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A digital Library platform project Proposal

Project Title : <u>Developing Digital Library System (Offline-first Mobile App with Periodic Sync)</u>

Client: በ ኢ /ኦ /ተ /ቤ አ ቶ ና ደ ብ ረ ጽ ዮ ን ቅ /ማ ር ያ ም ቤ /ያ ን ፈ ለ ገ ሕ ይ ወ ት ሰ /ት /ቤ /ት ቤ ተ -መጻ ሕ ፍ ት ክ ፍ ል

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Wolaita soddo, Ethiopia

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Prepared By Natinael Samuel Full-Stack Developer | Software Engineer

1) Project Goal

The goal of this project is to build a **low-cost, offline-first mobile app** for librarians that enables:

- Registering books and generating/printing QR labels.

- Registering users using the existing **Fayda National ID** (16-digit ID, barcode).

- Checking books in/out by scanning the user ID barcode + book QR (borrow) and scanning book QR (return).

- Storing all activity locally and syncing to a central online database when Wi-Fi is available (semi-automatic, e.g., every X hours).

- Producing simple reports (overdue, top books, top readers, counts by category).

2) Success Criteria

The project will be considered complete when:

- Librarians can register books and produce QR labels.

- Librarians can register users with Fayda ID and identify users by scanning their Fayda barcode.

- Borrow/return transactions work offline and sync reliably when internet is available. - Reports are accessible within the app.

- Sync conflict handling prevents record corruption.

- The app runs smoothly on **basic Android devices**.

3) Minimum Viable Product (MVP) Features

- **Book registration form** (title, author, category, notes, unique ID).
- **QR generation** for books (save/share/export).
- **User registration** by Fayda ID (16-digit ID, name, phone, optional photo).
- **Borrow flow**: Scan Fayda barcode → scan book QR → save record.
- **Return flow**: Scan book QR → mark as returned.
- **Local storage**: SQLite database with robust backups.
- **Sync system**: Semi-automatic (every X hours) + manual sync option.
- **Reports**: Overdue books, top borrowed, counts by category.
- **Search**: Local book search by title, author, category.

4) Phase 2 (Nice-to-Have Features)

- Advanced search + filters.
- User management (blocking, fines, borrowing limits).
- Notifications (SMS) for overdue books.
- Multi-device conflict resolution with logs.
- Role-based accounts for librarians.
- Cloud-hosted dashboard (web) for church admin.
- Report export to CSV/PDF.

5) Tech Stack (Practical, Low-Cost)

- **Mobile framework**: React Native (Expo).
- **Local database**: SQLite (via react-native-sqlite-storage).
- **QR handling**: Expo barcode scanner + QR generation library.
- **Backend/Sync**: Supabase (Postgres + Auth + Storage).
- **Hosting**: Supabase free tier or cheap VPS when needed.

6) Data Model (Simplified Schema)

Users: fayda_id, name, phone, photo, status.

Books: book_code, title, author, category, notes.

Transactions: tx_id, book_code, fayda_id, type (borrow/return), timestamp, sync_status.

SyncLog: sync_id, device_id, status, details.

7) Workflow Overview

- **Book QR**: Contains book_code, scanned for transactions.
- **User Fayda ID**: Scanned to identify users.
- **Borrow Flow**: Scan Fayda → scan Book → record saved.
- **Return Flow**: Scan Book → mark as returned.
- **Reports**: Generate overdue, top books, top readers.

8) Offline-First Sync Strategy

- Every action writes immediately to local SQLite.
- Sync triggers: automatic (on Wi-Fi every X hours) + manual "Sync Now" button.
- Data uploaded in **batch bundles** to Supabase.
- Conflict resolution: duplicate filtering & admin conflict list.

9) Core App Screens

1. Login / Shift start.
2. Dashboard with key counts.
3. Scan (borrow/return mode).
4. Register User.
5. Register Book + Generate QR.
6. Books List & Search.
7. Transactions History.
8. Reports.
9. Sync page.
10. Settings.

10) Privacy & Security

- Store minimal user data.
- Encrypt sensitive Fayda ID if possible.
- HTTPS-only sync.
- Role-based access control.
- Limit photo retention.

11) Equipment & Costs

- Basic Android phones: Avalable by the librarian
- QR label printing at local print shops: 20 Birr per sticker.
- Hosting: Supabase free tier.

12) Implementation Plan

Phase 0 (Planning): Approvals & workflow confirmation.

Phase 1 (MVP: 2–4 weeks): Book & user registration, QR generation, borrow/return, local DB, manual sync.

Phase 2: Sync backend (Supabase), multi-device conflict handling, reports export.

Phase 3: Extra features (notifications, dashboard, advanced search).

13) Risks & Mitigation

- **Risk**: Forgetting to sync → **Mitigation**: auto-sync + reminders.
- **Risk**: Poor barcode scanning → **Mitigation**: good QR printing + phone flashlight.
- **Risk**: Data corruption during sync → **Mitigation**: batch uploads & validation.

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14) Conclusion

This **Digital Library System** will modernize the church's library operations with a **low-cost, offline-first solution**, ensuring smooth daily operations, reliable data storage, and minimal equipment costs.