ASMC Admin Panel - API Integration Documentation

This document provides comprehensive documentation for API integration in the ASMC Admin Panel, including RTK Query setup, authentication, error handling, and data flow patterns.

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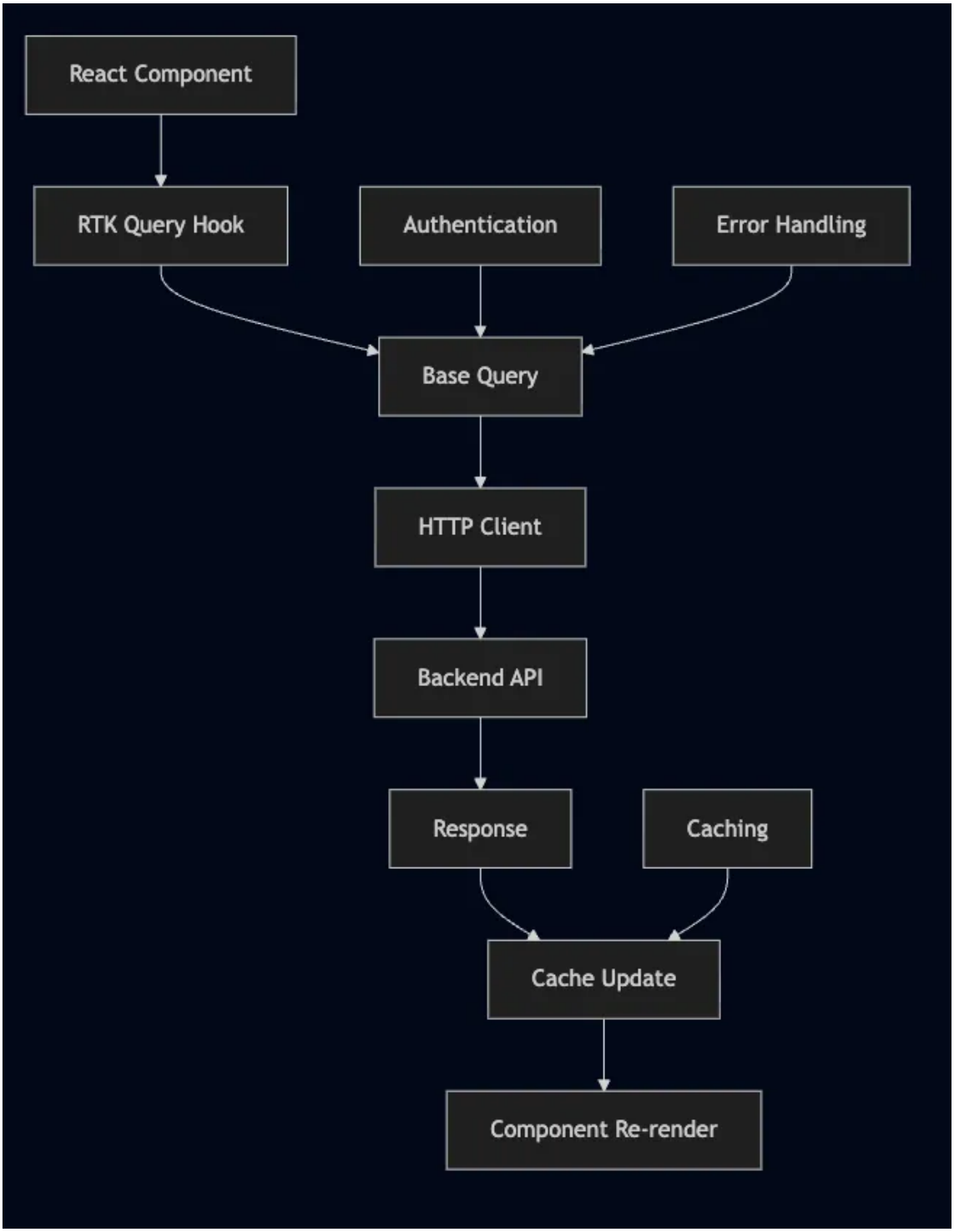
API Integration Overview

Architecture

The admin panel uses RTK Query for API integration, providing:

- **Automatic Caching**: Intelligent caching of API responses
- **Background Refetching**: Automatic data synchronization
- **Optimistic Updates**: Immediate UI updates with rollback
- **Request Deduplication**: Prevents duplicate requests
- **Error Handling**: Centralized error management
- **Type Safety**: Full TypeScript support

