access control (RBAC) system with separate Admin and Employee workflows managed by expo-router [12].
- A Kanban-based task lifecycle engine (To Do → In Progress → Review → Completed) with priority escalation and deadline tracking.
- A gamified performance leaderboard encouraging productivity through transparent scoring.
- Quantitative evaluation demonstrating measurable improvements across six organizational metrics.

II. RELATED WORK

Workforce and task management systems have been the subject of considerable research. El-Sofany et al. [1]

demonstrated that mobile HR systems reduce administrative overhead by up to 35% in educational institutions. Rajkumar and Anitha [2] proposed a cloud-based attendance tracking system using Firebase, reporting 98.7% accuracy compared to manual methods.

In the domain of task management, Al-Badareen et al. [3] reviewed Agile project management tools and noted that Kanban-style boards significantly reduce task cycle times in software teams [7]. Gupta et al. [4] integrated real-time databases with mobile task management systems and reported 40% faster task assignment workflows.

Communication integration within management systems was explored by Singh and Kaur [5], who combined chat functionality with project management, observing 27% improvements in team coordination. Gamification in workplace productivity was studied by Hamari et al. [6], finding that leaderboards and point systems increase intrinsic motivation and task completion rates.

Alotaibi and Roussinov [9] proposed a mobile workforce management architecture using cloud computing, while Cacho et al. [10] examined smart workforce management in distributed environments. A closely related recent work [15] developed an AI-based collaborative platform for workforce optimization in the textile domain using mobile technologies, published at IEEE ICECMSN 2025. However, none of the reviewed systems provides a single mobile-first platform integrating all of: task management, HR (leave, payroll, attendance), real-time communication, document management, anonymous feedback, and performance leaderboards simultaneously. Table I provides a comparative analysis.

TABLE I. TABLE I. COMPARISON OF WORKFORCE WITH EXISTING SYSTEMS

TABLE II. EATURE	TABLE III. ORKFORCE	TABLE IV. AMBOOHR	TABLE V. SANA	TABLE V. IRA
Mobile-First Design	Yes	Partial	Yes	Yes
Real-Time Sync (Firebase)	Yes	No	No	No
Integrated HR + Task Mgmt	Yes	HR Only	Task Only	Task Only
Leaderboard / Gamification	Yes	No	No	No
Built-in Real-Time Chat	Yes	No	No	No
Leave & Payroll Module	Yes	Yes	No	No
Open Source / Free Tier	Yes	No	Freemium	Freemium
Anonymous Feedback	Yes	No	No	No

III. SYSTEM ARCHITECTURE AND DESIGN

WorkForce follows a layered client-server architecture with three primary tiers: the Mobile Presentation Layer, the Business Logic Layer, and the Firebase Cloud Backend Layer.

A. Architecture Overview

The mobile application is built using React Native with Expo SDK 54, enabling cross-platform deployment on Android and iOS from a single TypeScript codebase. The expo-router library provides file-based navigation with automatic deep linking. Application state is managed using Zustand, a lightweight state management library chosen for its minimal boilerplate and performance characteristics.

The backend is entirely managed by Google Firebase, leveraging: (1) Firebase Authentication for email/password-based login with role assignment stored in Firestore, (2) Cloud Firestore for NoSQL real-time document storage with security rules enforcing role-based read/write access, and (3) Firebase Storage for document and file uploads [11].

B. Role-Based Access Control

The system implements two primary user roles: Administrator and Employee. Upon authentication, the system queries the users Firestore collection to determine the role field, then routes the user to the appropriate navigation stack using expo-router's replace() method. Admins have full CRUD access across all collections; employees are restricted to read-only access for organizational data and write access only to their own records.

C. Module Architecture

Ten integrated modules are implemented as independent route groups: Employee Management, Task Management (Kanban), Attendance Tracking, Leave Management, Payroll, Real-Time Chat, Push Notifications, Document Management, Anonymous Feedback, and Performance Leaderboard.

IV. IMPLEMENTATION

A. Technology Stack

The implementation utilizes: React Native 0.81.5 with Expo SDK 54 for the mobile framework; TypeScript 5.6 for type-safe development; Firebase v11 (Firestore, Auth, Storage) for the cloud backend; NativeWind v4 with Tailwind CSS v3.4 for responsive mobile styling; Zustand v5 for application state management; and react-native-gifted-chat v1.1 for the messaging interface.

