

Key JWT Enhancements Added

1. JWT Manager Class

- **Token Storage & Retrieval:** Securely manages JWT tokens in localStorage
- **Token Validation:** Decodes JWT payload to check expiration client-side
- **Automatic Expiry Monitoring:** Sets up timers to warn users and handle token expiration
- **Token Display:** Shows token status, expiry time, and countdown in the dashboard

2. Enhanced Security Features

- **Automatic Logout:** Logs out users when tokens expire
- **Session Warnings:** Alerts users 5 minutes before token expiration
- **Refresh Token Support:** Framework for token refresh (if your backend supports it)
- **Page Visibility Checks:** Validates token when user returns to the page

3. Improved API Integration

- **Automatic Token Headers:** Adds `Authorization: Bearer` headers to authenticated requests
- **Token Expiry Handling:** Automatically attempts token refresh before API calls
- **Better Error Handling:** Proper 401/403 error handling with automatic logout

4. Visual Improvements

- **Token Information Panel:** Shows current token status in the dashboard
- **Warning Alerts:** Visual indicators for token expiry warnings
- **Session Management:** Clear feedback on token refresh and expiry

5. Backend Requirements

Your backend needs these endpoints to work with this enhanced JWT implementation:

```
javascript
```

// Required backend endpoints:

```
POST /api/auth/login      // Returns { token, refreshToken?, user }
POST /api/auth/logout     // Invalidates token
POST /api/auth/refresh    // Optional: Refreshes expired tokens
GET  /api/users/:id       // Protected: Requires valid JWT
PUT  /api/users/:id       // Protected: Requires valid JWT
```

6. JWT Token Format

Your backend should create JWT tokens with this payload structure:

```
javascript

{
  userId: 123,
  username: "user@example.com",
  exp: 1640995200, // Expiration timestamp
  iat: 1640991600 // Issued at timestamp
}
```

Implementation Benefits

- Comprehensive JWT token management with automatic expiry handling
- Security monitoring and session validation
- Enhanced user experience around session management
- Automatic token refresh capabilities
- Visual feedback for token status and expiry warnings