Integration Flow



RTK Query Configuration

Base API Configuration

Location: `/src/store/api/baseApi.js`

```
import { createApi, fetchBaseQuery } from '@reduxjs/toolkit/query/react';

const baseQuery = fetchBaseQuery({
    baseUrl: process.env.REACT_APP_API_BASE_URL || '/api',
    prepareHeaders: (headers, { getState }) => {
        // Get token from Redux state
        const token = getState().auth?.token;
        if (token) {
            headers.set('authorization', `Bearer ${token}`);
        }

        // Set content type
        headers.set('content-type', 'application/json');

        // Add CSRF token if available
        const csrfToken = document.querySelector('meta[name="csrf-token"]');
        if (csrfToken) {
            headers.set('X-CSRF-Token', csrfToken.getAttribute('content'));
        }

        return headers;
    },
});

// Enhanced base query with error handling
const baseQueryWithReauth = async (args, api, extraOptions) => {
    let result = await baseQuery(args, api, extraOptions);

    // Handle 401 errors (unauthorized)
    if (result.error && result.error.status === 401) {
        // Try to refresh token
        const refreshResult = await baseQuery(
            {
                url: '/auth/refresh',
                method: 'POST',
                body: { refreshToken: getState().auth?.refreshToken },
            },
            api,
            extraOptions,
        );

        if (refreshResult.data) {
            // Update tokens in state
            api.dispatch(setAuthTokens(refreshResult.data));

            // Retry original request
            result = await baseQuery(args, api, extraOptions);
        } else {
            // Refresh failed, logout user
            api.dispatch(logout());
        }
    }
```

```
    return result;
};

export const baseApi = createApi({
    reducerPath: 'baseApi',
    baseQuery: baseQueryWithReauth,
    tagTypes: [
        'Members',
        'Bookings',
        'Events',
        'Facilities',
        'Staff',
        'Categories',
        'Locations',
        'Plans',
        'Activities',
        'Halls',
        'Reports',
        'Documentation',
    ],
    endpoints: () => ({}),
});
```

API Service Configuration

Location: `/src/helpers/axios.js`

```
import axios from 'axios';
import { store } from '../store';

// Create axios instance
const apiClient = axios.create({
    baseURL: process.env.REACT_APP_API_BASE_URL || '/api',
    timeout: parseInt(process.env.REACT_APP_API_TIMEOUT) || 30000,
    headers: {
        'Content-Type': 'application/json',
    },
});

// Request interceptor
apiClient.interceptors.request.use(
    (config) => {
        const state = store.getState();
        const token = state.auth?.token;

        if (token) {
            config.headers.Authorization = `Bearer ${token}`;
        }

        // Add request timestamp for debugging
        config.metadata = { startTime: new Date() };
```

```
        return config;
    },
    (error) => {
        return Promise.reject(error);
    },
);

// Response interceptor
apiClient.interceptors.response.use(
    (response) => {
        // Calculate request duration
        const duration = new Date() - response.config.metadata.startTime;
        console.log(
            `API Request: ${response.config.method?.toUpperCase()} ${
                response.config.url
            } - ${duration}ms`,
        );

        return response;
    },
    async (error) => {
        const originalRequest = error.config;

        // Handle 401 errors
        if (error.response?.status === 401 && !originalRequest._retry) {
            originalRequest._retry = true;

            try {
                const state = store.getState();
                const refreshToken = state.auth?.refreshToken;

                if (refreshToken) {
                    const response = await axios.post('/api/auth/refresh', {
                        refreshToken,
                    });

                    const { token, refreshToken: newRefreshToken } = response.data;
                    store.dispatch(
                        setAuthTokens({ token, refreshToken: newRefreshToken }),
                    );

                    // Retry original request
                    originalRequest.headers.Authorization = `Bearer ${token}`;
                    return apiClient(originalRequest);
                }
            } catch (refreshError) {
                // Refresh failed, logout user
                store.dispatch(logout());
                window.location.href = '/login';
            }
        }
```

```
        return Promise.reject(error);
    },
);

export default apiClient;
```

