PharmaTrack India - Pharmaceutical Supply Chain Tracking System

A comprehensive pharmaceutical supply chain tracking system designed for the Indian market, featuring QR code generation, expiry date tracking, discounted pricing, and role-based access control.

🚀 Features

Core Functionality

- **Drug Registration & Tracking**: Complete lifecycle tracking from manufacturing to patient delivery
- **QR Code Generation**: Secure QR codes for drug tracking (manufacturer/admin only)
- **Customer Portal**: QR code scanning and drug information access for customers
- **Expiry Date Management**: Automatic expiry tracking with discounted pricing
- **Role-Based Access**: Different interfaces for manufacturers, distributors, pharmacies, and customers

QR Code System

- **Secure QR Generation**: Manufacturers and admins can generate QR codes for drugs
- **QR Code Viewing**: View QR codes for any drug in the system
- **Customer Scanning**: Customers can scan QR codes to get complete drug information
- **Data Integrity**: Security hashes prevent QR code tampering

Expiry & Pricing System

- **Automatic Expiry Tracking**: Real-time expiry status updates
- **Discounted Pricing**: Automatic discounts based on expiry dates

  - 50% discount for drugs < 30 days to expiry
  - 30% discount for drugs < 60 days to expiry
  - 15% discount for drugs < 90 days to expiry

- **Expired Drug Blacklisting**: Expired drugs are automatically blacklisted
- **Price Display**: All prices in Indian Rupees (₹)

User Management

- **Smooth User Switching**: Logout button for easy user switching
- **Current User Display**: Shows logged-in user name and role
- **Role-Based Navigation**: Users only see pages they have access to
- **Demo Accounts**: Pre-configured accounts for testing

🛠 Technology Stack

- **Frontend**: React 18, TypeScript, Vite
- **UI Components**: Shadcn/ui, Tailwind CSS
- **QR Code**: qrcode library for generation
- **State Management**: React hooks with localStorage persistence
- **Authentication**: Local storage-based mock authentication

📋 Demo Credentials

Username	Password	Role	Access
admin	admin123	Administrator	Full access to all features
cipla	cipla123	Manufacturer	Drug creation, QR generation, transfers
medplus	medplus123	Distributor	Drug transfers, distribution management
apollo	apollo123	Pharmacy	Drug sales, customer interactions
customer	customer123	Customer	QR code scanning, drug information

🚀 Getting Started

Prerequisites

- Node.js 18+
- npm or yarn

Installation

```
# Clone the repository
git clone <repository-url>
cd chain-trackr-main

# Install dependencies
npm install

# Start development server
npm run dev

# Build for production
npm run build
```

Running the Application

1. Start the development server: `npm run dev`
2. Open your browser to `http://localhost:8080`
3. Login with any of the demo credentials above
4. Explore different features based on your role

📋 User Interfaces

Dashboard

- Overview of all drugs in the system
- Statistics and analytics
- Quick access to all features
- Drug cards with QR code viewing

Manufacturing

- Register new drugs with expiry dates and pricing
- Generate QR codes for tracking
- View manufacturing history

Distribution

- Transfer drugs between entities
- Track distribution network
- View transfer history

Sales

- Record drug sales to patients
- Track sales history
- View revenue analytics

Customer Portal

- Scan QR codes to get drug information
- View manufacturing and expiry dates
- See pricing and discount information
- Access complete drug profiles

Track Drug

- Search drugs by batch number
- View complete supply chain timeline
- Access QR codes for tracking
- See detailed drug information

🔐 Security Features

- **Role-Based Access Control**: Users only see features they have permission for
- **QR Code Security**: Hash verification prevents tampering
- **Data Integrity**: Secure data storage and validation
- **Session Management**: Automatic session expiry and logout

🎨 Design Features

- **Indian Localization**: All currency in Indian Rupees (₹)
- **Professional UI**: Modern, clean interface with medical theme
- **Responsive Design**: Works on desktop, tablet, and mobile
- **Background Images**: Integrated medical-themed background images
- **Color-Coded Status**: Visual indicators for drug status and expiry

📊 Sample Data

The application comes with 30 sample drugs including:

- Pain relief medications (Paracetamol, Ibuprofen, etc.)
- Antibiotics (Amoxicillin, Azithromycin, etc.)
- Chronic disease medications (Metformin, Insulin, etc.)

