**Requirements Specification Document**

**Pharmaceutical Company Management System**

**Team Members:**

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**1. Project Summary**

**1.1 Project Overview**

The main goal of this project is to create a comprehensive web-based pharmaceutical management system that enables efficient management of medicines, stores, supplies, users, and analytics. The system provides role-based access control with three user types: **Employee**, **Employer**, and **Admin**, each having specific permissions and access levels to different modules of the application.

**1.2 Project Scope**

The scope of the Pharmaceutical Company Management System involves developing a full-stack web application with:

* **Frontend**: React.js with TypeScript, Tailwind CSS, and modern UI components
* **Backend**: Node.js with Express.js REST API
* **Database**: PostgreSQL with Prisma ORM
* **Authentication**: JWT-based authentication with role-based access control
* **Real-time Analytics**: Interactive dashboards and reports with live data visualization
* **CRUD Operations**: Complete Create, Read, Update, Delete functionality for all entities
* **Responsive Design**: Mobile-first approach ensuring accessibility across all devices

**2. General Description**

This document outlines the comprehensive pharmaceutical management system with advanced features including real-time analytics, supply chain management, user management, and automated alerts system.

**2.1 Product Functions Overview**

The system provides a robust web-based platform with the following core functionalities:

**Core Management Modules:**

* **Medicine Management**: Complete inventory management with expiry tracking
* **Store Management**: Medical store information and location tracking
* **Supply Management**: Supply chain tracking with real-time updates
* **User Management**: Role-based user administration (Admin only)
* **Analytics Dashboard**: Real-time data visualization and insights
* **Reports System**: Comprehensive reporting with export functionality
* **Alerts Management**: Automated notifications for critical events
* **Settings Management**: System configuration and preferences

**3. Database Architecture**

**3.1 Database Tables**

**medicines table**

- id (Primary Key)

- name (Medicine name)

- company (Manufacturer)

- date\_of\_manufacture

- date\_of\_expiry

- price (Decimal)

- created\_at, updated\_at

**medical\_stores table**

- store\_id (Primary Key)

- store\_name

- location

- created\_at, updated\_at

**supplies table**

- supply\_id (Primary Key)

- medicine\_id (Foreign Key → medicines.id)

- store\_id (Foreign Key → medical\_stores.store\_id)

- quantity

- supply\_date

- created\_at, updated\_at

**users table**

- id (Primary Key)

- name

- email (Unique)

- password\_hash

- role (employee/employer/admin)

- is\_active (Boolean)

- created\_at, updated\_at

**3.2 Database Relationships**

* **One-to-Many**: Medicine → Supplies
* **One-to-Many**: Store → Supplies
* **Many-to-Many**: Medicines ↔ Stores (through Supplies)

**4. User Types and Access Control**

**4.1 Role-Based Access Matrix**

**Module Employee Employee Employer Admin**

**Dashboard ✅ Read ✅ Full Access ✅ Full Access**

**Medicine Management ❌ No Access ✅ Full Access ✅ Full Access**

**Store Management ❌ No Access ✅ Full Access ✅ Full Access**

**Supply Management ❌ No Access ✅ Full Access ✅ Full Access**

**Analytics Dashboard ❌ No Access ❌ No Access ✅ Full Access**

**Reports Management ❌ No Access ❌ No Access ✅ Full Access**

**Alerts Management ❌ No Access ✅ Full Access ✅ Full Access**

**User Management ❌ No Access ❌ No Access ✅ Full Access**

**Settings Management ❌ No Access ❌ No Access ✅ Full Access**

**5. User Interface Design**

**5.1 Authentication System**

**Login Page Features:**

* **Secure Authentication**: JWT-based login system
* **Role-based Redirection**: Automatic routing based on user role
* **Form Validation**: Client-side and server-side validation
* **Password Security**: Bcrypt hashing for password storage
* **Responsive Design**: Mobile-optimized interface

**User Registration (Admin Only):**

* **Admin-controlled Registration**: Only admins can create new users
* **Role Assignment**: Ability to assign employee/employer/admin roles
* **Email Validation**: Unique email constraint with validation
* **Account Status Management**: Active/inactive user status control

**5.2 Post-Login Interface**

**Dashboard Layout:**

* **Responsive Navbar**: Sticky navigation with role-based menu items
* **Sidebar Navigation**: Collapsible sidebar with module access
* **KPI Cards**: Real-time statistics display
* **Quick Actions**: Shortcut buttons for common tasks
* **Recent Activity**: Live feed of recent system activities

**Navigation Structure:**

├── Dashboard (All users)

├── Medicine Management (Employer/Admin)

├── Store Management (Employer/Admin)

├── Supply Management (Employer/Admin)

├── Analytics Dashboard (Admin only)

├── Reports Management (Admin only)

├── Alerts Management (Employer/Admin)

├── User Management (Admin only)