Authentication Integration

Authentication API

Location: `/src/store/auth/authApi.js`

```
import { baseApi } from '../api/baseApi';

export const authApi = baseApi.injectEndpoints({
    endpoints: (builder) => ({
        login: builder.mutation({
            query: (credentials) => ({
                url: '/auth/login',
                method: 'POST',
                body: credentials,
            }),
            invalidatesTags: ['User'],
        }),

        logout: builder.mutation({
            query: () => ({
                url: '/auth/logout',
                method: 'POST',
            }),
            invalidatesTags: ['User'],
        }),

        refreshToken: builder.mutation({
            query: (refreshToken) => ({
                url: '/auth/refresh',
                method: 'POST',
                body: { refreshToken },
            }),
        }),

        getProfile: builder.query({
            query: () => '/auth/profile',
            providesTags: ['User'],
        }),

        updateProfile: builder.mutation({
            query: (profileData) => ({
                url: '/auth/profile',
                method: 'PUT',
                body: profileData,
            }),
```

```
            invalidatesTags: ['User'],
        }),

        changePassword: builder.mutation({
            query: (passwordData) => ({
                url: '/auth/change-password',
                method: 'POST',
                body: passwordData,
            }),
        }),
    }),
});

export const {
    useLoginMutation,
    useLogoutMutation,
    useRefreshTokenMutation,
    useGetProfileQuery,
    useUpdateProfileMutation,
    useChangePasswordMutation,
} = authApi;
```

Authentication Hook

Location: `/src/hooks/useAuth.js`

```
import { useDispatch, useSelector } from 'react-redux';
import { useNavigate } from 'react-router-dom';
import {
    useLoginMutation,
    useLogoutMutation,
    useGetProfileQuery,
} from '../store/auth/authApi';
import { setAuthUser, clearAuth } from '../store/auth/authSlice';

export const useAuth = () => {
    const dispatch = useDispatch();
    const navigate = useNavigate();

    const { user, token, isAuthenticated } = useSelector((state) => state.auth);

    const [loginMutation, { isLoading: isLoggingIn }] = useLoginMutation();
    const [logoutMutation, { isLoading: isLoggingOut }] = useLogoutMutation();
    const { data: profile, isLoading: isLoadingProfile } =
useGetProfileQuery(undefined, {
        skip: !isAuthenticated,
    });

    const login = async (credentials) => {
        try {
            const response = await loginMutation(credentials).unwrap();
            const { token, refreshToken, user } = response.data;
```

```
            // Store tokens
            localStorage.setItem('authToken', token);
            localStorage.setItem('refreshToken', refreshToken);

            // Update Redux state
            dispatch(setAuthUser({ user, token, refreshToken }));

            return { success: true, user };
        } catch (error) {
            return { success: false, error: error.data?.message || 'Login failed' };
        }
    };

    const logout = async () => {
        try {
            await logoutMutation().unwrap();
        } catch (error) {
            console.error('Logout error:', error);
        } finally {
            // Clear local storage
            localStorage.removeItem('authToken');
            localStorage.removeItem('refreshToken');

            // Clear Redux state
            dispatch(clearAuth());

            // Navigate to login
            navigate('/login');
        }
    };

    const hasPermission = (permission) => {
        if (!user || !user.permissions) return false;
        return user.permissions.includes(permission);
    };

    const hasRole = (role) => {
        if (!user || !user.roles) return false;
        return user.roles.includes(role);
    };

    return {
        user,
        token,
        isAuthenticated,
        isLoggingIn,
        isLoggingOut,
        isLoadingProfile,
        login,
        logout,
        hasPermission,
        hasRole,
```

```
    };
};
```