Each drug includes:

- Complete manufacturing information
- Expiry dates and pricing
- Supply chain history
- QR codes for tracking

🔄 Key Workflows

Manufacturer Workflow

1. Register new drug with expiry date and price
2. Generate QR code for tracking
3. Transfer drugs to distributors
4. Monitor drug status and expiry

Customer Workflow

1. Scan QR code on drug package
2. View complete drug information
3. Check expiry date and pricing
4. Verify drug authenticity

Admin Workflow

1. Monitor all drugs in the system
2. Generate QR codes for any drug
3. View analytics and statistics
4. Manage user access and permissions

📈 Detailed Functionality Architecture

🔐 Authentication & User Management

Login System

- **Multi-Role Authentication**: Support for 5 distinct user roles
- **Session Management**: Secure login/logout with localStorage persistence
- **Role-Based Access Control (RBAC)**: Granular permissions per role
- **User Switching**: Smooth logout and re-login for role testing

User Roles & Permissions Matrix

Feature	Admin	Manufacturer	Distributor	Pharmacy	Customer
Dashboard Access	☑ Full	☑ Full	☑ Full	☑ Full	☑ Limited
Drug Registration	☑	☑	✖	✖	✖
QR Code Generation	☑	☑	✖	✖	✖
QR Code Viewing	☑	☑	✖	✖	✖
Drug Transfers	☑	☑	☑	✖	✖
Sales Recording	☑	✖	✖	☑	✖
Customer Portal	☑	✖	✖	✖	☑
Analytics & Reports	☑ Full	☑ Limited	☑ Limited	☑ Limited	✖
System Administration	☑	✖	✖	✖	✖

🏭 Manufacturer Role Architecture

Core Capabilities

- **Drug Registration**: Create new drug batches with complete metadata
- **QR Code Management**: Generate and view QR codes for drug tracking
- **Supply Chain Initiation**: Start drug distribution process
- **Quality Control**: Monitor drug status and expiry dates

Detailed Workflow

1. **Drug Creation Process**

   - Enter drug name, composition, batch number
   - Set manufacturing date and expiry date
   - Define pricing (base price in ₹)
   - Generate unique QR code for tracking
   - Store complete drug metadata

2. **QR Code Generation**

   - Create secure QR codes with drug information
   - Include security hash for tamper detection
   - Store QR data with batch number
   - Enable offline QR code viewing

3. **Distribution Management**

   - Transfer drugs to distributor entities
   - Track transfer history and status
   - Monitor drug location in supply chain
   - Update drug status automatically

4. **Quality Monitoring**

   - Track expiry dates in real-time
   - Monitor drug status changes
   - View manufacturing analytics
   - Generate quality reports

Data Access

- **Own Drugs**: Full access to drugs created by manufacturer
- **System Overview**: View all drugs in system (read-only)
- **Analytics**: Manufacturing statistics and reports
- **QR Codes**: Generate and view QR codes for any drug

🚐 Distributor Role Architecture

Core Capabilities

- **Drug Transfers**: Move drugs between supply chain entities
- **Inventory Management**: Track drug stock and location
- **Supply Chain Coordination**: Coordinate between manufacturers and pharmacies
- **Status Monitoring**: Monitor drug status and expiry

Detailed Workflow

1. **Transfer Management**

    - Receive drugs from manufacturers
    - Transfer drugs to pharmacies
    - Update drug location and status
    - Maintain transfer audit trail

2. **Inventory Tracking**

    - Monitor drug stock levels
    - Track drug locations
    - Manage warehouse operations
    - Handle logistics coordination

3. **Quality Assurance**

    - Verify drug authenticity
    - Check expiry dates
    - Monitor storage conditions
    - Report quality issues

4. **Supply Chain Analytics**

    - View distribution statistics
    - Track transfer efficiency
    - Monitor delivery times
    - Generate distribution reports

Data Access

- **Transfer Operations**: Full access to drug transfer functions
- **Inventory View**: Complete inventory visibility
- **Analytics**: Distribution and transfer statistics
- **Quality Monitoring**: Expiry and status tracking

🏪 Pharmacy Role Architecture

Core Capabilities

- **Sales Management**: Record drug sales to customers
- **Customer Interaction**: Handle customer queries and purchases
- **Inventory Management**: Track pharmacy stock levels
- **Revenue Analytics**: Monitor sales performance

