

Technical Specification Report: Pool & Cafe Web Application

1. Technology Stack Overview

Frontend (Customer Facing)

- Framework: React.js (Vite)
- Styling: Vanilla CSS (Custom Design System)
- 3D/Immersive: @react-three/fiber, @react-three/drei, three.js
- State Management: React Context API (AuthContext)
- Routing: react-router-dom

Frontend (Admin Dashboard)

- Framework: Next.js 14+ (App Router)
- Styling: Tailwind CSS (lucide-react for icons)
- State Management: React Context API (AuthContext, PoolContext, SearchContext)

Backend

- Runtime: Node.js
- Framework: Express.js
- Security: helmet, cors, bcryptjs, jsonwebtoken

Database

- Primary: MongoDB (Atlas)
- ODM: Mongoose

2. API Inventory & Role-Based Access (RBAC)

Authentication Flow

1. Login → Verify hash → Return JWT (1h expiry)
2. JWT sent via x-auth-token header

3. Middleware verifies role and access

Key Endpoints:

/api/auth/register – Register new customer (Public)
/api/auth/login – Login (Public)
/api/admin/dashboard-stats – KPIs (Admin, Manager)
/api/admin/tables – Manage tables (Admin, Manager, Staff)
/api/admin/bookings – View bookings (Admin, Manager, Staff)
/api/admin/clients – View users (Admin, Manager)
/api/admin/staff – Manage staff (Admin)
/api/admin/settings – Business settings (Admin)
/api/bookings – Create booking (Authenticated)
/api/bookings/user/:id – View own bookings
/api/menu – View menu (Public)
/api/menu – Manage menu (Admin)

3. Application Architecture & Data Flow

Request Flow:

UI → Context → API → Backend Route → Controller → MongoDB → Response → UI Update

Booking Validation Logic:

$(StartA < EndB) \text{ AND } (EndA > StartB)$

Price Calculation:

$(Duration \times Rate) + PreOrders$

3D Integration:

React Three Fiber renders 3D Pool Scene in Hero & Booking Page.

Future improvement: Bind table availability state to 3D model colors.

4. Admin Dashboard Module Separation

Admin: Full access (Users, Finance, Staff, Settings)

Manager: Operational + Reporting (No staff/settings edit)

Staff: Operational only (Bookings, Orders, Tables)

5. Deployment Readiness

Environment Variables:

Backend:

- PORT
- MONGODB_URI
- JWT_SECRET

Frontend Admin:

- NEXT_PUBLIC_API_URL

Frontend Customer:

- VITE_API_URL

Sanity Checks:

- No hardcoded data
- Role-based route protection
- Mobile responsive UI
- Error boundaries implemented