API Endpoints

Members API

Location: `/src/store/members/membersApi.js`

```
import { baseApi } from '../api/baseApi';

export const membersApi = baseApi.injectEndpoints({
    endpoints: (builder) => ({
        getMembers: builder.query({
            query: (params = {}) => ({
                url: '/members',
                params: {
                    page: params.page || 1,
                    limit: params.limit || 10,
                    search: params.search,
                    status: params.status,
                    category: params.category,
                    sortBy: params.sortBy,
                    sortOrder: params.sortOrder,
                },
            }),
            providesTags: (result) =>
                result
                    ? [
                          ...result.data.map(({ id }) => ({ type: 'Members', id })),
                          { type: 'Members', id: 'LIST' },
                      ]
                    : [{ type: 'Members', id: 'LIST' }],
        }),

        getMember: builder.query({
            query: (id) => `/members/${id}`,
            providesTags: (result, error, id) => [{ type: 'Members', id }],
        }),

        createMember: builder.mutation({
            query: (memberData) => ({
                url: '/members',
                method: 'POST',
                body: memberData,
            }),
            invalidatesTags: [{ type: 'Members', id: 'LIST' }],
        }),

        updateMember: builder.mutation({
            query: ({ id, ...memberData }) => ({
                url: `/members/${id}`,
```

```
                method: 'PUT',
                body: memberData,
            }),
            invalidatesTags: (result, error, { id }) => [
                { type: 'Members', id },
                { type: 'Members', id: 'LIST' },
            ],
        }),

        deleteMember: builder.mutation({
            query: (id) => ({
                url: `/members/${id}`,
                method: 'DELETE',
            }),
            invalidatesTags: (result, error, id) => [
                { type: 'Members', id },
                { type: 'Members', id: 'LIST' },
            ],
        }),

        getMemberHistory: builder.query({
            query: (id) => `/members/${id}/history`,
            providesTags: (result, error, id) => [{ type: 'Members', id, history: true
}],
        }),

        exportMembers: builder.query({
            query: (params) => ({
                url: '/members/export',
                params,
                responseHandler: (response) => response.blob(),
            }),
        }),

        importMembers: builder.mutation({
            query: (formData) => ({
                url: '/members/import',
                method: 'POST',
                body: formData,
            }),
            invalidatesTags: [{ type: 'Members', id: 'LIST' }],
        }),
    }),
});

export const {
    useGetMembersQuery,
    useGetMemberQuery,
    useCreateMemberMutation,
    useUpdateMemberMutation,
    useDeleteMemberMutation,
    useGetMemberHistoryQuery,
```

```
    useExportMembersQuery,
    useImportMembersMutation,
} = membersApi;
```

Bookings API

Location: `/src/store/booking/bookingApi.js`

```
import { baseApi } from '../api/baseApi';

export const bookingApi = baseApi.injectEndpoints({
    endpoints: (builder) => ({
        getBookings: builder.query({
            query: (params = {}) => ({
                url: '/booking',
                params: {
                    page: params.page || 1,
                    limit: params.limit || 10,
                    status: params.status,
                    facility: params.facility,
                    dateFrom: params.dateFrom,
                    dateTo: params.dateTo,
                    member: params.member,
                },
            }),
            providesTags: (result) =>
                result
                    ? [
                          ...result.data.map(({ id }) => ({ type: 'Bookings', id })),
                          { type: 'Bookings', id: 'LIST' },
                      ]
                    : [{ type: 'Bookings', id: 'LIST' }],
        }),

        getBooking: builder.query({
            query: (id) => `/booking/${id}`,
            providesTags: (result, error, id) => [{ type: 'Bookings', id }],
        }),

        createBooking: builder.mutation({
            query: (bookingData) => ({
                url: '/booking',
                method: 'POST',
                body: bookingData,
            }),
            invalidatesTags: [
                { type: 'Bookings', id: 'LIST' },
                { type: 'Facilities', id: 'LIST' },
            ],
        }),

        updateBooking: builder.mutation({
            query: ({ id, ...bookingData }) => ({
```

```
                url: `/booking/${id}`,
                method: 'PUT',
                body: bookingData,
            }),
            invalidatesTags: (result, error, { id }) => [
                { type: 'Bookings', id },
                { type: 'Bookings', id: 'LIST' },
                { type: 'Facilities', id: 'LIST' },
            ],
        }),

        cancelBooking: builder.mutation({
            query: (id) => ({
                url: `/booking/${id}/cancel`,
                method: 'POST',
            }),
            invalidatesTags: (result, error, id) => [
                { type: 'Bookings', id },
                { type: 'Bookings', id: 'LIST' },
            ],
        }),

        approveBooking: builder.mutation({
            query: (id) => ({
                url: `/booking/${id}/approve`,
                method: 'POST',
            }),
            invalidatesTags: (result, error, id) => [
                { type: 'Bookings', id },
                { type: 'Bookings', id: 'LIST' },
            ],
        }),

        getBookingCalendar: builder.query({
            query: (params) => ({
                url: '/booking/calendar',
                params: {
                    facility: params.facility,
                    date: params.date,
                    view: params.view, // 'day', 'week', 'month'
                },
            }),
            providesTags: ['Bookings'],
        }),
    }),
});

export const {
    useGetBookingsQuery,
    useGetBookingQuery,
    useCreateBookingMutation,
    useUpdateBookingMutation,
```

```
    useCancelBookingMutation,
    useApproveBookingMutation,
    useGetBookingCalendarQuery,
} = bookingApi;
```