Detailed Workflow

1. **Sales Recording**

    - Record customer purchases
    - Apply expiry-based discounts
    - Update inventory levels
    - Generate sales receipts

2. **Customer Service**

    - Handle customer inquiries
    - Provide drug information
    - Assist with QR code scanning
    - Manage customer relationships

3. **Inventory Management**

    - Monitor pharmacy stock
    - Track drug availability
    - Manage reorder processes
    - Handle expired drugs

4. **Revenue Analytics**

    - Track sales performance
    - Monitor discount applications
    - Analyze customer patterns
    - Generate revenue reports

Data Access

- **Sales Operations**: Full access to sales recording
- **Customer Data**: Access to customer interaction history
- **Inventory**: Pharmacy stock visibility
- **Analytics**: Sales and revenue statistics

👤 Customer Role Architecture

Core Capabilities

- **QR Code Scanning**: Scan drug QR codes for information
- **Drug Information Access**: View complete drug details
- **Expiry Checking**: Verify drug expiry dates
- **Price Verification**: Check pricing and discounts

Detailed Workflow

1. **QR Code Interaction**

   - Scan QR codes on drug packages
   - Input QR data manually if needed
   - Retrieve complete drug information
   - Verify drug authenticity

2. **Drug Information Access**

   - View manufacturing details
   - Check expiry dates
   - See pricing information
   - Access composition details

3. **Expiry & Pricing**

   - Check if drug is expired
   - View discounted pricing
   - Understand expiry warnings
   - Verify purchase decisions

4. **Security Verification**

   - Verify QR code authenticity
   - Check security hashes
   - Confirm drug origin
   - Validate supply chain

Data Access

- **QR Scanning**: Access to QR code scanning functionality
- **Drug Information**: Read-only access to drug details
- **Pricing**: View pricing and discount information
- **Security**: Verify drug authenticity and origin

👮🗄 Admin Role Architecture

Core Capabilities

- **System Administration**: Full system access and control
- **User Management**: Monitor and manage user activities
- **Analytics & Reporting**: Comprehensive system analytics
- **Quality Assurance**: Monitor overall system health

Detailed Workflow

1. **System Monitoring**

   - Monitor all drugs in system
   - Track user activities
   - Monitor system performance
   - Handle system issues

2. **Analytics & Reporting**

   - Generate comprehensive reports
   - Analyze supply chain efficiency
   - Monitor quality metrics
   - Track system usage

3. **Quality Assurance**

   - Monitor drug expiry patterns
   - Track quality issues
   - Ensure data integrity
   - Maintain system security

4. **User Support**

   - Assist with user issues
   - Monitor user activities
   - Provide system guidance
   - Handle administrative tasks
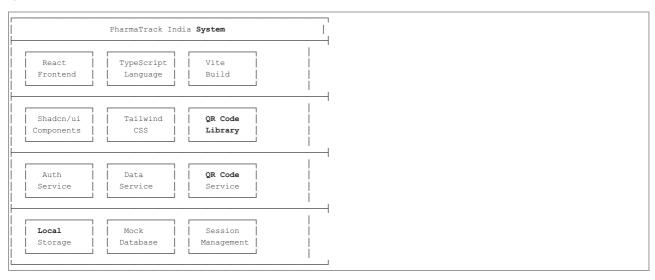
Data Access

- **Full System Access**: Complete access to all features
- **User Management**: Monitor all user activities
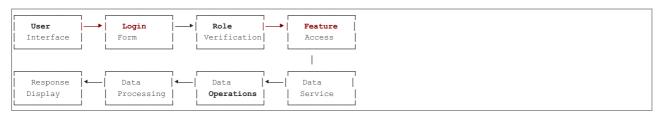
- **Analytics**: Comprehensive system analytics
- **Administration**: Full administrative control