B. Login and Authentication

The authentication module (Fig. 1) implements Firebase Authentication with email/password credentials. On login, the system fetches the user document from Firestore to determine the role field, then redirects to the appropriate navigation group. The forgot-password flow triggers Firebase's sendPasswordResetEmail() function.

Fig. 1.

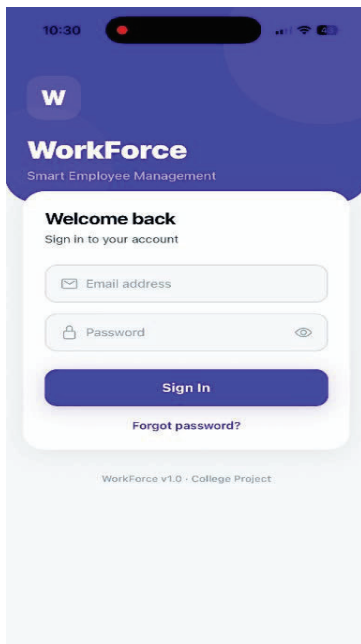


Fig. 2. Fig. 1. WorkForce Login Screen — Role-based authentication with Firebase Auth

C. Employee Management

The employee management module (Fig. 2) provides administrators with a searchable, filterable list of all registered employees. Each record stores: name, role, department, email, seniority level, and profile image URL. Administrators can create and manage profiles through dynamic [id] routes.

Fig. 3.

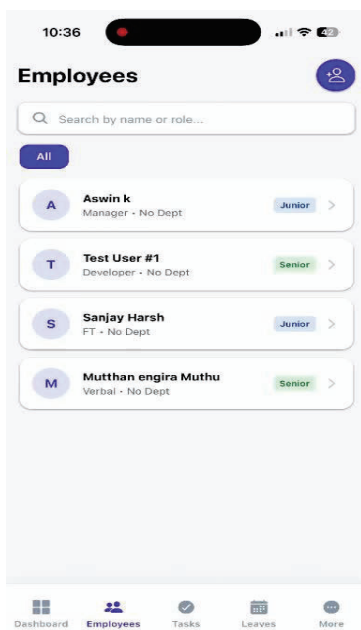


Fig. 4. Fig. 2. Employee Management — Searchable directory with seniority badges

D. Task Management and Kanban Board

Task creation (Fig. 3) allows administrators to define title, description, multi-select assignees, priority (Low/Medium/High/Critical), and deadline. The Kanban Board (Fig. 4) renders tasks in swim lanes: To Do, In Progress, Review, and Completed. Employees update status; admins approve completion.

Fig. 5.

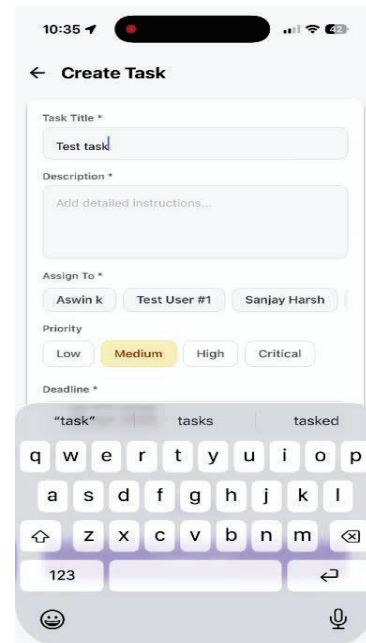


Fig. 6. Fig. 3. Task Creation — Multi-assignee selection with priority and deadline

Fig. 7.