Data Flow Patterns

Component Integration Pattern

```
import React, { useEffect, useState } from 'react';
import {
    useGetMembersQuery,
    useCreateMemberMutation,
    useUpdateMemberMutation,
    useDeleteMemberMutation,
} from '../store/members/membersApi';

const MembersManager = () => {
    const [filters, setFilters] = useState({
        search: '',
        status: 'all',
        page: 1,
        limit: 10,
    });

    // RTK Query hooks
    const {
        data: membersData,
        isLoading,
        isError,
        error,
        refetch,
    } = useGetMembersQuery(filters);

    const [createMember, { isLoading: isCreating }] = useCreateMemberMutation();
    const [updateMember, { isLoading: isUpdating }] = useUpdateMemberMutation();
    const [deleteMember, { isLoading: isDeleting }] = useDeleteMemberMutation();

    // Derived data
    const members = membersData?.data || [];
    const pagination = membersData?.pagination || {};

    // Event handlers
    const handleCreateMember = async (memberData) => {
        try {
            await createMember(memberData).unwrap();
            // Success notification will be handled by global error middleware
        } catch (error) {
            console.error('Failed to create member:', error);
        }
    };
```

```
    const handleUpdateMember = async ({ id, ...memberData }) => {
        try {
            await updateMember({ id, ...memberData }).unwrap();
        } catch (error) {
            console.error('Failed to update member:', error);
        }
    };

    const handleDeleteMember = async (id) => {
        try {
            await deleteMember(id).unwrap();
        } catch (error) {
            console.error('Failed to delete member:', error);
        }
    };

    const handleFilterChange = (newFilters) => {
        setFilters((prev) => ({ ...prev, ...newFilters }));
    };

    if (isError) {
        return <div>Error: {error?.data?.message || 'Failed to load members'}</div>;
    }

    return (
        <div>
            <MembersFilters filters={filters} onFilterChange={handleFilterChange} />

            <MembersTable
                members={members}
                loading={isLoading}
                onEdit={handleUpdateMember}
                onDelete={handleDeleteMember}
                pagination={pagination}
            />

            <CreateMemberModal onSubmit={handleCreateMember} loading={isCreating} />
        </div>
    );
};
```

Optimistic Updates

```
import { membersApi } from '../store/members/membersApi';

// Optimistic update example
const updateMemberOptimistic = membersApi.useUpdateMemberMutation({
    // Optimistic update
    onQueryStarted: async ({ id, ...patch }, { dispatch, queryFulfilled }) => {
        // Optimistic update
        const patchResult = dispatch(
            membersApi.util.updateQueryData('getMembers', undefined, (draft) => {
```

```
                const member = draft.data.find((m) => m.id === id);
                if (member) {
                    Object.assign(member, patch);
                }
            }),
        );

        try {
            await queryFulfilled;
        } catch {
            // Rollback on error
            patchResult.undo();
        }
    },
});
```

Error Handling

Global Error Middleware

Location: `/src/store/middleware/errorMiddleware.js`

```
import { createListenerMiddleware } from '@reduxjs/toolkit';
import { setNotification } from '../common/commonSlice';

export const errorMiddleware = createListenerMiddleware();

// Listen for rejected async actions
errorMiddleware.startListening({
    predicate: (action) => action.type.endsWith('/rejected'),
    effect: async (action, listenerApi) => {
        const { dispatch } = listenerApi;

        // Extract error information
        const error = action.payload;
        const errorMessage =
            error?.data?.message || error?.message || 'An error occurred';
        const statusCode = error?.status;

        // Handle different error types
        switch (statusCode) {
            case 400:
                dispatch(
                    setNotification({
                        message: errorMessage,
                        severity: 'warning',
                    }),
                );
                break;

            case 401:
                dispatch(
```

```
                setNotification({
                    message: 'Session expired. Please login again.',
                    severity: 'error',
                }),
            );
            // Logout will be handled by auth interceptor
            break;

        case 403:
            dispatch(
                setNotification({
                    message: 'Access denied. You do not have permission.',
                    severity: 'error',
                }),
            );
            break;

        case 404:
            dispatch(
                setNotification({
                    message: 'Resource not found.',
                    severity: 'warning',
                }),
            );
            break;

        case 422:
            // Validation errors
            if (error.data?.errors) {
                dispatch(
                    setNotification({
                        message: 'Please check your input and try again.',
                        severity: 'warning',
                    }),
                );
            } else {
                dispatch(
                    setNotification({
                        message: errorMessage,
                        severity: 'warning',
                    }),
                );
            }
            break;

        case 500:
            dispatch(
                setNotification({
                    message: 'Server error. Please try again later.',
                    severity: 'error',
                }),
            );
```

```
                break;

            default:
                dispatch(
                    setNotification({
                        message: errorMessage,
                        severity: 'error',
                    }),
                );
        }

        // Log error for debugging
        console.error('API Error:', {
            action: action.type,
            error: error,
            timestamp: new Date().toISOString(),
        });
    },
});
```