🔧 Technical Architecture
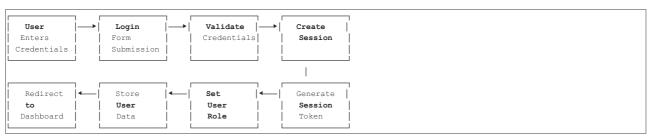
System Architecture Overview

```
┌─────────────────────────────────────────────────────┐  ┌──────────────────────────────┐
│  ┌─────────────────────────────────────────────────┐ │
│  │          PharmaTrack India System               │ │
│  └─────────────────────────────────────────────────┘ │
│  ┌──────────┐  ┌──────────┐  ┌──────────┐          │
│  │  React   │  │TypeScript│  │  Vite    │          │
│  │ Frontend │  │ Language │  │  Build   │          │
│  └──────────┘  └──────────┘  └──────────┘          │
│  ┌──────────┐  ┌──────────┐  ┌──────────┐          │
│  │Shadcn/ui │  │ Tailwind │  │ QR Code  │          │
│  │Components │  │   CSS    │  │ Library  │          │
│  └──────────┘  └──────────┘  └──────────┘          │
│  ┌──────────┐  ┌──────────┐  ┌──────────┐          │
│  │  Auth    │  │  Data    │  │ QR Code  │          │
│  │ Service  │  │ Service  │  │ Service  │          │
│  └──────────┘  └──────────┘  └──────────┘          │
│  ┌──────────┐  ┌──────────┐  ┌──────────┐          │
│  │  Local   │  │  Mock    │  │ Session  │          │
│  │ Storage  │  │ Database │  │Management│          │
│  └──────────┘  └──────────┘  └──────────┘          │
└─────────────────────────────────────────────────────┘
```

Data Flow Architecture

```
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│  User    │→ │  Login   │→ │  Role    │→ │ Feature  │
│Interface │  │  Form    │  │Verification│ │ Access   │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
                                                │
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│ Response │← │  Data    │← │  Data    │← │  Data    │
│ Display  │  │Processing│  │Operations│  │ Service  │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
```

Authentication Flow

```
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│  User    │→ │  Login   │→ │ Validate │→ │  Create  │
│ Enters   │  │  Form    │  │Credentials│ │ Session  │
│Credentials│ │Submission│  │          │  │          │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
                                                │
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│ Redirect │← │  Store   │← │  Set     │← │ Generate │
│   to     │  │  User    │  │  User    │  │ Session  │
│Dashboard │  │  Data    │  │  Role    │  │  Token   │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
```

QR Code Generation Flow

```
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│  Drug    │→ │ Generate │→ │  Create  │→ │  Store   │
│ Creation │  │ Security │  │ QR Code  │  │ QR Data  │
│  Form    │  │  Hash    │  │  Image   │  │  with    │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
                                                │
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│ Display  │← │  Return  │← │ Generate │← │  Update  │
│ QR Code  │  │ QR Code  │  │ QR Code  │  │  Drug    │
│  Image   │  │  Image   │  │  Data    │  │  Record  │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
```

Drug Tracking Flow

```
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│  Scan/   │→ │  Decode  │→ │ Validate │→ │ Retrieve │
│  Input   │  │ QR Code  │  │ Security │  │  Drug    │
│ QR Code  │  │  Data    │  │  Hash    │  │  Data    │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
                                                │
┌──────────┐  ┌──────────┐  ┌──────────┐  ┌──────────┐
│ Display  │← │Calculate │← │  Check   │← │  Fetch   │
│  Drug    │  │ Discount │  │ Expiry   │  │ Complete │
│Information│ │  Price   │  │ Status   │  │  Drug    │
└──────────┘  └──────────┘  └──────────┘  └──────────┘
```

Role-Based Access Control (RBAC)

```
┌─────────────────────────────────────────────────────────────┐
│   ┌───────────────────────────────────────────┐    │
│   │         User Authentication           │    │
│   └───────────────────────────────────────────┘    │
│   ┌─────────┐ ┌─────────────┐ ┌─────────────┐    │
│   │  Admin  │ │ Manufacturer │ │ Distributor │    │
│   │  Role   │ │    Role      │ │    Role     │    │
│   └─────────┘ └─────────────┘ └─────────────┘    │
│   ┌─────────┐ ┌─────────────┐                  │
│   │ Pharmacy │ │  Customer    │                  │
│   │  Role   │ │    Role      │                  │
│   └─────────┘ └─────────────┘                  │
│   ┌─────────┐ ┌─────────┐ ┌─────────────┐     │
│   │Dashboard│ │  Drug   │ │  QR Code     │     │
│   │ Access  │ │ Creation │ │ Generation   │     │
│   └─────────┘ └─────────┘ └─────────────┘     │
│   ┌─────────┐ ┌─────────┐ ┌─────────────┐     │
│   │Transfers│ │  Sales  │ │  Customer    │     │
│   │ Access  │ │Recording│ │   Portal     │     │
│   └─────────┘ └─────────┘ └─────────────┘     │
└─────────────────────────────────────────────────────────────┘
```