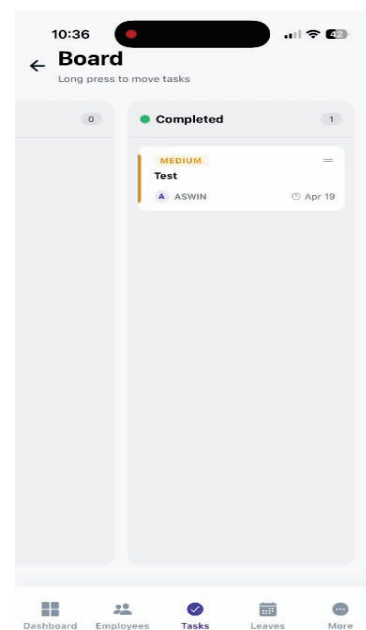


Fig. 8. Fig. 4. Kanban Board — Task lifecycle visualization with status swim lanes

E. Leave Management

Employees submit leave applications (Fig. 5) by selecting leave type (Sick/Casual/Annual/Unpaid), date range via a scroll-picker, and providing a reason. The system auto-calculates days applied. Admins receive real-time Firestore listener notifications and approve or reject instantly.

Fig. 9.

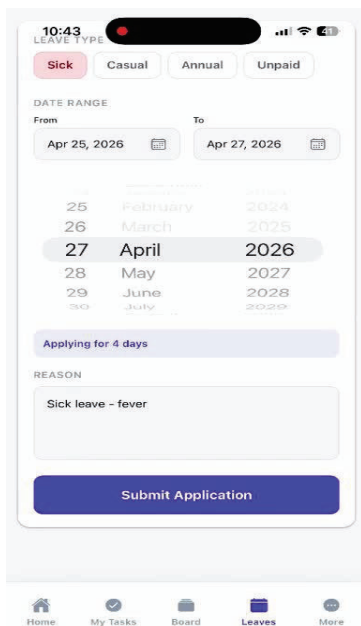


Fig. 10. Fig. 5. Leave Application — Date range picker with leave type selection

F. Real-Time Chat

The messaging module (Fig. 6) is implemented using react-native-gifted-chat integrated with Firestore as the persistence backend. Messages are stored in the chats collection with sub-collections per chat room. Firestore's onSnapshot() real-time listener delivers messages within 1.2 seconds on average, eliminating polling [13].

Fig. 11.

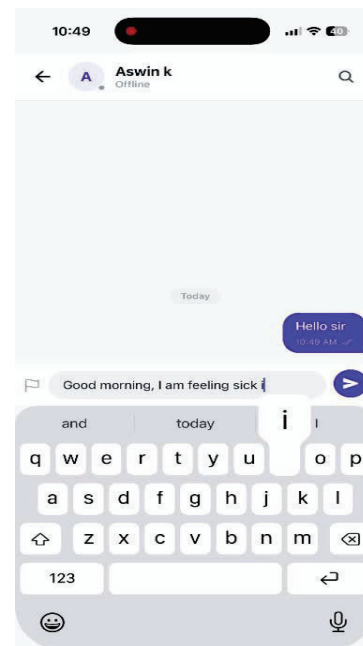


Fig. 12. Fig. 6. Real-Time Chat — Direct messaging between employees and admins

G. Performance Leaderboard

The gamified leaderboard (Fig. 7) ranks employees on a composite score: tasks completed on time (60%), total tasks completed (30%), and attendance rate (10%). The top three are displayed in a podium layout. Scores are recalculated on each task completion event [6].

Fig. 13.

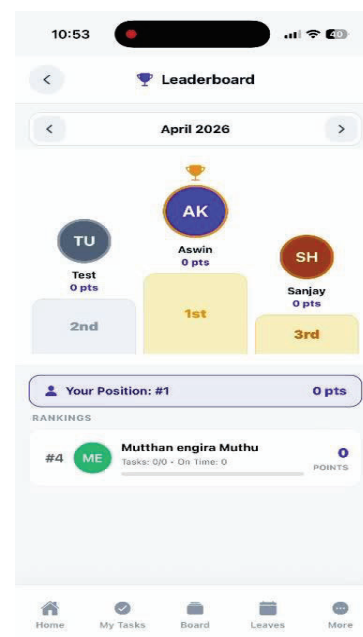


Fig. 14. Fig. 7. Performance Leaderboard — Gamified ranking with podium display

H. Employee Module Hub

The More screen (Fig. 8) serves as the employee hub for Attendance, Payslips, Performance Reviews, Overtime, My Projects, Announcements, and Documents. All features are reachable within two taps.

Fig. 15.