Component-Level Error Handling

```
import React from 'react';
import { Alert, Button, Box } from '@mui/material';
import { useGetMembersQuery } from '../store/members/membersApi';

const MembersList = () => {
    const { data: members, isLoading, isError, error, refetch } =
useGetMembersQuery();

    if (isError) {
        return (
            <Box>
                <Alert
                    severity="error"
                    action={
                        <Button color="inherit" size="small" onClick={() =>
refetch()}>
                            Retry
                        </Button>
                    }
                >
                    Failed to load members: {error?.data?.message || error?.message}
                </Alert>
            </Box>
        );
    }

    if (isLoading) {
        return <div>Loading members...</div>;
    }
```

```
    return (
        <div>
            {members?.data?.map((member) => (
                <div key={member.id}>{member.name}</div>
            ))}
        </div>
    );
};
```

Caching Strategies

Cache Configuration

```
export const membersApi = createApi({
    // ... other config
    endpoints: (builder) => ({
        getMembers: builder.query({
            query: (params) => ({
                url: '/members',
                params,
            }),
            // Cache for 5 minutes
            keepUnusedDataFor: 300,
            // Refetch on window focus
            refetchOnFocus: true,
            // Refetch on reconnect
            refetchOnReconnect: true,
            providesTags: ['Members'],
        }),
    }),
});
```

Manual Cache Management

```
import { useDispatch } from 'react-redux';
import { membersApi } from '../store/members/membersApi';

const useCacheManagement = () => {
    const dispatch = useDispatch();

    const invalidateMembersCache = () => {
        dispatch(membersApi.util.invalidateTags(['Members']));
    };

    const updateMemberInCache = (memberId, updates) => {
        dispatch(
            membersApi.util.updateQueryData('getMembers', undefined, (draft) => {
                const member = draft.data.find((m) => m.id === memberId);
                if (member) {
                    Object.assign(member, updates);
                }
```

```
            }),
        );
    };

    const removeMemberFromCache = (memberId) => {
        dispatch(
            membersApi.util.updateQueryData('getMembers', undefined, (draft) => {
                draft.data = draft.data.filter((m) => m.id !== memberId);
            }),
        );
    };

    return {
        invalidateMembersCache,
        updateMemberInCache,
        removeMemberFromCache,
    };
};
```

Performance Optimization

Request Deduplication

RTK Query automatically deduplicates identical requests:

```
// Multiple components can call this simultaneously
// Only one request will be made
const { data: members } = useGetMembersQuery({ page: 1, limit: 10 });
const { data: members2 } = useGetMembersQuery({ page: 1, limit: 10 }); // Same request
```

Conditional Queries

```
const MembersComponent = ({ shouldFetch, memberId }) => {
    // Only fetch when conditions are met
    const { data: members } = useGetMembersQuery(undefined, {
        skip: !shouldFetch,
    });

    const { data: member } = useGetMemberQuery(memberId, {
        skip: !memberId,
    });

    return <div>{/* Component JSX */}</div>;
};
```

Polling and Real-time Updates

```
// Poll every 30 seconds
const { data: members } = useGetMembersQuery(undefined, {
    pollingInterval: 30000,
});
```

```
// Poll with conditional logic
const { data: members } = useGetMembersQuery(undefined, {
    pollingInterval: (data, query) => {
        // Stop polling if no data or error
        return data?.length === 0 ? 30000 : 0;
    },
});
```

Background Refetching

```
const { data: members } = useGetMembersQuery(undefined, {
    // Refetch when window regains focus
    refetchOnFocus: true,
    // Refetch when network reconnects
    refetchOnReconnect: true,
    // Refetch when component mounts
    refetchOnMountOrArgChange: true,
});
```

Summary

The ASMC Admin Panel's API integration provides:

- **Seamless Integration**: RTK Query for efficient API management
- **Authentication**: JWT-based auth with automatic token refresh
- **Error Handling**: Comprehensive error management and user feedback
- **Caching**: Intelligent caching with background updates
- **Performance**: Request deduplication and optimistic updates
- **Type Safety**: Full TypeScript support for API responses

This architecture ensures reliable, performant, and maintainable API integration for the admin panel.

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