Supply Chain Flow

```
┌───────────┐    ┌───────────┐    ┌───────────┐    ┌───────────┐
│Manufacturer│ → │Distributor│ → │ Pharmacy  │ → │ Customer  │
│  Creates  │    │ Transfers │    │   Sells   │    │   Buys    │
│   Drug    │    │   Drug    │    │   Drug    │    │   Drug    │
└───────────┘    └───────────┘    └───────────┘    └───────────┘
     │                │                │                │
     ▼                ▼                ▼                ▼
┌───────────┐    ┌───────────┐    ┌───────────┐    ┌───────────┐
│ Generate  │    │  Update   │    │  Apply    │    │  Scan QR  │
│  QR Code  │    │ Location  │    │ Discount  │    │   Code    │
└───────────┘    └───────────┘    └───────────┘    └───────────┘
```

Expiry Management Flow

```
┌───────────┐    ┌───────────┐    ┌───────────┐    ┌───────────┐
│   Check   │ → │ Calculate │ → │  Apply    │ → │  Update   │
│  Expiry   │    │  Days to  │    │ Discount  │    │  Status   │
│   Date    │    │  Expiry   │    │  Price    │    │           │
└───────────┘    └───────────┘    └───────────┘    └───────────┘
                                                       │
                                                       ▼
┌───────────┐    ┌───────────┐    ┌───────────┐    ┌───────────┐
│  Display  │ ← │  Mark as  │ ← │  Check if │ ← │  Update   │
│  Status   │    │  Expired  │    │  Expired  │    │   Drug    │
│           │    │           │    │           │    │  Record   │
└───────────┘    └───────────┘    └───────────┘    └───────────┘
```

Security Architecture

- **Authentication**: Local storage-based session management
- **Authorization**: Role-based access control (RBAC)
- **Data Integrity**: Hash verification for QR codes
- **Session Security**: Automatic session management

Data Persistence

- **Local Storage**: Client-side data persistence
- **Mock Database**: Simulated backend data storage
- **Data Synchronization**: Real-time data updates
- **Backup & Recovery**: Data persistence across sessions

API Architecture

- **Mock Services**: Simulated backend API calls
- **Data Service Layer**: Centralized data management
- **Authentication Service**: User session management
- **QR Code Service**: QR generation and verification

💾 System Analytics

Manufacturing Analytics

- Drugs created per manufacturer
- QR codes generated
- Quality metrics
- Expiry patterns

Distribution Analytics

- Transfer efficiency
- Delivery times
- Inventory turnover
- Supply chain performance

Sales Analytics

- Revenue tracking
- Discount applications
- Customer patterns
- Inventory performance

Quality Analytics

- Expiry monitoring
- Quality issues
- Security verification
- System health metrics

🔁 Step-by-Step Workflow Diagrams

🏭 Manufacturer Workflow

```
|                    Manufacturer Workflow                  |
|                                                           |
| Step 1: Login as Manufacturer                          |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   Enter   |──▶|  Validate |──▶|   Access  |         |  |
|  |Credentials|   |Credentials|   | Dashboard |         |  |
|  └───────────┘   └───────────┘   └───────────┘         |  |
|                                                           |
| Step 2: Create New Drug                                |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  | Navigate  |──▶|    Fill   |──▶|   Submit  |         |  |
|  |    to     |   |    Form   |   |    Form   |         |  |
|  |Manufacturing|  └───────────┘   └───────────┘         |  |
|  └───────────┘                                         |  |
|                                                           |
| Step 3: Generate QR Code                               |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   Click   |──▶|  Generate |──▶|  Display  |         |  |
|  |  Generate |   |  QR Code  |   |  QR Code  |         |  |
|  |  QR Code  |   └───────────┘   |   Image   |         |  |
|  └───────────┘                   └───────────┘         |  |
|                                                           |
| Step 4: Transfer Drug                                  |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  | Navigate  |──▶|   Select  |──▶|  Confirm  |         |  |
|  |    to     |   |  Drug &   |   |  Transfer |         |  |
|  |Distribution|  |Distributor|   └───────────┘         |  |
|  └───────────┘   └───────────┘                         |  |
```