└── Settings Management (Admin only)

**5.3 Module-Specific Interfaces**

**Medicine Management:**

* **CRUD Operations**: Add, edit, delete, view medicines
* **Expiry Tracking**: Automatic alerts for expiring medicines
* **Search & Filter**: Advanced filtering by name, company, expiry date
* **Bulk Operations**: Import/export functionality
* **Price Management**: Cost tracking and history

**Supply Management:**

* **Supply Chain Tracking**: Complete supply lifecycle management
* **Real-time Updates**: Live inventory updates
* **Store-Medicine Mapping**: Link supplies to specific stores
* **Quantity Management**: Stock level monitoring
* **Date Tracking**: Supply date and delivery tracking

**Analytics Dashboard:**

* **Interactive Charts**: Bar charts, pie charts, line graphs
* **Real-time Data**: Live data visualization with auto-refresh
* **KPI Monitoring**: Key performance indicators tracking
* **Trend Analysis**: Monthly and yearly trend analysis
* **Export Functionality**: PDF and Excel export options

**Reports Management:**

* **Comprehensive Reports**: Inventory, store performance, supply trends
* **Critical Alerts**: Automated system notifications
* **Export Options**: Multiple format support (PDF, Excel, CSV)
* **Scheduled Reports**: Automated report generation
* **Filter Options**: Date range, category, store-specific filters

**6. Technical Architecture**

**6.1 Frontend Architecture**

* **Framework**: React.js 18+ with TypeScript
* **UI Library**: Custom components with Radix UI primitives
* **Styling**: Tailwind CSS with custom design system
* **State Management**: React Context API with custom hooks
* **Data Fetching**: Custom API service layer with error handling
* **Charts**: Recharts library for data visualization
* **Routing**: React Router for SPA navigation

**6.2 Backend Architecture**

* **Runtime**: Node.js with Express.js framework
* **Database ORM**: Prisma with PostgreSQL
* **Authentication**: JWT tokens with bcrypt password hashing
* **API Design**: RESTful API with standardized responses
* **Error Handling**: Centralized error handling middleware
* **Security**: CORS, Helmet.js, input validation
* **Environment**: Environment-based configuration

**6.3 Database Design**

* **Database**: PostgreSQL 14+
* **ORM**: Prisma for type-safe database access
* **Migrations**: Automatic schema migrations
* **Indexing**: Optimized indexes for performance
* **Relationships**: Foreign key constraints with cascade options
* **Validation**: Database-level and application-level validation

**7. Feature Implementation Status**

**7.1 Completed Features**

* **Authentication System**: JWT-based login with role-based access
* **Database Integration**: PostgreSQL with Prisma ORM
* **Medicine Management**: Complete CRUD with real API integration
* **Store Management**: Full store management functionality
* **Supply Management**: Complete supply chain management
* **User Management**: Admin-controlled user administration
* **Analytics Dashboard**: Real-time data visualization
* **Reports Management**: Comprehensive reporting system
* **Alerts Management**: Automated notification system
* **Settings Management**: System configuration interface
* **Responsive Design**: Mobile-first responsive interface

**7.2 Advanced Features**

* **Real-time Data Updates**: Live data synchronization
* **Export Functionality**: PDF/Excel export for reports
* **Advanced Search**: Multi-field search and filtering
* **Data Validation**: Client and server-side validation
* **Error Handling**: Comprehensive error management
* **Loading States**: User-friendly loading indicators
* **Toast Notifications**: Real-time user feedback

**8. Team Responsibilities (Updated)**

| **Team Member** | **Primary Responsibilities** |
| --- | --- |
| **Adwaith S Menon** | Frontend, Navigation System, Component Architecture, Database Design. |
| **Nikhil Sai G** | Database Design, PostgreSQL Integration, Component Architecture, Authentication System |
| **Kundhan M** | Full-stack Integration, API Development, System Architecture |
| **Tarun Kumar T** | Authentication System, Security Implementation, User Management |

**9. System Requirements**

**9.1 Development Environment**

* **Node.js**: Version 18+
* **PostgreSQL**: Version 14+
* **npm/yarn**: Package management
* **Git**: Version control
* **VS Code**: Recommended IDE

**9.2 Production Requirementsg**

* **Server**: Node.js runtime environment
* **Database**: PostgreSQL server
* **Web Server**: Nginx/Apache (optional)
* **SSL Certificate**: HTTPS encryption
* **Domain**: Custom domain with DNS configuration

**10. Future Enhancements**

**10.1 Planned Features**

* **Mobile Application**: React Native mobile app
* **Advanced Analytics**: Machine learning insights
* **Notification System**: Email/SMS notifications
* **Multi-language Support**: Internationalization
* **API Documentation**: Swagger/OpenAPI documentation
* **Advanced Security**: Two-factor authentication
* **Backup System**: Automated database backups
* **Audit Logging**: Complete activity tracking