

5 Rivers Barber Shop - System Design Document

1. Problem Statement

Design a web-based appointment booking system for a barber shop that allows customers to book appointments online and the owner to manage appointments efficiently with real-time updates.

2. Users and Roles

Customer/User:

- Browse services
- Book appointments
- View booking confirmation

Owner:

- View and manage all appointments
- Confirm, reschedule, or cancel bookings
- Access dashboard with daily schedules and statistics
- Access restricted to owner (authentication required)

3. Core Features

- Customer appointment booking with date and time selection
- Owner dashboard for appointment management
- Role-based access control (owner vs customer)
- Persistent storage of bookings (currently localStorage, planned Firebase backend)
- Responsive UI for mobile and desktop
- Notifications or alerts for new bookings (planned)

4. System Architecture

Frontend:

- HTML, CSS, JavaScript for UI and user interactions
- Components for booking form, calendar, and dashboard
- Event listeners and handlers for user input and owner actions

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Backend (Planned / Future):

- Firebase for persistent cloud storage of appointments and users
- Authentication via Firebase Auth or JWT
- Cloud functions for notifications and business logic (e.g., booking validation)

Data Flow:

Customer Browser -> Book Appointment -> Frontend Form -> Save Booking -> LocalStorage/Firebase -> Owner Dashboard

5. Database Schema (Firebase example)

Collection | Fields | Description

-----|-----|-----

users | userId, role (customer/owner), email, passwordHash | User authentication and roles

appointments | appointmentId, userId, date, time, status (booked/cancelled), notes | Booking details

6. Security Considerations

- Restrict dashboard access via owner-only authentication
- Validate booking times to prevent double-booking
- Use HTTPS for all communications
- Sanitize and validate all user inputs

7. Scalability and Future Enhancements

- Migrate from localStorage to Firebase for multi-device sync and real-time updates
- Implement push notifications for booking reminders
- Add payment integration for deposits
- Introduce analytics dashboard for business insights
- Scale backend using serverless functions or microservices as demand grows

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8. Deployment

- Host frontend on GitHub Pages, Netlify, or Vercel
- Backend on Firebase or Node.js server
- CI/CD pipelines for automatic deployment and testing

9. Conclusion

The 5 Rivers Barber Shop booking system provides an accessible, user-friendly interface for customers and a powerful dashboard for owners. The system is designed to scale and adapt to future business needs.