🚚 Distributor Workflow

```
|                    Distributor Workflow                   |
|                                                           |
| Step 1: Login as Distributor                           |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   Enter   |──▶|  Validate |──▶|   Access  |         |  |
|  |Credentials|   |Credentials|   | Dashboard |         |  |
|  └───────────┘   └───────────┘   └───────────┘         |  |
|                                                           |
| Step 2: Receive Drugs from Manufacturer                |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   View    |──▶|  Confirm  |──▶|   Update  |         |  |
|  |  Pending  |   |  Receipt  |   |   Status  |         |  |
|  | Transfers |   └───────────┘   └───────────┘         |  |
|  └───────────┘                                         |  |
|                                                           |
| Step 3: Transfer to Pharmacy                           |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   Select  |──▶|   Choose  |──▶|  Execute  |         |  |
|  |    Drug   |   |  Pharmacy |   |  Transfer |         |  |
|  └───────────┘   └───────────┘   └───────────┘         |  |
|                                                           |
| Step 4: Monitor Inventory                              |  |
|  ┌───────────┐   ┌───────────┐   ┌───────────┐         |  |
|  |   View    |──▶|   Check   |──▶|  Generate |         |  |
|  | Inventory |   |   Status  |   |  Reports  |         |  |
|  └───────────┘   └───────────┘   └───────────┘         |  |
```

🏛 Pharmacy Workflow

```
┌─────────────────────────────────────────────────────────────┐
│                     Pharmacy Workflow                       │
│═════════════════════════════════════════════════════════════│
│ Step 1: Login as Pharmacy                                   │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │    Enter     │──▶ │   Validate   │──▶ │    Access    │   │
│  │ Credentials  │    │ Credentials  │    │  Dashboard   │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 2: Record Drug Sale                                    │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │   Navigate   │──▶ │    Select    │──▶ │    Record    │   │
│  │  to Sales    │    │   Drug &     │    │     Sale     │   │
│  │              │    │  Customer    │    │              │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 3: Apply Discounts                                     │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │    Check     │──▶ │  Calculate   │──▶ │    Apply     │   │
│  │   Expiry     │    │   Discount   │    │   Discount   │   │
│  │    Date      │    │    Price     │    │    Price     │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 4: Generate Sales Report                               │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │     View     │──▶ │   Analyze    │──▶ │    Export    │   │
│  │    Sales     │    │    Data      │    │    Report    │   │
│  │   History    │    │              │    │              │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
└─────────────────────────────────────────────────────────────┘
```

👤 Customer Workflow

```
┌─────────────────────────────────────────────────────────────┐
│                     Customer Workflow                       │
│═════════════════════════════════════════════════════════════│
│ Step 1: Login as Customer                                   │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │    Enter     │──▶ │   Validate   │──▶ │    Access    │   │
│  │ Credentials  │    │ Credentials  │    │   Customer   │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 2: Scan QR Code                                        │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │    Open      │──▶ │   Scan QR    │──▶ │   Decode     │   │
│  │   Scanner    │    │    Code      │    │    Data      │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 3: View Drug Information                               │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │  Retrieve    │──▶ │   Display    │──▶ │    Check     │   │
│  │    Drug      │    │  Complete    │    │   Expiry     │   │
│  │    Data      │    │   Details    │    │   Status     │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
│═════════════════════════════════════════════════════════════│
│ Step 4: Verify Authenticity                                 │
│  ┌──────────────┐    ┌──────────────┐    ┌──────────────┐   │
│  │    Check     │──▶ │   Verify     │──▶ │   Confirm    │   │
│  │   Security   │    │    Hash      │    │   Purchase   │   │
│  │    Hash      │    │              │    │   Decision   │   │
│  └──────────────┘    └──────────────┘    └──────────────┘   │
└─────────────────────────────────────────────────────────────┘
```