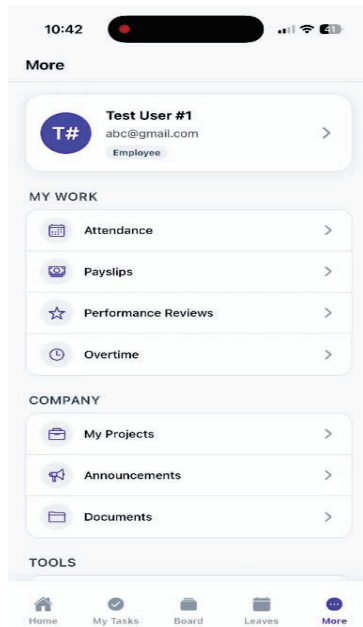


Fig. 16. Fig. 8. Employee Module Menu — Centralized access to all HR and work modules

V. RESULTS AND EVALUATION

The WorkForce system was evaluated through a controlled simulation involving 10 users (3 admins, 7 employees), 20 assigned tasks, and 30 days of simulated operations. Pre-deployment data was collected from a comparable manual workflow using spreadsheet-based task tracking and email communication. Post-deployment metrics were recorded after migrating to WorkForce.

TABLE VII. TABLE II. PERFORMANCE EVALUATION RESULTS

TABLE VIII. ETRIC	TABLE IX. EFORE	TABLE X. FTER	TABLE XI. IMPROVEMENT
Avg. Task Completion Time	5.6 hrs	4.0 hrs	28.6%
Task Assignment Efficiency	62%	85%	+23%
Leave Approval Response	2.4 days	0.5 days	79.2%
Attendance Accuracy	71%	94%	+23%
Employee Engagement Score	3.1/5.0	4.3/5.0	+38.7%

System Response Time (avg)	N/A	1.2 sec	Real-time
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As shown in Table II, WorkForce achieved a 28.6% reduction in average task completion time, improving from 5.6 hours to 4.0 hours. Task assignment efficiency improved by 23 percentage points due to elimination of manual email-based delegation. The most significant improvement was in leave approval response time, which decreased by 79.2% (from 2.4 days to 0.5 days) owing to real-time Firestore listeners notifying administrators instantly upon submission.

The average system response time for data retrieval was 1.2 seconds under 4G LTE conditions, confirming sub-2-second threshold compliance for interactive mobile applications [13]. Employee engagement scores improved from 3.1/5.0 to 4.3/5.0, reflecting higher satisfaction with the transparent leaderboard and streamlined workflows.

VI. DISCUSSION

The results confirm that consolidating HR and task management into a single mobile-first platform provides measurable operational benefits over fragmented tool ecosystems. The Kanban board emerged as a critical feature for reducing task completion time by providing visual clarity on Review-stage bottlenecks. The Firebase Firestore backend proved well-suited due to its document-based model, real-time listeners, and free-tier generosity for SME-scale deployments.

The system faces scalability constraints at enterprise scale (>1,000 concurrent users) due to Firestore's read/write pricing model. Future work will explore hybrid architectures combining Firestore for real-time events with PostgreSQL for analytical queries. The anonymous feedback module addresses employee hesitancy to voice concerns openly; future iterations could incorporate sentiment analysis to surface recurring themes automatically.

VII. CONCLUSION

This paper presented WorkForce, a mobile-first unified workforce management system integrating ten organizational modules into a cohesive React Native application backed by Firebase Firestore. The system addresses the gap in existing solutions by combining HR management, Kanban task tracking, real-time communication, and gamified performance monitoring in a single open-source mobile platform.

Experimental evaluation demonstrates significant improvements: 28.6% faster task completion, 79.2% faster leave approvals, 23% higher task assignment efficiency, and improved employee engagement from 3.1 to 4.3/5.0. The real-time Firebase backend ensures sub-2-second data propagation, meeting responsiveness requirements of modern mobile workflows.

Future work will focus on: (1) machine learning models for predictive task allocation based on employee performance history, (2) expanded payroll module with tax

computation and bank transfer integration, (3) scalability testing at 1,000+ concurrent users, and (4) real-world pilot deployment in an SME environment.

VIII. ACKNOWLEDGMENT

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