👹 💼 Admin Workflow

```
┌─────────────────────────────────────────────────────┐
│                  Admin Workflow                      │
│─────────────────────────────────────────────────────│
│ Step 1: Login as Admin                              │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │   Enter      │──▶│  Validate    │──▶│   Access     │ │
│  │ Credentials  │   │ Credentials  │   │   Full       │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Step 2: Monitor System                              │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │    View      │──▶│  Analyze     │──▶│  Identify    │ │
│  │  Dashboard   │   │ Statistics   │   │   Issues     │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Step 3: Generate QR Codes                           │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │   Select     │──▶│  Generate    │──▶│    View      │ │
│  │  Any Drug    │   │  QR Code     │   │  QR Code     │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Step 4: Generate Reports                            │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │   Access     │──▶│  Compile     │──▶│   Export     │ │
│  │  Analytics   │   │   Data       │   │  Reports     │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
└─────────────────────────────────────────────────────┘
```

🔍 **QR Code Processing Flow**

```
┌─────────────────────────────────────────────────────┐
│              QR Code Processing                      │
│─────────────────────────────────────────────────────│
│ Input Phase                                          │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │  Scan QR     │──▶│  Decode      │──▶│  Extract     │ │
│  │   Code       │   │  QR Data     │   │  Drug ID     │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Validation Phase                                     │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │   Check      │──▶│  Verify      │──▶│  Validate    │ │
│  │  Security    │   │  Hash        │   │  Format      │ │
│  │   Hash       │   │              │   │              │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Retrieval Phase                                      │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │   Search     │──▶│  Fetch       │──▶│   Load       │ │
│  │  Database    │   │  Drug        │   │  Complete    │ │
│  │              │   │  Data        │   │  Details     │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
│─────────────────────────────────────────────────────│
│ Display Phase                                        │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐ │
│  │  Calculate   │──▶│  Format      │──▶│  Display     │ │
│  │  Discount    │   │  Data        │   │  Results     │ │
│  │   Price      │   │              │   │              │ │
│  └──────────────┘   └──────────────┘   └──────────────┘ │
└─────────────────────────────────────────────────────┘
```

💰 **Pricing & Discount Flow**

```
┌──────────────────────────────────────────────────┐
│                Pricing & Discount Flow            │
├──────────────────────────────────────────────────┤
│ Step 1: Check Expiry Date                       │  │
│  ┌──────────┐     ┌──────────┐     ┌──────────┐  │
│  │   Get    │────▶│ Calculate│────▶│ Determine│  │
│  │  Expiry  │     │ Days to  │     │  Status  │  │
│  │   Date   │     │  Expiry  │     │          │  │
│  └──────────┘     └──────────┘     └──────────┘  │
│                                                    │
│ Step 2: Apply Discount Logic                    │  │
│  ┌──────────┐     ┌──────────┐     ┌──────────┐  │
│  │  Check   │────▶│  Apply   │────▶│ Calculate│  │
│  │ Days to  │     │ Discount │     │  Final   │  │
│  │  Expiry  │     │   Rate   │     │  Price   │  │
│  └──────────┘     └──────────┘     └──────────┘  │
│                                                    │
│ Step 3: Update Drug Status                      │  │
│  ┌──────────┐     ┌──────────┐     ┌──────────┐  │
│  │ Check if │────▶│ Mark as  │────▶│  Update  │  │
│  │ Expired  │     │ Expired  │     │ Database │  │
│  └──────────┘     └──────────┘     └──────────┘  │
│                                                    │
│ Step 4: Display Results                         │  │
│  ┌──────────┐     ┌──────────┐     ┌──────────┐  │
│  │   Show   │────▶│ Display  │────▶│   Show   │  │
│  │ Original │     │ Discount │     │  Final   │  │
│  │  Price   │     │  Price   │     │  Status  │  │
│  └──────────┘     └──────────┘     └──────────┘  │
```

🚀 Deployment

Production Build

```
npm run build
```

The built files will be in the `dist` directory, ready for deployment to any static hosting service.

Environment Variables

No environment variables are required for the current implementation as it uses localStorage for data persistence.

🤝 Contributing

1. Fork the repository
2. Create a feature branch
3. Make your changes
4. Test thoroughly
5. Submit a pull request

📄 License

This project is licensed under the MIT License.

📞 Support

For support or questions, please contact the development team.

PharmaTrack India - Revolutionizing pharmaceutical supply chain transparency in India through secure technology and comprehensive tracking solutions.